2st Edition

ICS Congress Newsletter

39th Annual Meeting – San Francisco, USA

29 September – 3 October 2009

Melting Pot San Francisco

The Opening Ceremony was a popular event

SAN FRANCISCO – After ten years, the annual meeting of the International Continence Society (ICS) finally returned to the USA. With great success: 2475 participants from all over the world found their way to San Francisco. This is why the city is a well-chosen venue – San Francisco is famous for being a melting pot of cultures.

To do it justice, the Opening Ceremony of the 37th annual meeting provided a wide range of culinary and cultural highlights: Californian fish and seafood, Chinese Dim Sum, Japanese Sushi, Napa Valley wine and cheese were placed on different food stations. Of course, nobody wanted to miss this possibility, so there was a huge rush in the San Francisco City Hall, where the Opening ceremony took place.

Beautiful athmosphere

The San Francisco City Hall was open for all participants the whole evening. The building was first open to public in 1915. Its dome, which owes much to Mansart's Baroque dome of Les Invalides, Paris, is the fifth largest dome in the world. The City Hall was build by Arthur Brown Jr. who also designed San Francisco's War Memorial Opera House, Veterans Building, Temple Emanuel, Coit Tower and the Federal office building at 50 United Nations Plaza.

Chinese Dragon in the San Francisco City Hall

Historical building

In its open space area in the city's Civic Center there is a Beaux-Arts monument dedicated to the brief „City Beautiful" movement that epitomized the high-minded American Renaissance of the period 1880–1917. The present building is actually a replacement for an earlier City Hall that was completely destroyed during the 1906 Earthquake ■

A lot of people came to the Opening Ceremony.

Index

BIERMANN

Biermann Verlag GmbH
Otto-Hahn-Str. 7
D-50997 Köln
Phone: (+49) 22 36 / 376-0
Fax: (+49) 22 36 / 376-999

Publisher:
Dr. Hans Biermann

Editor-in-Chief:
Dieter Kaulard

Editors:
Martin Fleischmann
E-Mail: mf@biermann.net
Birgit Grodotzki,

Graphics Artist:
Ursula Klein

Advertising / Product Manager:
Thijs van Egeraat
Phone: (+49) 22 36 / 376-526,
Fax: (+49) 22 36 / 376-477
E-Mail: tve@biermann.net

Retrospect: Building ICS

Growing interest increases the need for a scientific society

SAN FRANCISCO – There was considerable growing world-wide interest in bladder and anorectal function and dysfunction in the first half of the 20th century. There was also a growing interest in the use of electrical stimulation to improve continence of urine and bowel.

Lack of agreement on terminology meant that many workers were just talking past each other and the need for standardisation was apparent. There was an enthusiasm to increase international collaboration. Many units found enormous value in interdisciplinary collaboration between clinicians and engineers.

It was against this background that Eric Glen received warm support when he proposed establishing the Continent Club, the precursor of ICS. His project resulted from a light-hearted conversation when visiting Professor Aboulker in Paris. Peter Gammelgaard in Copenhagen, Peter Caldwell in Exeter, and Richard Turner Warwick in London, supported the proposal, and Peter Caldwell agreed to preside over the first meeting, which was held in Exeter in 1971. With Peter as president, Shedden Alexander, a Glasgow surgeon, as vice-president and Eric as organizing secretary, the meeting was attended by over 50 participants from several countries, and it was hailed as a great success both socially and scientifically. At the business meeting, members decided to change the name to International Continence Society.

At the same meeting Dr Smeekes from The Hague, emphasised the importance of standardising the nomenclature used in urodynamics.

At the third ICS conference held in Copenhagen in 1973, Tage Hald was elected first chairman of the ICS Standardisation Committee. His committee published the first ICS reports between 1976 and 1981. The society has gone on to publish many reports and retains the copyright enabling them to be published in a range of international journals.

Around 1977, recognizing the great increase in members from North America, a number of whom were members of the Urodynamics Society (UDS, later renamed the Society for Urodynamics and Female Urology or SUFU), Norman Zinner proposed that ICS should hold a joint meeting with UDS. Members agreed, and the first joint meeting was held in Los Angeles in 1980, chaired by Norman. Subsequent joint meetings were held in Aachen, 1983, and Boston, 1986.

It was decided at the Exeter meeting in 1971, that the ICS should have neither a permanent president nor chairman, but that the chairman would change each year and the post be held by the host for the annual scientific meeting. Continuity was provided by the Honorary Secretary whose term of office was not limited at first. Eric Glen served from 1971 to 1985. The second General Secretary Paul Abrams, served from 1985 to 2003.

Since then the ICS has grown from strength to strength, boasting a membership of over 2000 from 80 different countries covering many disciplines including physicians, surgeons, nurses, physicists, physiotherapists, bio-engineers and scientists. ICS became a registered UK Charity in 1998.

At the 2008 AGM after an extensive review, the leadership structure was changed once more. A large Board of Trustees was selected to lead the society, chaired by the General Secretary. There were many changes to the Articles and Bylaws. Terms of office-bearing were limited to 3 years. The aims of these changes were to reflect the wishes of the Membership for greater democracy with much shorter terms of office and rotating positions.

More material is required for the ICS History project and the Society archives currently being assembled. Some have promised to contribute photos, and memories of interest. It's not too late and the authors would appreciate any further contributions.

Authors:
Ted Arnold, Eric Glen and Norman Zinner

Is cost the achilles heel of posterior tibial nerve stimulation?

A cost minimisation comparison with antimuscarinic therapy in the management of OAB

LONDON – Overactive Bladder (OAB) syndrome, defined as 'urgency with or without urge incontinence, usually with frequency and nocturia', is a prevalent condition which is known to adversely affect Quality of Life (QoL).

The overall prevalence in individuals 40 years and above is estimated to be 16.6% and increases with age. Frequency is the most commonly reported symptom (85%) whilst 54% complained of urgency and 36% urge incontinence.

Anti-muscarinic drug therapy, in conjunction with behavioural therapy such as bladder retraining, remains the first line management of patients with OAB symptoms. However, whilst medical therapy is known to be effective, compliance and persistence with medication is often affected by the bothersome antimuscarinic adverse effects of dry mouth, constipation, somulence and blurred vision.

Those patients with intractable symptoms who have failed to respond to oral antimuscarinic therapy remain a therapeutic challenge. Whilst Botulinum Toxin, Sacral Nerve Stimulation (SNS) and reconstructive urological surgery remain efficacious in well selected patient groups both morbidity and cost remain high. Consequently there remains a need for a cost effective alternative for those patients who have failed medical therapy.

Stimulation of the posterior tibial nerve in patients with urge incontinence was first reported in 1983 and has also been proposed for pelvic floor dysfunction. The tibial nerve is a mixed nerve containing L4-S3 fibres and originates from the same spinal cord segments as the innervation to the bladder and pelvic floor. Consequently peripheral neural modulation may have a role in the management of urinary symptoms.

In a prospective multicentre study 35 patients with urge incontinence underwent 12 weekly sessions of Posterior Tibial Nerve Stimulation (PTNS) with 70% of patients reporting a greater than 50% reduction in urinary symptoms and 46% being completely cured. More recently a prospective randomised multicentre North American study has been reported comparing PTNS with tolterodine 4mg ER in 100 patients. Overall there was an improvement in 75% of patients with PTNS compared to 55.8% with tolterodine ER and there was a significant improvement in QoL in both groups.

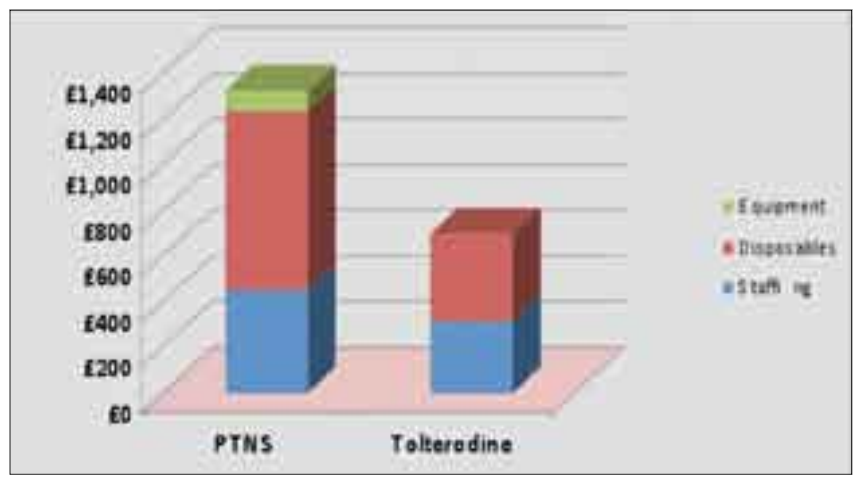


Fig. 1: Cost minimisation comparison at 1 year

A cost minimisation model was developed in order to compare the cost-utility of PTNS and tolterodine ER 4mg od in the management of OAB patients (Table 1). The cost comparison was based on both a one and two year follow-up period from the perspective of the NHS. Equal efficacy for the two treatments was assumed based on the available evidence in terms of urinary symptoms and QoL.

For the PTNS model the cost of treatment was estimated using standard NHS sources for equipment and disposables (Urgent PC, Uroplasty) (Fig. 1) whilst the lifespan of the device was estimated to be 5 years. This allowed calculation of the annual equivalent cost (amortisation) and an estimate of equipment cost per use. The treatment algorithm was comprised of 12 weekly visits over an initial three month period and subsequent maintenance therapy of one treatment session per month. It was assumed that 50 patients would be treated per year, each visit would last 30 minutes, and staff costing was based on a specialist nurse salary.

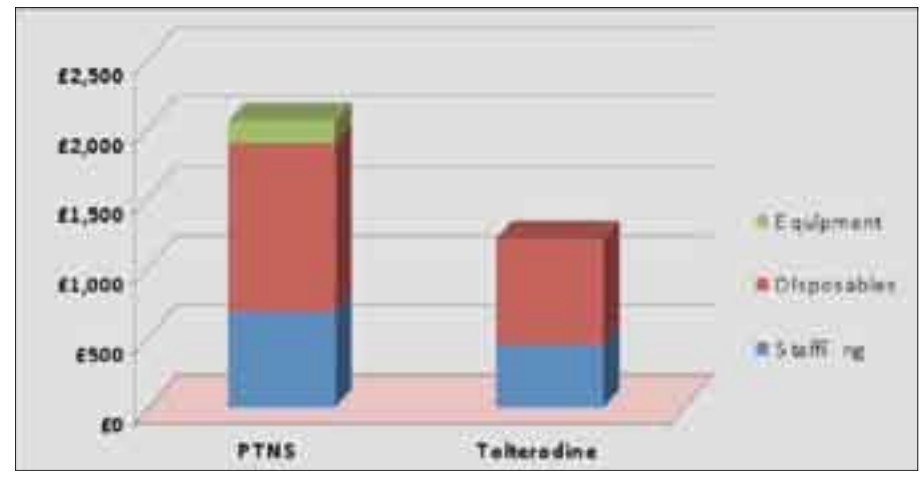


Fig. 2: Cost minimisation comparison at 2 years


ROBINSON (4)
Dudley Robinson

For the antimuscarinic model drug costs were estimated using the national NHS prescriptions tariff (BNF 57, March 2009) for tolterodine ER 4mg od. Subsequent follow up visits were assumed to be three monthly in the first year and six monthly in the second and were priced using the NHS tariff.

The model was designed to allow input variables to be changed dependent on costs and medical care models used. Using the standard model cost minimisation comparison at 1 year found antimuscarinic therapy to be cheaper than PTNS (£696.00 and £1324.00 respectively; difference - £628.00) [Figure 2]. However when considering the results over 2 years the difference in cost between the two treatments is slightly reduced (£2055.00 and £1215.00 respectively; difference - £840.00) [Figure 3] reflecting the lower costs associated with maintenance therapy rather than the initial treatment. Consequently over 1 year PTNS treatment is 47.4% more expensive than antimuscarinic therapy whilst over 2 years this is reduced to 40.9%.

The majority of cost in the PTNS model is composed of staffing and disposable costs. Consequently reducing the frequency of maintenance visits to six weekly lowers the costs for PTNS over the 2 year model to £1622.00 although this may have an effect on efficacy. Alternatively a 50% reduction in the price of consumables would reduce the cost of PTNS to £1501.00 making it 19.1% more expensive than antimuscarinic therapy.

Equally the antimuscarinic model is very sensitive to changes in the cost of medication. A 50% increase in drug tariff would increase overall antimuscarinic costs to £1588.00 over two years – 19.8% cheaper than PTNS. Conversely a reduction in cost of medication by 50% (such as using generic medication) would mean drug treatment was 57.5% cheaper.

The evidence from this cost minimisation analysis would suggest that antimuscarinic therapy remains cheaper than PTNS in women with OAB. However there is a trend to reduced costs in the PTNS arm over time as the initial outlay for equipment is offset suggesting that therapy may become more cost effective in the longer term. The mo-

continued on page 3

continued from page 2

del is also sensitive to change and allows modelling to be tailored to different clinical situations. Clearly reducing the cost of medication, by using a generic preparation, has a significant effect on price comparisons and will further reduce the relative cost of the antimuscarinic model.

Fig. 3: UPC200 hand 2

In conclusion, based on this cost minimisation analysis PTNS would appear to be more expensive than antimuscarinic therapy and should be reserved as a second line therapy for those patients who are unable to tolerate antimuscarinic therapy or who have intractable OAB symptoms prior to considering sacral neuromodulation or intravesical Botulinum Toxin. ■

PTNS	Value	Range	Tolterodine	Value	Range
Equipment Cost	£960.00	£700-£1200	Daily drug cost	£1.04	£0.50-£2.50
Life-span	5	1-5	OPD Cost	£79.00	£50-£150
Patients per annum	50	50-200	OPD Visits Yr1	4	1-7
Disposable lead	£37.00	£20-£50	OPD Visits Yr2	2	1-4
Hourly nursing cost	£43.00	£20-£60			
Initial Treatments	12	6-20			
Maintenance Yr1	9	5-15			
Maintenance Yr2	12	6-18			
Duration of visit (hrs)	0.5	0.2-1.0			

Table 1: Model inputs for cost minimisation comparison for PTNS and

Authors:
[1]Dudley Robinson, [2]Jacklin P, [1]Cardozo L.
[1]Dept of Urogynaecology, Kings College Hospital, London, UK
[2]National Collaborating Centre for Women's and Children's Health. London. UK

Session 26 (Poster) - Neuromodulation (Basic & Clinical), Saturday 3rd October, 13:30-14:30, Hall D

References

ABRAMS P, CARDOZO L, FALL M, GRIFFITHS D, ROSIER P, ULMSTEN U et al. The standardisation of terminology of lower urinary tract function. Report from the standardisation committee of the International Continence Society. Neurourol Urodynam 2002;21:167-178.
KELLEHER CJ, CARDOZO LD, KHULLAR V, SALVATORE S. A new questionnaire to assess the quality of life of urinary incontinent women. Br J Obstet Gynaecol 1997;104:1374-1379.
MILSOM I, ABRAMS P, CARDOZO L, ROBERTS RG, THUROFF J, WEIN AJ. How widespread are the symptoms of overactive bladder and how are they managed? A population-based prevalence study. BJU Int 2001;87(9):760-766.
KELLEHER CJ, CARDOZO LD, KHULLAR V, SALVATORE S. A medium-term analysis of the subjective efficency of treatment for women with detrusor instability and low bladder compliance. Br. J. Obstet. Gynaecol. 1997;104:988-993.
MCGUIRE EJ, SHI-CHUN Z, HORWINSKI ER et al. Treatment of motor and sensory detrusor instability by electrical stimulation. J Urol 1983;129:78.
STOLLER ML. Afferent nerve stimulation for pelvic floor dysfunction. Eur Urol 1999;135:32.
VANDONINICK V, VAN BALKEN MR, FINAZZI AGRO E, PETTA F, CALTRAGIRONE C, HEESAKKERS JPFA, KIERNENEY LALM, DEBRUYNE FMJ, BERNELMANS BLH. Posterior tibial nerve stimulation in the treatment of urge incontinence. Neurourol Urodyn 2003;22:17-23.
PETERS KM, LEONG FC, SHOBERI SA, MACDIARMID SA, ROVNER ES, WOOLDRIDGE LS, SIEGEL SW, TATE SS, JARNAGIN BK, ROSENBLATT PL, FEAGINS BA. A randomised multicentre study comparing percutaneous tibial nerve stimulation with pharmaceutical therapy for the treatment of overactive bladder. Poster presentation. AUA, Orlando, Florida. 2008

Treating sphincteric incontinence and bladder wall defect

Bone marrow mesenchymal stromal cells display a smooth muscle phenotype which is enhanced by tgfb1

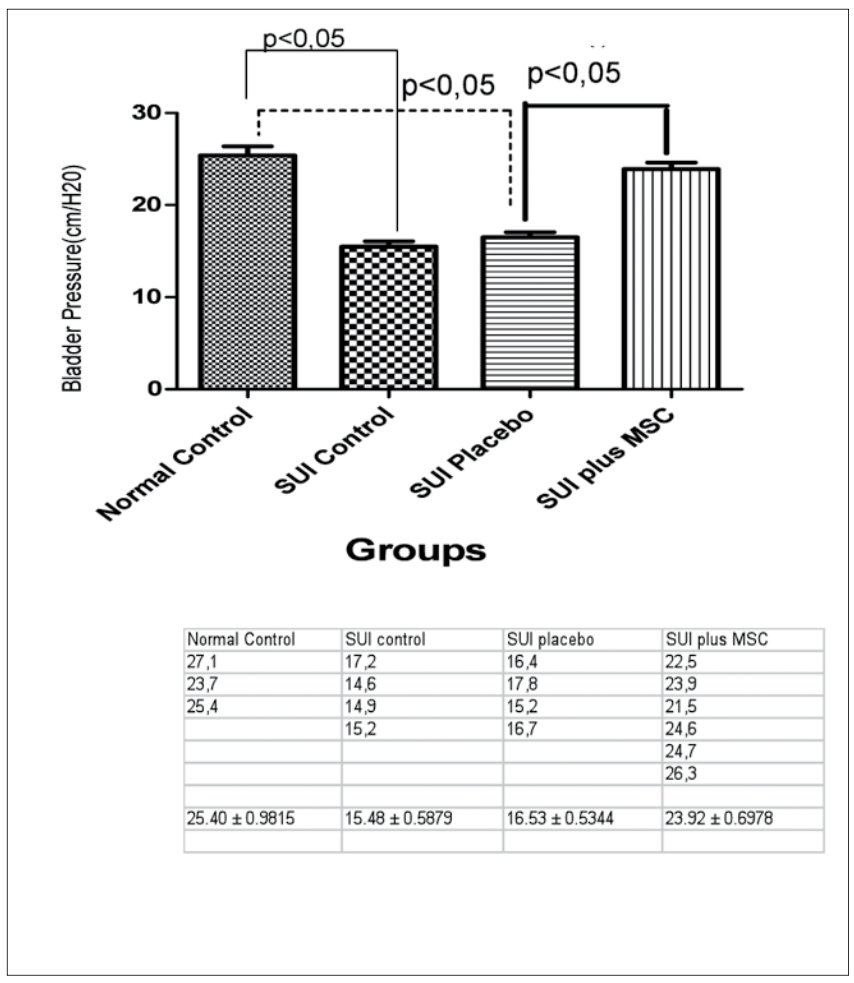
MONTREAL – Marrow derived mesenchymal stromal cells (MSCs) possess mesenchymal plasticity making them ideal candidates for regenerative medicine applications for repair of damaged tissues. We propose that MSCs can be harvested, ex vivo expanded and subsequently utilized for uroregenerative purposes.

In particular, to functionally replace in vivo the external sphincter and detrusor muscle. The initial step to attain this objective was to harvest rat bone marrow cells, isolate MSCs and ascertain their basal smooth muscle cell-like (SMC) phenotype, and develop a culture method to enhance in vitro differentiation into SMCs. The second step involved the injection of the MSCs into an animal model of stress urinary incontinence (SUI) and the measurement of their improvement using leak point pressure (LPP) recordings.

Materials and methods

Femoral and tibial bones were collected from a normal female Sprague-Dawley (SD) rat and all nucleated marrow cells were isolated from bone marrow and resuspended in Dulbecco's Modified Eagle's Medium (DMEM) and 10% fetal bovine serum (FBS). Marrow cells were maintained at 37 C in a humidified atmosphere of 5% carbon dioxide. Non-adherent cells (hematopoietic cells) were discarded at first week. Adherent mesenchymal stem cells (MSCs) were subsequently passaged when they achieved 80% confluence. The phenotype of cultured MSCs (passage 6) was verified by flow cytometry for expression of cell surface markers and mesenchymal plasticity by use of differentiation media. For enhancement of SMC differentiation, MSC culture media was supplemented with 1ng/ml TGFb1. Subsequent to a 14 day treatment, SMC phenotype was ascertained by immunofluorescence staining for smooth muscle cells markers (calponin, smooth muscle a-actin (SMA) and desmin). Western blots were performed on differentiated and undifferentiated MSC protein lysates for expression of calponin, SMA and desmin.

We separated 17 female SD rats into 4 groups. Three rats were used as normal control and 14 underwent bilateral pudendal nerve transaction to create an animal model of SUI. 4 of these were SUI control rats, 4 underwent periurethral injection with Plasma Lyte (SUI placebo control) and 6 underwent periurethral injection of PKH 26 labeled MSCs. Four weeks after injection, conscious cystometrogram for each animal was performed and valsalva LPP was recorded.



Normal Control	SUI control	SUI placebo	SUI plus MSC
27,1	17,2	16,4	22,5
23,7	14,6	17,8	23,9
25,4	14,9	15,2	21,5
	15,2	16,7	24,6
			24,7
			26,3
25.40 ± 0.9815	15.48 ± 0.5879	16.53 ± 0.5344	23.92 ± 0.6978

Fig. 1: Leak point pressure measurement

Results

Tissue culture dish adherent rat MSCs have a doubling time of 48-56 hours. Cytometric analysis of these cells was performed. Cells were positive for the following cell surface antigens: CD44, CD73, CD90, RT1A, and negative for: CD31, CD45, and RT1B. Immunofluorescence microscopic analysis of MSCs revealed that undifferentiated and TGFb1-treated rat MSCs express calponin. However, only the TGFb1-treated MSC expressed SMA and desmin. The immunohistology results were validated using Western Blot analysis of cell lysates. The PKH 26 labelled MSCs injected periurethrally were found in situ and remained at the site of injection on pathology assessment. The LPP measurements were statistically significantly different between SUI placebo controls (4) and SUI injected with MSCs (6) ($p<0.05$). (Fig.1)

CORCOS I2

Jacques Corcos

Interpretation of results

Rat mesenchymal stromal cells express calponin. TGFb1 treatment of rat MSCs skewed their phenotype towards that of true SMCs as demonstrated by upregulation of SMA and desmin expression. PKH 26 labelled MSCs injected periurethrally in an animal model of SUI significantly improved the valsalva LPP

Concluding message

We propose that MSCs may be of use in uroregenerative medicine applications and future experiments will involve the use of scaffolds for in vivo MSCs tissue replacement. ■

Author:
Jacques Corcos
Surgery, Department, McGill University, Montreal
e-mail: jacques.corcos@mcgill.ca

Session 13 (Poster) - Physiology, Friday 2nd October, 11:00-12:30, Hall B

5K Fun Run

Busses will depart from the Moscone Center at 06:30 prompt. Arrivals back at the Moscone Center will be at 08:30.

The ICS fun run will take place on a specially designed flat route along San Francisco Bay starting and ending at East Beach in the eastern end of Crissy Field in the crisp, fresh morning air. The route is a circuit and has the Golden Gate Bridge in view ahead of us and the sea to the right. We turn around at Ft. Point underneath the Golden Gate Bridge and return to the finishing point near where we started. ■

Saturday 3rd October 2009, 07:00

Safe mesh overlag in vaginal POP repair

System for pelvic organ prolapse repair

KIBUZ/LILLE – The introduction of surgical mesh into vaginal surgery for pelvic organ prolapsed (POP) repair reduced failure rates to 5-12%.[1]

Those techniques are based on trocar passage through the obturator foramen or the ischio rectal fossa, with reported complications of visceral (rectal or bladder) or blood vessel injury.[2]

The EndoFast Reliant™ system (Endogun Medical Systems Ltd., Israel) is based on novel technology that enables soft tissue attachment of mesh for reinforcement of the vaginal walls without the need of trocar passage. The system consists of a fixation device that deploys spider fasteners through a mesh (Fig 1). The deployed fasteners can support an average weight of 1.0 kg each.[3]

Objective and Methods

The objectives of our prospective study were to evaluate safety and outcome of this novel technology over one year period. This multicenter study was approved by the local ethics committees and regulatory bodies and all patients signed an informed consent. Patients were recruited for the study between March 2007 and June 2008. We included patients with symptomatic POP that needed surgical repair, without the need for a hysterectomy. The study population consisted of 20 female patients with vaginal wall prolapse in their anterior and/or posterior compartments. Their mean age was 61.2 years (range 34.2-79.2), and mean BMI was 25.9 (range: 21.6 – 29.0). Based on preoperative screening, 18/20 patients presented with cystocele (90%), 8/20 patients with rectocele (40%) and 8/20 patients with enterocele (40%). 10 out of 20 patients presented with a variety of defect types (50%).

Preoperative evaluation

All patients underwent a preoperative evaluation that included physical examination, vaginal examination based on POP-Q system, answering questionnaires regarding their symptoms (PFDI–20 questionnaire) and sexual function assessment (FSFI questionnaire). Patients' follow-up was carried out at 2 weeks, 3 months, 6 months and 1 year post-operatively, using the same measures that were evaluated at the pre-operative visit. To evaluate possible migration of the fasteners, the patients underwent radiographs of the bony pelvis prior to discharge and 3 months post-operatively.

Surgical procedure

All surgeons from the three centers who took part in this study had cadaver training prior to surgery, in order to learn the technique and to be familiar with the new technology. The surgical procedures were performed under general or regional anesthesia.

Anatomic landmarks

The procedure involved deep dissection between the vaginal epithelium and the underlying viscera. A pre cut mesh (either posterior or anterior mesh) was inserted into the surgical field and four fasteners were deployed through the mesh straps into the connective tissue. The anatomical landmarks that were used for fasteners' attachment were adjacent to the Ischial spines (proximal straps) and obturator internus muscle (distal straps) for anterior compartment, and adjacent to the Ischiac spines (proximal straps) and Puborectalis (distal straps) for posterior compartment. The vaginal epithelium was closed without trimming vaginal excess. At the end, Foley catheter and vaginal pack are left for 24 hours.

Final results

20 patients underwent 32 vaginal wall reinforcement procedures (12 cases of double compartment correction) using the EndoFast Reliant™ system. Data has been collected for 20 patients. Mean age was 61.2 years +/- 11.7 (range 34.2-79.2) and mean BMI was 25.9 +/- 3.9 (range: 21.6 – 29.0). Based on pre-operative screening, 18/20 patients presented with cystocele (90%), 8/20 patients with rectocele (40%) and 8/20 patients with enterocele (40%). Ten out of 20 patients presented with a variety of defect types (50%).

There were no intra-operative complications and up to discharge, no major complications were observed and no blood transfusions were needed. During follow up period, no mesh erosion was noted.

continued on page 5

continued from page 4

No detachment or migration of fasteners was observed. One case of misplacement of a single fastener was observed due to dyspareunia, which was removed under local anesthesia. Two cases of de novo SUI occurred (10%), of which one was treated surgically

Prolapse resolved in 100 % of our patients at 3 months (Grade 0 or 1) and in 90% at 6 and 12 months (2 patients of 20 had asymptomatic grade 2 prolapse). We observed significant improvement in pelvic floor symptoms (PFDI score) that were related to bulging (4.1 to 0.1, p<0.01) but not to bladder (1.4 to 0.2, p=0.067) or to rectum (0.3 to 0.3, p=0.8) symptoms.

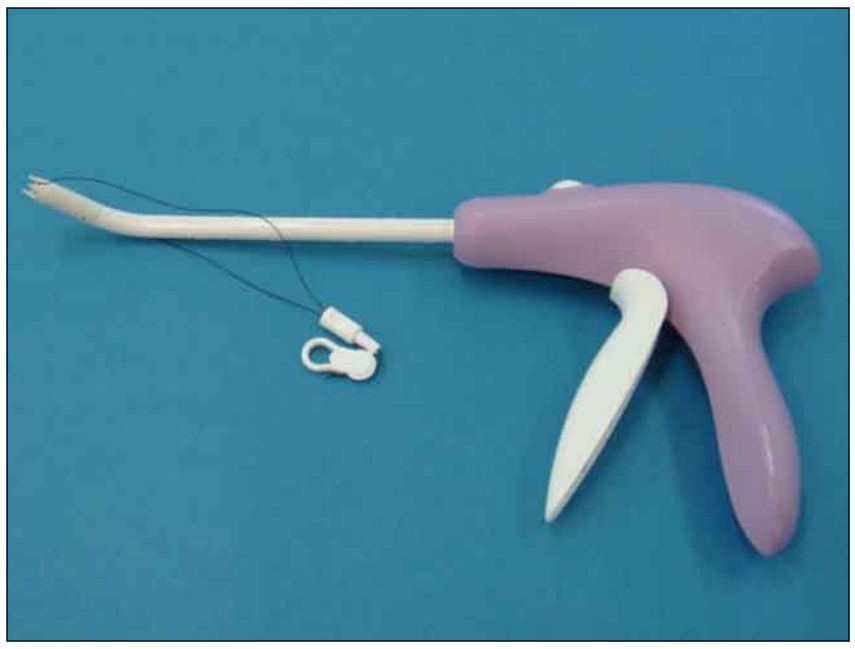


Fig. 1: Fixation Device

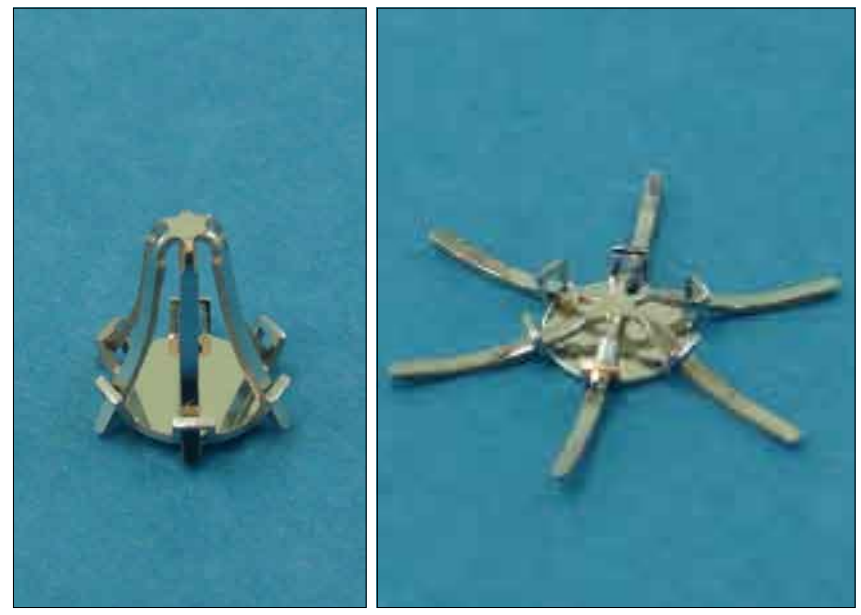


Fig. 2: Spider Fastener™ in unemployed (left) and deployed (right) configurations.

Sexual function did not change significantly during 6 and 12 months with respect to the domains of arousal, lubrication, orgasm and satisfaction. Pain during intercourse decreased from a mean score of 3.6 at screening to a mean score of 5.2 at 12 months.

Overall physician satisfaction was high (very satisfied and somewhat satisfied: 95.0%) and the procedure was perceived as safe by the physicians (very satisfied and somewhat satisfied – 100.0%).

Conclusion

The EndoFast Reliant™ system enables safe mesh overlay in vaginal POP repair. The low morbidity, maintenance of anatomical correction for one year and significant symptom improvement makes it an attractive option for prolapse repair. ■

Authors:
[1] Menachem Alcalay, [2]Miron Livneh, [3]Michel Cosson, [3] Jean-Philippe Lucot , [4]Peter Von Theobald
[1]Department of Obstetrics and Gynecology, Chaim Sheba Medical Center, Israel
[2]Endogun Medical Systems, Kibutz Haogen, Israel
[3]Department of Obstetrics and Gynecology,CHRU de Lille, Lille, France
[4]Department of Obstetrics and Gynecology, CHU de Caen, Caen, France

Non-Discussion-Poster

References

1. FEINER B, JELOVSEK JE, MAHER C. Efficacy and safety of transvaginal mesh kits in the treatment of prolapse of the vaginal apex: a systematic review. BJOG. 2009 Jan;116(1):15-24.

2. SUNG VW et al – the Society of Gynecologic Surgeons Systematic Review Group. Graft use in transvaginal pelvic organ prolapse repair: a systematic review. Obstet Gynecol. 2008, 112(5):1131-42.

3. ALCALAY M, LIVNEH M, SHIDLOVSKY D, HOD E. Pullout force of polypropylene mesh deployed by EndoFast Reliant fastener - a comparative study in a sheep model. ICS abstract, San Francisco 2009.

Surgical anatomy of the uterosacral ligament

USL has become an increasing focus of interest in the management of pelvic organ prolapse

DARLINGHURST – **The uterosacral ligament (USL) has become an increasingly focus of interest in terms of its use for surgical support in the management of pelvic organ prolapse.**[1,2]

Aknowledge of the surgical anatomy of the USL should be an imperative before embarking on such techniques, though there are gaps in the current understanding of USL anatomy including its clear subdivision. The published descriptions of anatomy of the USL have differed widely. Surgical safety can thus be compromised. It was the aim of our studies to elucidate and expand current knowledge of the uterosacral ligament (USL) with a view to its surgical use.

Methods

Studies were performed on: (i) ten unembalmed cadaveric pelves (observation only); (ii) two unembalmed pelves (observation, dissection and histology); (iii) five formalin-fixed pelves (dissection). None of the cadavers had evidence of previous pelvic surgery. Care was taken to preserve all the connective tissue and neurovascular structures lying deep to the peritoneum.

Four tissue blocks (1 cm x 2 cm) of the ligament were taken from one unembalmed pelvis starting from its cervical attachment, sampling the ligament at four equidistant points along its vertical extent. Five-micron thick sections were cut and stained with hematoxylin-eosin as well as trichrome (to demonstrate elastic fibers). As in the surgical situation, The USLs were best (and at times only) seen in the cadaveric and histological examinations when placed under tension.

Results

The general direction of the ligament was from the cervico-vaginal junction, curving on the side of the rectum, to reach the sacroiliac joint. Our examinations lead us to elucidate the following subdivision of the USL (total length around 12-14 cm) based on the thickness of the ligament.

(A) Subdivision: (i) A distal (cervical) section of 5-20 mm thickness (the thickest section) and generally 2-3 cm in vertical length. At the edge of the cervix and vagina, it was fused with the cardinal ligament. Macroscopically, this distal section was made up of dense connective tissue containing few small blood vessels and small branches of the hypogastric plexus. (ii) An intermediate section of around 5 cm length, up to 1-2 cm wide when placed under tension, and for the most part 5mm thick (thinning proximally), running postero-laterally from the level of the uterine isthmus, curving around the rectum towards the sacrum. (iii) A proximal (sacral) section of around 5–6 cm long, with variable thickness (generally thinner than the other sections) and appearance.

(B) Attachments: Distally, the USL was attached to the posterior aspect of the cervix and vaginal dome. This attachment spread to the lateral (and antero-lateral) aspects of the cervix and vaginal dome where it was confluent with the attachment of the cardinal ligament over a distance of 2 cm from the lateral aspect of the cervix (uterosacral-cardinal ligament complex), beyond which the two ligaments separated. The cardinal ligament remaining a thick bundle of connective tissue which ran posterolaterally to a broad attachment on the lateral wall of the pelvis. The USL merged caudally with the lateral ligament of the rectum. Proximally, its diffuse sacral attachment extended: (i) vertically from the sacrococcygeal joint to S3 (with the sacrouterine fold of peritoneum extending to S2 and at times S1) and (ii) transversely from the pelvic sacral foramina medially to 5 cm lateral to the sacro-iliac joint where it was attached to fascia overlying piriformis and levator ani.

(C) Intermediate section: Surgically useful observations on this relatively unattached section are (i) this section is best seen when under tension; (ii) even at its closest proximity to the ureter (at the junction with the cervical section) it is still at least 2.3-2.7 cm from that structure; (iii) medial traction on the intermediate section as might occur with midline plication with the contralateral ligament will also cause its anterior and superior displacement.

(D) Histology: Stripped of the peritoneum, the USL was seen as a collection of fatty tissue and dispersed strands of fibrous tissue investing the vessels and nerves destined for the cervix and upper vagina. Histological sections of the thickest (cervical) section showed small arteries and veins, numerous nerves intermingled with thin bands of collagen and elastic fibers and fatty tissue. Smooth muscle fibres were rarely observed. Collagen fibres decreased in number from the upper border of the ligament. This differed greatly from the macroscopic appearance when put under tension. In all pelves, fresh or embalmed, the ligament, under tension, became a dense, well defined structure. In 2 hemipelves, it was however visible as a dense ligamentous structure after excision of fatty tissue.

(E) Relations with neurovascular structures: The sacral attachment of the uterosacral ligament was just lateral to the sacral sympathetic trunks and ganglia, and the emergence of the sacral nerve roots S2, S3 and S4. The medial aspect of the ligament lying against the rectum was mostly fibrous. The pelvic splanchnic nerves and the hypogastric plexus were found on the lateral side of the ligament after teasing off the fibres from its rectal side.

The arteries and veins were on a plane even more lateral to the neural plane. The sacral portion of the uterosacral ligament spread caudally towards the lateral ligament of the rectum, which was a band of connective tissue accompanying the middle rectal artery as it reached the rectum from its origin from the internal iliac artery. The middle rectal artery was thus located close to the caudal border of the sacral section of the uterosacral ligament. At the level of the upper border of the sacral section, but lateral to it, were the superior gluteal artery and vein. They were more closely related to the pelvic attachment of the cardinal ligament and 4-5 cm lateral to the uterosacral ligament.

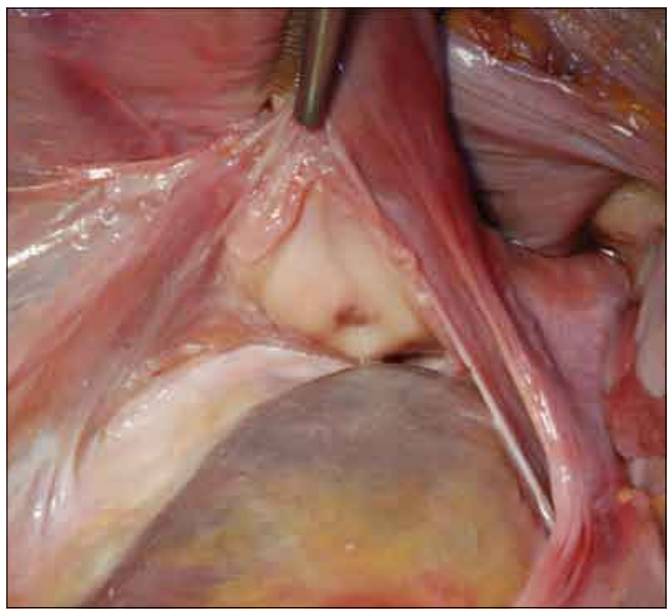


Fig. 1: An abdominal view of a fresh cadaver (donor 80 years old) with the vaginal vault opened to expose the cervix. Figure 1 shows that on light traction, the left USL appears only as a fold of peritoneum.

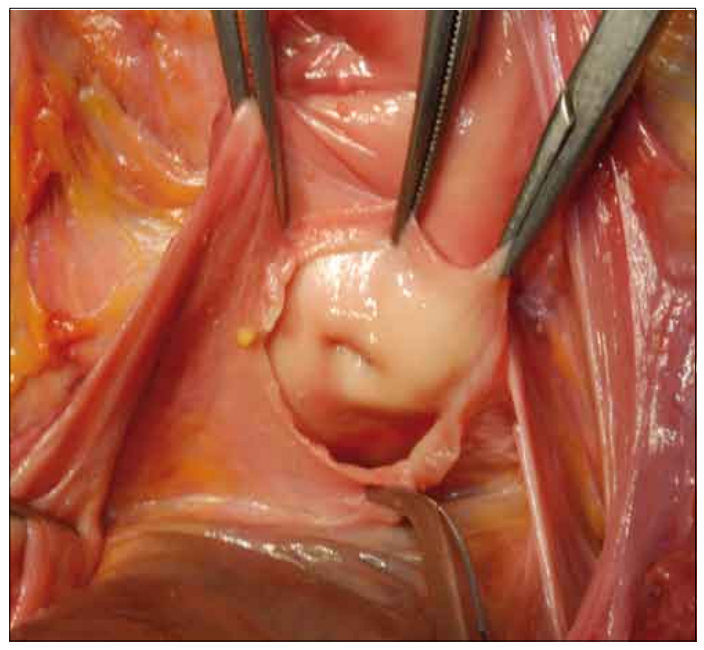


Fig. 2: An abdominal view of a fresh cadaver (donor 80 years old) with the vaginal vault opened to expose the cervix. Figure 2 shows the intermediate section of the USL (5 cm long) as a firm ligament when placed on tension. The distal clamp on the USL (top left) is at the level of the cervix equivalent to that placed for the first pedicle of a vaginal hysterectomy.

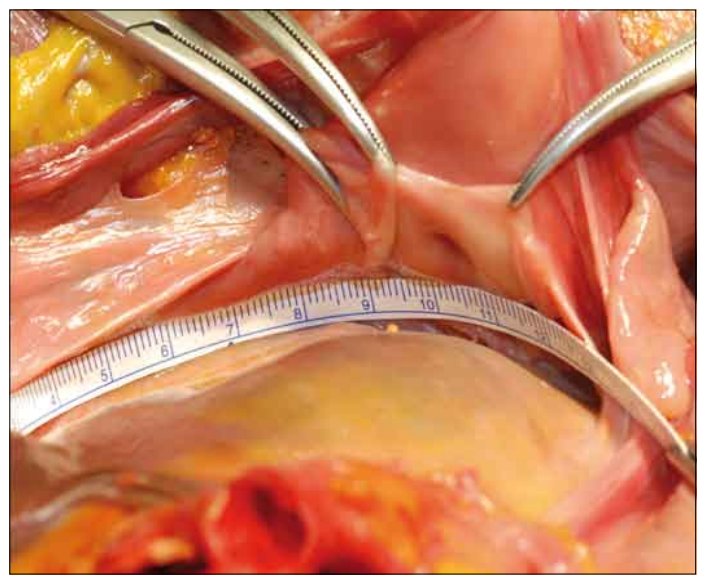


Fig. 3: An abdominal view of a fresh cadaver (donor 80 years old) with the vaginal vault opened to expose the cervix. Figure 3 demonstrates the 10 cm length of USL from sacrum to vaginal vault (proximal and intermediate sections).

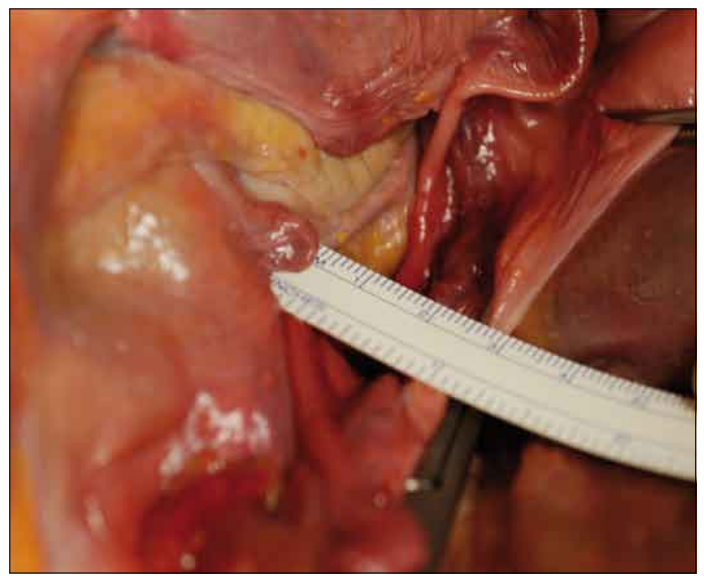


Fig. 4: An abdominal view of a fresh cadaver (donor 80 years old) with the vaginal vault opened to expose the cervix. Figure 4 demonstrates the more than 2 cm distance from the intermediate section of the USL to the ureter.

Discussion

We see our study as the first to cite the overall and sectional USL length on the basis of thickness and attachments. The distal attachment to the cervix is confluent with the cardinal ligament but only over a limited distance (uterosacral cardinal ligament complex). We would not favor this name as a global term for the USL and CL.

Our study offers a more comprehensive description of the sacral attachment of the USL, which has so far differed widely in the literature. In summary, the proximal attachment is diffuse and thin, extending to S3, though the overlying sacrouterine fold of peritoneum may extend to S2 or S1.

Conclusion

Our study highlights the relative surgical safety and strength in using the relatively unattached intermediate section. It is wide, still thick, well-defined when placed under tension and suitable for surgical use. It is at least 2.5 cm from the ureter. The strength of the USL is perhaps derived not only from the ligament itself, but also from the addition of extraperitoneal connec-

continued on page 7

continued from page 6

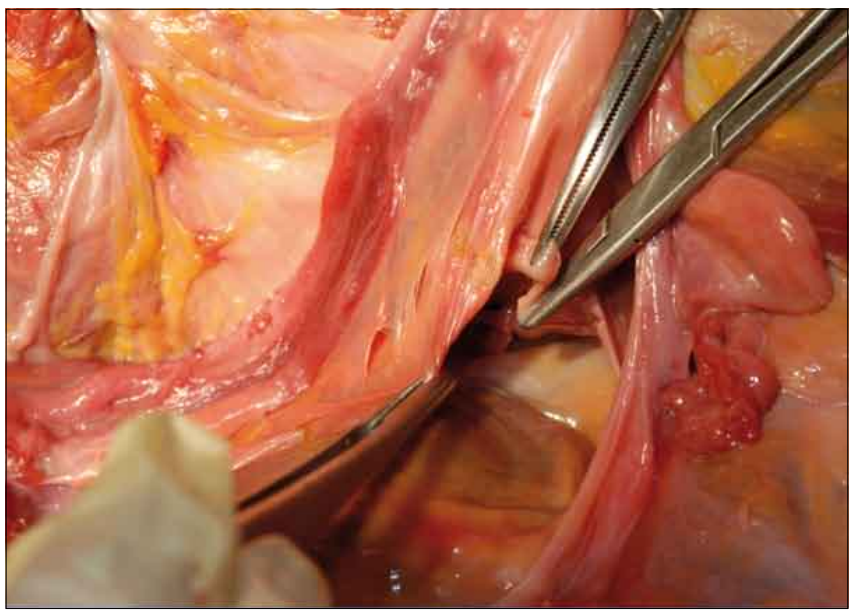
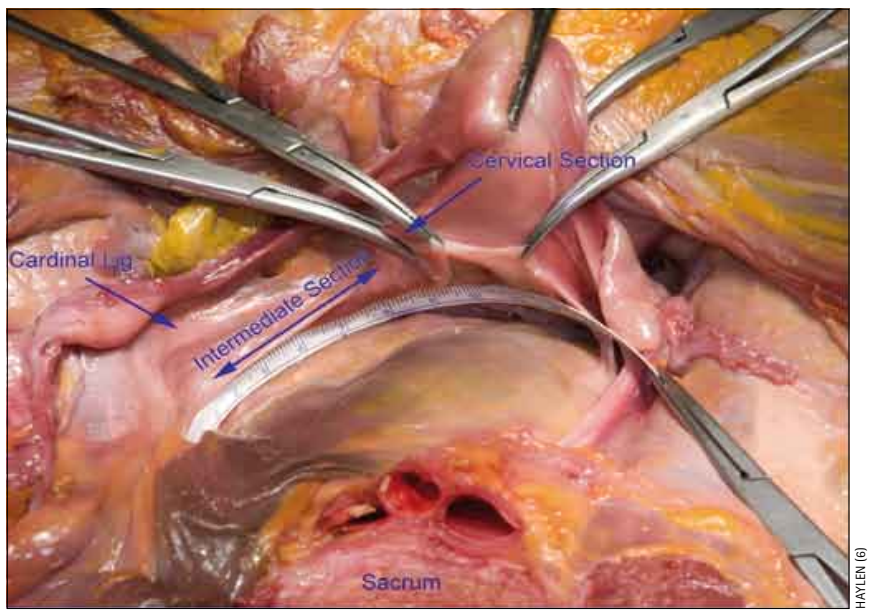


Fig. 5: Demonstrates that medial traction on the intermediate section of the USL, as would occur with plication with the contralateral ligament, will also lead to anterior and superior displacement.

tive tissue. We generally support previous descriptions of the ureteric[3] and neurovascular[4-7] relations of the USL. ■

Authors:
[1]Bernard T. Haylen, [2]Dzung Vu, [2]Kelly Tse, [3]Annabelle Farnsworth
[1]University of New South Wales & St Vincent's Clinic, Darlinghurst. N.S.W. Australia
e-mail: haylen@optusnet.com.au
[2]University of New South Wales, Kensington. N.S.W. Australia
[3]Douglas, Hanly Moir Pathology, North Ryde. N.S.W. Australia

Session 29 (Poster) - Painful Bladder Syndrome / IC, Saturday 3rd October, 15:00-16:00, Hall C



HAYLEN (6)

Fig. 6: The different directions taken by the uterosacral and cardinal ligaments in the pelvis are demonstrated.

References

1. YAZDANY T, BHATIA N. Uterosacral ligament vaginal vault suspension: anatomy, outcome and surgical considerations. Curr Opin Obstet Gynecol. 2008;20:484-488.
2. DWYER PL, FATTON B. Bilateral extraperitoneal uterosacral suspension: a new approach to correct posthysterectomy vaginal vault prolapse. Int Urogynecol J. 2008;19:283-292.
3. BULLER JL, THOMPSON JR, CUNDIFF GW, SULLIVAN LK, SCHÖN YBARRA MAS, BENT AE. Uterosacral ligament: Description of anatomic relationships to optimize surgical safety. Obstet Gynecol. 2001;97;6:873-879.
4. CAMPBELL R. The anatomy and histology of the sacrouterine ligaments. Am J Obstet Gynecol. 1950;59:1-12.
5. RAMANAH R, PARRATTE B, ARBEZ-GINDRE F, MAILLET R, RIETHMULLER D. The uterosacral complex: ligament or neurovascular pathway? Anatomical and histological study of fetuses and adults. Int Urogynecol J. 2008;19:1565-1570.
6. BUTLER-MANUEL SA, BUTTERY LDK, POLAK JM, A'HERN RA, BARTON DJP. Autonomic nerve trauma at radical hysterectomy: The nerve content and subtypes within the superficial and deep uterosacral ligaments. Reprod Sci. 2008;1:91-96.
7. SIDDIQUE SA, GUTMAN RE, SCHÖN YBARRA MA, ROJAS F, HANDA VL. Relationship of the uterosacral ligament to the sacral plexus and to the pudendal nerve. Int Urogynecol J. 2006;17:642-645.

Unique advantages in understanding SUI mechanisms

Computer modeling approaches help understand SUI mechanisms and create clinical applications

MINNEAPOLIS – Computer modeling approach has many unique advantages in understanding SUI mechanisms and for suggesting clinical applications. We initially developed expertise in this concept through FE (finite element) modeling of the female pelvis during physical or daily activities.

We are using it to characterize relative relationships and structures during these activities that elicit UI (urinary incontinence) in females. The long-time goal of our 'subject-specific pelvic modeling' project is to develop a composite profile of incontinence and continence in females via comparing simulated results of the FE models to known MR predictors of SUI (stress urinary incontinence). Individual parameters on anatomical MR images will be measured and correlated with presence of SUI. Simulated results based on the FE models will be compared against these specific factors for their association with SUI. Specific parameters such as levator ani thickness and others associated with urinary incontinence will be included into the composite profile of incontinence and continence in females.

The study presented in 'Zhang Y, Timm G, Sweet R, Metzger G, Burke D, Erdman A. Computer model based dynamic urethrovaginal support assessment for female SUI' in the ICS 2009 conference serves as a further study based on a feasibility study present in 'Zhang, Y., Kim, S., Erdman, A.G., Roberts, K.P., and Timm, G.W. Feasibility of Using a Computer Modeling Approach to Study SUI Induced by Landing a Jump. Annals of Biomedical Engineering. 37(7): 1425-1433. 2009.' and a subject-specific pelvic modeling study present in 'Zhang, Y., Sweet, R.M., Metzger, G.J., Burke, D.M, Erdman, A.G., and Timm, G.W. Advanced Finite Element Mesh Model of Female SUI Research During Physical and Daily Activities. Studies in Health Technology and Informatics. 142: 447-452. 2009'. The unique parts of this study consists of 1) A fresh cadaver urologic tissue properties database is under development by performing soft tissue testing procedure on tissue specimens harvested from fresh cadavers within 48 hours of the time of death. The present pelvic model could be refined in the future using the mechanical properties in this urologic tissue properties database after it is completely developed. 2) Each subject-specific pelvic model consists of over 35 anatomical parts including 10 pelvic muscles, 10 pelvic ligaments, 6 pelvic bones, skin, fat tissues, bladder, urethra, uterus, vagina and colon, rectum and anus, which, to the best of our knowledge, stands for the most comprehensive female pelvic model to simulate the biomechanical characteristics in terms of female SUI. The deformation distributions over the pelvic floor and the bladder which were obtained from the computer simulations based on the subject-specific models that the pelvic floor and the bladder neck have high level deformation distributions during the subject's jumping process. It can be surmised that the abdominal muscles and pelvic diaphragm play a very important role in supporting the bladder at the bladder neck area during vigorous physical or daily activities. Videos which show the dynamic biomechanical response of the pelvic floor and the bladder of a female subject induced by jumping are also achieved using this approach.

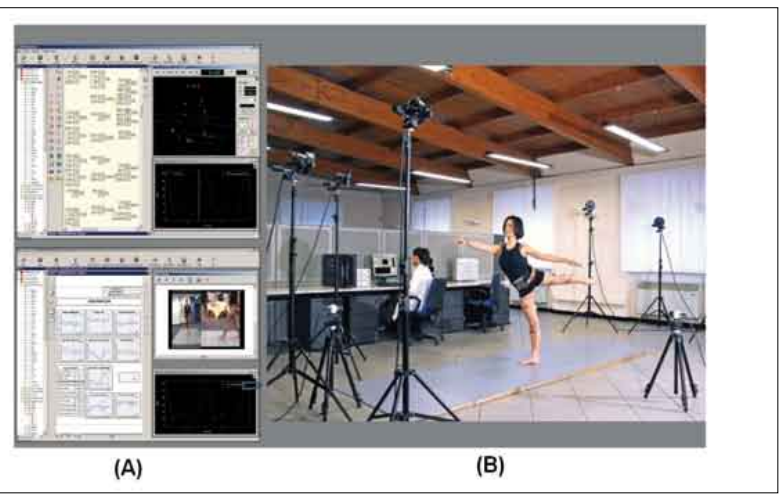


Fig 1. BTS SMART Motion Capture System

Next step: validate study

Next step of this project is going to a validation study of such a subject-specific pelvic modeling approach. Validation is always the most important and the most difficult part in the computer modeling study, but a human subject experimental design has already been developed using a Motion Capture System (BTS SMART, BTS S.p.A.) as shown in Fig. 1, to conduct the validation studies for our subject-specific pelvic modeling approach as shown in Fig. 2. Dynamic biomechanical response of the female pelvis induced by landing a jump was measured on a female subject by using the Motion Capture System. The dynamic biomechanical measurements are being used to validate the computer model of the pelvis of this specific female subject. The validation results will be reported soon. ■

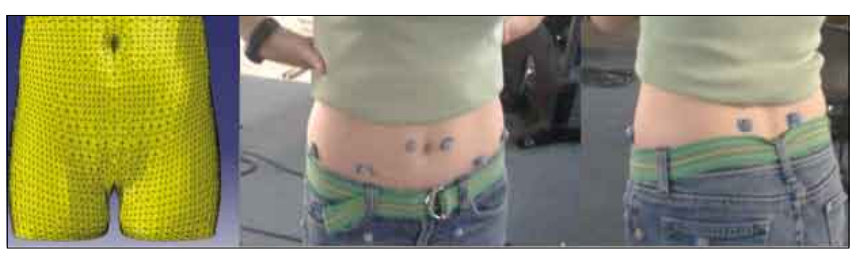


Fig 2. Validation study conducted on a female subject using the motion capture system.

ZHANG (3)

Yingchun Zhang

Author:
Yingchun Zhang
Department of Urology, University of Minnesota Medical School, Minneapolis, Minnesota, USA
e-mail: zhang320@umn.edu

Session 24 (Poster) - Urodynamic Techniques & BOO, Saturday 3rd October, 13:30-14:30, Hall B

Best Clinical Abstract

Brain shows specific activity patterns with UI

Functional magnetic resonance imaging provides insights in urge urinary incontinence

PITTSBURGH – Urge urinary incontinence (UI) is diagnosed clinically using bladder diary and pads which also help grade its severity and further guide and assess the therapy outcomes. Unfortunately, the effectiveness of treatment has not greatly improved, partly due to our lack of understanding of the pathobiology of the disease.

Our group has adapted functional brain imaging to study UI by adding urodynamics to fMRI which enabled simultaneous monitoring of brain and bladder activity during bladder filling and study of bladder storage and continence control under experimental conditions. In older women, this methodology showed increased activity of brain regions involved in mapping body sensations (right insula/somatosensory cortex), emotional processing (anterior cingulated cortex – ACC, limbic cortex) and decision-making (various parts of frontal cortex), implying their potential role in continence control. Such activity is most pronounced when subjects report strong bladder sensation – probably 'urgency' – while in the scanner, further implying that such brain activity might represent a neural correlate of this symptom.

TADIC (3)

Stasa D. Tadic

Despite these findings, it is not yet known whether these experimental observations reflect patients' everyday experience, as registered by standard clinical tests such as a bladder diary or a pad test. Thus, we hypothesized that the brain responses to bladder filling observed in the scanner during reported sensations of 'urgency' would correlate with clinical measures. Secondary analysis included correlation of brain responses with patients' reports of the burden of disease using the Urge Impact Scale (URIS-24).

We conducted a cross-sectional study of functionally independent, community-dwelling women with pure or predominantly urge UI, aged 60 and older. All had undergone detailed clinical and video urodynamic testing followed by fMRI scanning with simultaneous simple urodynamics. They also had to be able to complete a voiding diary accurately and to perform a 24-hour pad test.

Scanning session: we used an originally developed method as described above. The bladder was filled quickly until subjects signalled strong urge and, then, we repeated 1 or 2 cycles of filling/emptying. All analyses were done using Statistical Parametric Mapping (SPM2) (http://www.fil.ion.ucl.ac.uk/spm/spm2.html).

Results

The average age of our 14 subjects was 76 years, range 64-88. Average UI episodes/day were 2.3 (range 0.7-4.7). 9/14 subjects had demonstratable detrusor overactivity on urodynamcs.

Among these patients, bladder filling during self-reported urgency provoked brain activity in many regions, including dorsal anterior cingulate, insula, frontal cortex (superior, middle and medial frontal gyrus), precentral and fusiform gyrus and cerebellum. In contrast, bladder filling led to deactivation in some frontal locations: rostral and subgenual ACG, subcallosal, medial and superior frontal gyrus.

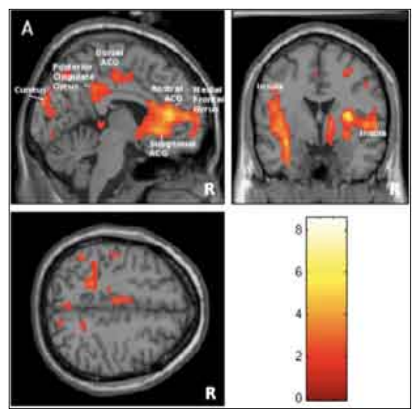


Fig. 1a: Statistical map of brain regions where responses to bladder filling during scanning session were significantly associated with the number of daytime urge incontinent episodes measured on the bladder diary (positive correlation at threshold level of p<0.05, r >0.48).

Some of the brain responses during bladder filling (as illustrated on Fig. 1a) were significantly correlated with daytime incontinence frequency (urge UI episodes per day), measured with a 3-day bladder diary. The correlation was positive in rostral and subgenual ACG (plot shown in Fig. 1b), insula, inferior frontal gyrus, orbitofrontal cortex, dorsal ACG, posterior cingulate gyrus, parahippocampus, cuneus, and parts of the parieto-temporal lobe. Brain responses were also significantly and positively correlated with the amount of daytime urine loss in similar regions. No significant negative correlations with daytime incontinence frequency or amount of leakage were observed.

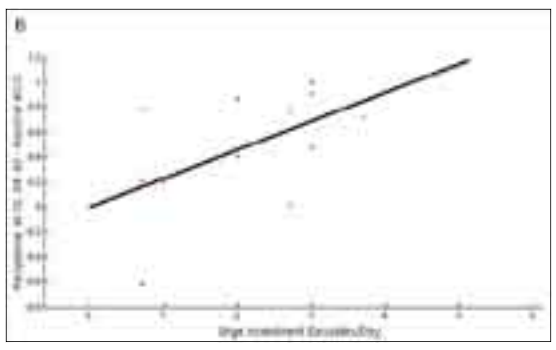


Fig. 1b: Graphical illustration of positive correlation between brain response in rostral anterior cingulate gyrus and number of daytime urgency incontinent episodes on bladder diary (r=0.60).

Secondary analysis showed that the baseline score for the psychological burden of urgency incontinence, as represented by the Urge Impact Scale (URIS-24), significantly correlated with brain responses to bladder filling, albeit in different regions: precuneus/cuneus and posterior cingulate gyrus, superior temporal, supramarginal, and transverse gyrus. Moreover, the relation was inverse: increased burden of disease correlated with a lesser degree of activation in these brain regions.

Discussion

This study showed that regional brain activity provoked by bladder filling (in the presence of self-reported urgency) significantly correlated with the severity of UI in daily life (either incontinence frequency or amount of leakage) and, thus, demonstrated a cross-sectional relation between the clinically assessed severity of urge incontinence and changes in brain activity during bladder filling, measured under experimental conditions.

Such design streamlines clinical relevance of experimental brain imaging studies findings (e.g. ACG activation may indicate an emotional reaction to imminent loss of bladder control/fear of leakage and an attempt to suppress it - which could be used as a target for interventions aimed at modifying urgency).

Conclusion

Activation of brain regions involved in control of continence is related to commonly used patient-derived clinical measures of urge incontinence severity.

Thus, observations made under artificial conditions in an fMRI scanner reflect patients' real-life experience and may provide useful therapeutic targets and outcome variables. ■

Authors:
Stasa Dusan Tadic, Derek Griffiths, Werner Schaefer, Cheng C, Neil M. Resnick
Division of Geriatric Medicine – Continence Research Unit University of Pittsburgh, USA
e-mail: std45@pitt.edu

Session 22 (Podium) - Neurourology II, Saturday 3rd October, 11:00-12:00, Hall A

Pelvic organ prolapse: Benefits of pelvic floor muscle training

An assessor blinded randomised controlled trial

OSLO – The overall high prevalence of female pelvic organ prolapse (POP) and related problems indicates a need for early prevention and treatment. A Cochrane review has concluded that there is scant knowledge about pelvic floor muscle training (PFMT) in prevention and treatment of POP.

The aim of this randomised controlled trial (RCT) was to investigate the effectiveness of PFMT in reversing POP and alleviating symptoms.

This assessor blinded parallel group RCT was conducted at a university hospital and a physiotherapy (PT) clinic. 109 women with POP were stratified on degree of POP according to organ prolapse quantification (POP-Q) and randomly allocated by a computer generated random number system to PFMT (n = 59) or control (n = 50). Primary outcome measures were stage of prolapse (POP-Q2), position of bladder and bowel (3D ultrasound) and mechanical, bladder and bowel symptoms (validated symptom-bother questionnaire).

Women in both groups were advised to avoid straining and taught to pre-contract their pelvic floor muscles (PFM) prior and during increases in abdominal pressure. Woman in the PFMT group were individually supervised by a PT once a week during the first three months and every second week during the last three months and to do 3 sets of 8-12 contractions per day during the six months intervention period.

BRARKKEN

Ingeborg Braekken

Results

The mean age of the participants was 48.9 years (range 27-88), parity 2.4 (range 1-5) and body mass index 25.9 kg/m^2 (SD ± 4.5). There were no statistical differences between groups regarding age, parity, stage of POP and outcome measures at baseline, except for mechanical symptoms (p=0.025). Forty-seven (79 %) women in the PFMT group reached an adherence level of 80% (≥14 physiotherapy visits and ≥144 days with home exercise). Two women dropped out (one in each group). No adverse effects were reported.

Eleven (19 %) women in the PFMT group versus four (8 %) women in the control group improved one POP stage (p=0.04). Women in the PFMT group had greater elevation of the bladder (difference: 3.0 mm; 95% CI: 1.5-4.4; p < .001, effect size 0.79) and bowel (difference: 5.5 mm; 1.4-7.3; p=0.022, effect size 0.63) than controls. Based on the standardised questionnaire significant more symptomatic women in the PFMT group than in the control group reduced their frequency of symptoms; feeling of vaginal bulge /perception of pelvic pressure (32 [74 %] versus 8 [31 %], p = 0.007), stress urinary incontinence (29 [74 %] versus 8 [30 %], p<0.001), urge urinary incontinence (16 [59 %] versus 4 [33 %], p= 0.042), flatus (18 [53 %] versus 5 [22 %], p=0.02) and fecal incontinence (9 [64 %] versus 0 [0 %], p=0.07).

Interpretation of results

The present study demonstrated that PFMT can improve stage of POP. Although statistical significant differences were found between groups, the number of women improving POP-Q stage may be considered relatively low. However, during a Valsalva manoeuvre the PFM are stretched and pushed in a caudal direction, opposite to the PFM function. Hence, an improvement in POP-Q may not be expected. A lift of bladder and bowel position shown by ultrasound may be a better measure of the effect of PFMT. The present study demonstrated that PFMT can be an effective conservative treatment option for women with POP. PFMT is without adverse effects and may therefore be a first choice intervention.

Concluding message: Supervised and intensive PFMT over six months can reverse POP and reduce mechanical, bladder and bowel symptoms. ■

Authors:
[1] Ingeborg Hoff Brækken, [2] Memona Majida, [3] Marie Ellström, [1]Kari Bo
[1]Norwegian School of Sport Sciences
[2]Akershus University Hospital
[3]Akershus University Hospital and University of Oslo, Norway

Session 8 (Poster) - Pelvic Floor, Thursday 1st October, 16:00-17:30, Hall B

Funding: Norwegian Foundation for Health and Rehabilitation and Norwegian Women's Public Health Association

Playing with pressure

Can an air-filled intravesical balloon in-vivo attenuate pressure and raise the abdominal pressure?

CARACAS/DENVER – Historically, most therapeutic efforts to relieve the leakage associated with Stress Urinary Incontinence have focused on increasing the urethral pressure (the fluid pressure needed to just open a closed urethra) through methods such as slings, colposuspension, periurethral bulking, or radiofrequency ablation, for example.

We report the first human clinical experience with a different approach: that is, seeking to lower the peak intravesical pressure while leaving urethral pressure unchanged. This is accomplished without surgery or injection; through the introduction of a small, air-filled, free-floating balloon into the bladder. An in-vitro experiment was devised and results are presented, to aid in the understanding of the underlying mechanism of action of the observed clinical effect.

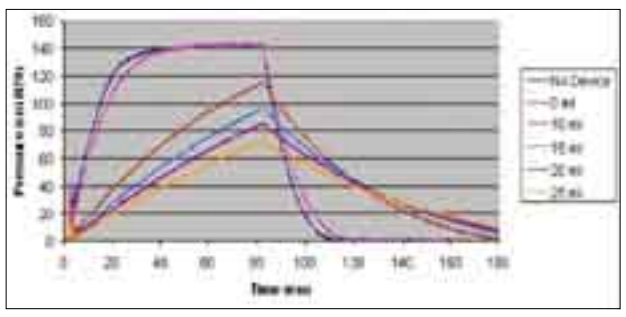


Fig. 1: In vitro pressure attenuation due to an air filled balloon at a range of volumes

Stress Urinary Incontinence related urine leakage occurs when intravesical pressure momentarily exceeds the urethral pressure. This commonly occurs, for example, during a cough, sneeze, or physical exertion. If the intravesical pressure change caused by such events can be reduced, there is the potential to reduce or eliminate this leakage. The authors have preliminarily assessed a novel intravesical balloon pressure attenuator device, both in-vitro and in-vivo, to determine its ability to reduce or suppress leakage by attenuating intravesical pressures due to short-duration transient pressure events.

A balloon was obtained, constructed of a thin polyurethane material (Solace Balloon). A one-way valve permitted it to be filled with various volumes of air. In-vitro feasibility assessment of its pressure attenuation capability was made using a custom-built bench-top acrylic chamber. The chamber was designed to simulate a transient pressure event in the bladder similar to those which commonly induce leakage in patients with stress urinary incontinence. The chamber volume of 250 ml was chosen to simulate a typical functional capacity of a female bladder. Computer controlled valves, connected to a compressed air source, were used to pressurize the chamber to a pressure of 140 cm H_2O to simulate an intravesical pressure which might result in stress urinary incontinence leakage. Pressure in the chamber was recorded without the balloon, and then for a series of balloon air volumes ranging from 0 to 25 ml. Pressure pulse duration was chosen to be 80 milliseconds to represent a typical duration of a leakage-inducing transient pressure event, as estimated based on examination of conventional urodynamics charts chosen at random.

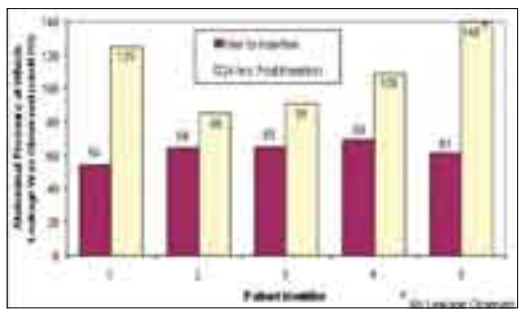


Fig. 2: In vivo effect of 25 ml intravesical balloon on the abdominal pressure at which stress urinary incontinence leakage was observed

In-vivo testing was performed under an approved clinical research protocol. Five female patients with stress urinary incontinence, having a mean age of 59.4 (range, 48-72) were enrolled into the study. Conventional urodynamic studies were conducted. Abdominal pressure was measured using a rectal catheter. These studies were conducted both immediately prior to balloon insertion and approximately 24 hours later.

The results of the in-vitro measurements using the acrylic chamber are shown in Figure 1. For a balloon volume of 25 ml, which corresponds to the volume used in the in-vivo study, the amplitude of a transient pressure pulse was reduced by 48 % from 144 cm H_2O to 74 cm H_2O.

The in-vivo results are summarized in Figure 2. In 4 of the 5 patients an increase was noted in the lowest abdominal pressure at which leakage occurred. In patient #5, no leakage was observed up to the pressure shown.

The in-vitro test results are consistent with engineering and physics principles. Addition of a balloon attenuator to a fluid-filled chamber reliably attenuates the peak pressure observed in the chamber in response to a pressure stimulus. For volumes and pressures that approximate physiological values, very significant pressure attenuation (approx. 50 %) can be obtained using a balloon volume that is just 10 % of a typical functional bladder capacity. This in-vitro result predicts that in-vivo a higher abdominal pressure would be needed for leakage to occur with the balloon than without the balloon. It follows logically that if the balloon can have this effect, then a reduction in stress urinary incontinence leakage in some patients should occur.

Fig. 3: An air-filled balloon representative of the samples used for the in-vivo and in-vitro testing in this study

Fig. 4: The device used to deliver a balloon into a patient's bladder in this study. The deflated balloon is contained within the insertion tip to the right. The syringe is used to inflate the balloon once it is inserted into the patient.

The in-vivo results support the in-vitro prediction, showing that either a higher abdominal pressure was needed for leakage to occur, or leakage was suppressed altogether. Review of other objective evidence (for example, flow rate and post-void residual both before and after the balloon insertion) supports a finding that the result is due to the device's pressure attenuation effect and not due to any obstructive phenomenon.

Fig. 5: An illustration of a free-floating, air-filled, intravesical balloon

The findings are promising enough to warrant further investigation into the use of air-filled balloon attenuators as a means to reduce leakage associated with stress urinary incontinence. ■

Authors:
[1]Miguel A. Lopez, [2]Jeffrey A. Snyder
[1]Hospital de Clinicas Caracas, Venezuela
[2]Genitourinary Surgical Consultants , Denver, Colorado USA
e-mail: jgillespie@solacetx.com

Session 15 (Poster) - LUTS in Women II, Friday 2nd October, 11:00-12:30, Hall D

State of the art

Being up-to-date in urodynamics

Utilization, education and best practices

NEW ORLEANS – This lecture will examine the current state of urodynamic practice. Emphasis will be placed on the technical aspect of performing urodynamics, and adherence to the ICS Standardization Reports on Terminology and Good Urodynamic Practices. I am indebted to Drs. Elizabeth Meuller and Harriette Scarpero for their contributions to this lecture.

For all clinicians dedicated to the treatment of urinary dysfunction, urodynamics remains an essential tool in the evaluation and management of our patients. Urodynamics is not simply a diagnostic procedure such as a radiograph or electrocardiogram, but it is a dynamic test between the patient and the clinician. According to the ICS Standardization Committee report on Good Urodynamic Practices, good urodynamic practice comprises three main elements: 1) A clear indication for and appropriate selection of relevant test measurements and procedures, 2) Precise measurement with data quality control and complete documentation, 3) Accurate analysis and critical reporting of results. Thus, even before testing begins, the investigator must formulate the 'urodynamic questions', which is the precise information that must be gained from the urodynamics assessment. In no way is this similar for every patient. As such, these studies must be individually tailored to meet the particular needs of each patient. The clinician is expected to monitor and actively participate in the urodynamics investigation. This is the opportunity to ensure that the study is technically sound, and that the appropriate information is obtained. If it is not, the clinician should alter the study to achieve the appropriate information.

The ICS committees on Terminology and Urodynamics Best Practices are held nearly universal as the standard in urodynamics technique and interpretation. These manuscripts are perhaps the most widely quoted in research documents and textbooks. Thus, for those who either perform research and/or teach urodynamics there is consensus that urodynamic testing and reporting should adhere to the ICS Guidelines. Despite this consensus, there are valid concerns that these standards are not being met. Utilization patterns suggest that despite increased urodynamics utilization, there is little quality data regarding the ability of urodynamics to predict the outcome of various treatments and even less data examining the quality and cost-effective use of urodynamics. We will review the components and techniques of urodynamics testing in the light of the ICS recommendations for good urodynamic practice. These principles should be applicable to all clinicians, and reliable reproducible urodynamic studies should be the result.

Uroflow

Uroflow is a noninvasive screening test for patients with lower urinary tract symptoms. This test measures flow rate (maximum and average in milliliters per second), total volume voided, and time to maximum flow. Uroflow cannot diagnose the etiology of an abnormal flow pattern, such as distinguishing bladder outlet obstruction from impaired contractility. In order to properly interpret a uroflow study, it is imperative to review the flow pattern and shape of the flow curve. An unobstructed outlet with a normal detrusor contraction results in a smooth arc-shaped flow rate curve with high amplitude. Any other shapes, such as curves that are flat, asymmetric, or have multiple peaks (fluctuating and/or intermittent), indicate abnormal voiding, but are not specific for its cause. Rapid changes in flow rate may also be artifacts, when the flow rate signal is extracorporeally modified through interference between the stream and the collecting funnel, the flowmeter, movement of the stream across the surface of the funnel, or patient movements. Thus correlation of the flow curve with the values detected by the flowmeter is important for appropriate interpretation. Ideally, voided volumes of at least 125–150 ml are required because smaller volumes may alter the results. Spikes on the curve should be eliminated or dampened to reflect the more physiologic flow process. The following are some of the key ICS recommendations for the performance of uroflowmetry:

- One millimeter should equal 1 s on the x-axis and 1ml/s and 10 ml voided volume on the y-axis.
- A sliding average over 2 s should be used to remove positive and negative spike artifacts.
- Only flow rate values, which have been 'smoothed', either electronically or manually, should be reported.
- If a flow/volume nomogram is used, this should be stated and referenced.

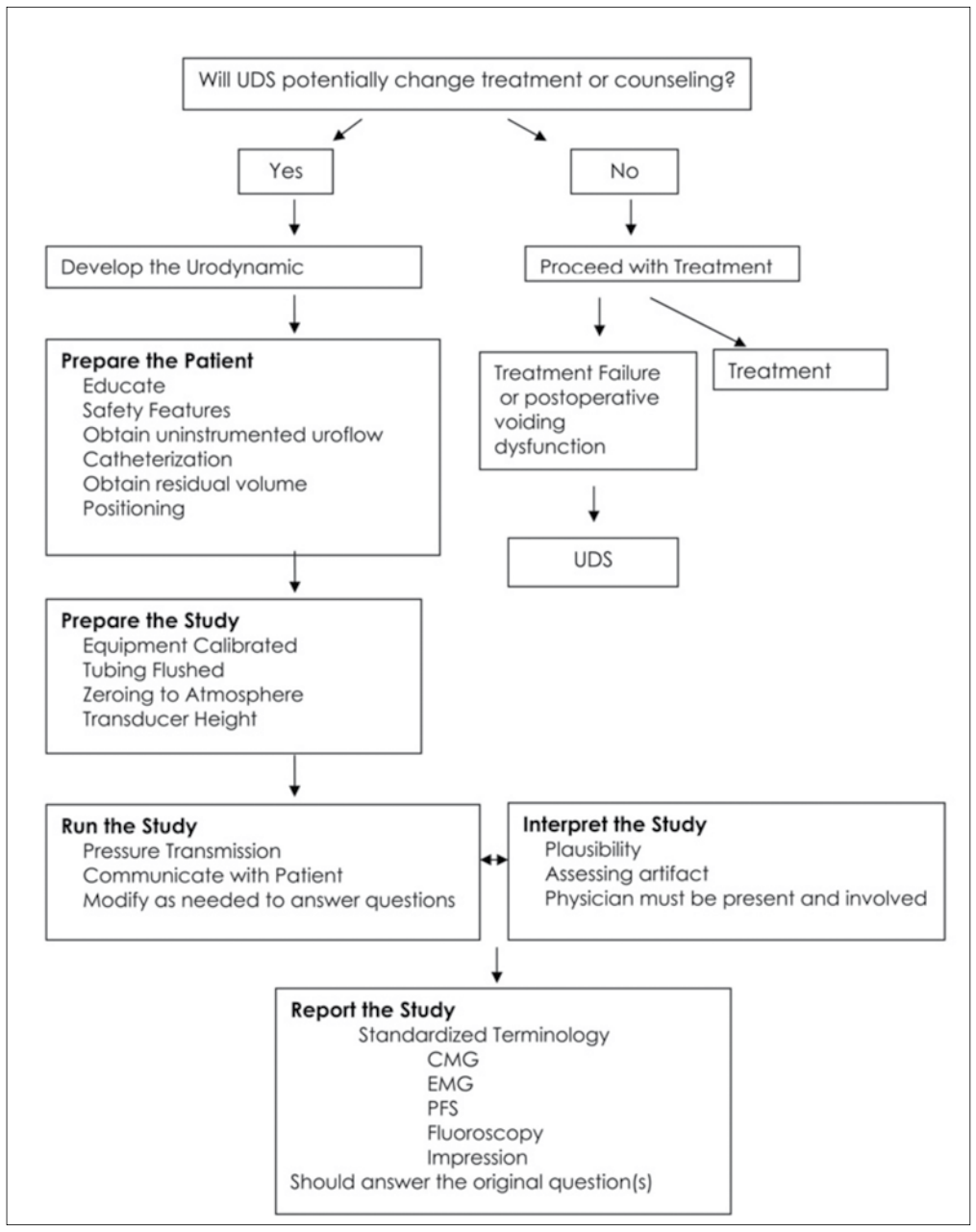


Fig. 1: Urodynamics Best Practice Algorithm. From: Scarpero H, Koski M, Kaufman M, Dmochowski R: Urodynamics Best Practices. AUA Update Series. Lesson 9, Volume 28, 2009.

Even in the setting of a technically sound uroflow study, it may only suggest a specific type of abnormality. Only when uroflowmetry is combined with intravesical and abdominal pressure recordings does it become possible, from the pressure-flow relationship, to analyze separately the contributions of detrusor contractility and bladder outlet function to the overall voiding pattern.

Filling Cystometry and Pressure-Flow Studies

Cystometry is the method by which the pressure/volume relationship of the bladder is measured. Filling cystometry refers to the urodynamic assessment of bladder filling. If may be performed via simple 'eyeball' cystometry, single channel or multiple channel assessment of bladder function. The multi-channel investigation is the most specific assessment of detrusor function, as abdominal pressure and patient activity may be distinguished from changes in detrusor pressure. Key measurements of bladder function during urinary storage include: sensation, capacity, compliance, and the presence (or absence) of involuntary rises in detrusor pressure. Compliance refers to the relationship between change in bladder volume and change in detrusor pressure from the start of bladder filling to cystometric capacity (or before any detrusor contraction that causes significant leakage). It is a calculated value obtained by dividing the volume change by the change in detrusor pressure during that change in bladder volume. It is expressed in ml/cm water. Normal bladder compliance should be greater than 12.5 ml/cm water. There may be many artifacts in compliance measurement, and there is a lack of standardization in technique of measurement and normal values. Therefore, it is more descriptive and meaningful to document compliance by recording the detrusor pressure at various volumes, and to assess if detrusor storage is occurring at "safe pressures" throughout filling.

During filling cystometry, the assessment of urethral competence can be performed via the recording of the abdominal leak point pressure. The abdominal leak point pressure is defined as the intravesical pressure at which urine leakage occurs in the absence of a detrusor contraction. The technique and interpretation of ALPP measurement lack standardization. At present, it appears the only conclusion is that the measurement of the ALPP is a method to establish the urodynamic diagnosis of stress incontinence.

Pressure-flow studies are used to evaluate the emptying characteristics of the lower urinary tract by simultaneous monitoring of bladder pressure and uroflow. The assessment of detrusor pressure during voiding (contractility) along with uroflow facilitates characterizing bladder and urethral function during voiding. Pressure-flow studies are the only way to distinguish between bladder outlet obstruction or impaired contractility. The presence or absence of bladder outlet obstruction is determined by the synchronous measurement of detrusor pressure and flow rate. The bladder outlet obstruction index (BOOI) can quantify the degree of obstruction by the equation, BOOI=PdetQmax-2Qmax. The recommended nomogram for men is the provisional ICS nonogram, which categorizes men according to the BOOI. There are 3 grades of obstruction: unobstructed (BOOI <20), equivocal (20<BOOI<40), and obstructed (BOOI>40).

The performance of filling cystometry and pressure-flow studies are highly technical and require substantial technical expertise to constantly monitor the urodynamics tracings to insure accurate recordings and avoid artifacts. The following are important ICS recommendations for the performance of filling cystometry and pressure-flow studies:

- A good urodynamic investigation should be performed interactively with the patient. It should be established by discussion with the patient that the patient's symptoms have been reproduced during the test.
- There should be continuous and careful observation of the signals as they are collected, and the continuous assessment of the qualitative and quantitative plausibility of all signals;
- Artifacts should be avoided, and any artifacts that occur should be corrected immediately. It is always difficult and is often impossible to correct artifacts during a retrospective analysis.
- Invasive urodynamics should not be performed without precise indications and well-defined 'urodynamic questions' that are to be answered by the results of the urodynamics study.
- It is recommended that there is strict adherence to the ICS standardization of zero pressure and reference height. Only then can pressure recordings be compared between patients and centers.
- Zero pressure is the surrounding atmospheric pressure.
- The reference height is defined as the upper edge of the symphysis pubis.
- The following three criteria form the minimum recommendations for ensuring quality control of pressure recordings:
- Resting values for abdominal, intravesical, and detrusor pressure

continued on page 11

continued from page 10

are in a typical range. (Reflective of balancing to atmosphere before connecting catheters to the patient).

- The abdominal and intravesical pressure signals are 'live', with minor variations caused by breathing or talking being similar for both signals; these variations should not appear in the detrusor pressure.
- Coughs are used (every 1 min. or, for example, 50 ml filled volume) to ensure that the abdominal and intravesical pressure signals respond equally. Coughs immediately before voiding and immediately after voiding should be included.
- It is recommended that a urodynamic test should be repeated if the initial test suggests an abnormality, leaves the cause of troublesome lower urinary tract symptoms unresolved, or if there are technical problems preventing proper analysis.
- The urodynamic findings and the interpretation of the results should be documented immediately after the study is finished, i.e., before the patient has left the urodynamics laboratory. Doing so allows for a second test if required.

Sphincter electromyography

EMG studies may be performed with surface electrodes to measure low levels of electrical activity from the distal striates sphincter, eternal anal sphincter or pelvic floor muscles. Needle EMG is more advanced, but more invasive as needles are placed directly into the specified muscle to measure the amplitude, frequency and wave form of motor action potentials. Sphincter EMG can be utilized to assist in the diagnosis of dysfunctional voiding characterized by intermittent contractions of the sphincter during voluntary voiding in neurologically intact individuals. Detrusor external sphincter dyssynergia is demonstrated by an involuntary detrusor contraction concurrent with increased sphincteric activity. Both of these events would be identified by increased EMG activity.

Fluoroscopy

The use of fluoroscopic imaging coupled with multi-channel urodynamics is termed videourodynamics. The use of fluoroscopy provides anatomic information regarding the bladder, bladder neck and urethra. Flouroscopy can be useful in localizing sites of obstruction, and is essential in the diagnosos of primary bladder neck obstruction. It is also most helpful in the diagnosis of external sphincter dyssynergia signified by dilation of the posterior urethra, coupled with increased EMG activity. Although the indications for videourodynamics are not standardized, patients at high risk for complicated voiding dysfunction: anyone with known (or suspected) neurogenic bladder, prior radical pelvic surgery, urinary diversion, failed anti-incontinence surgery, and prior pelvic radiation should be considered for videourodynamics.

Completing an urodynamics study

Before any study, there should be systematic preparation, which involved preparing the equipment, preparing the patient, performing the study and then reporting the urodynamics study. A uniform methodology and approach to these steps in an important way to manage and control quality in urodynamics practice (Fig. 1). Often, the clinician does not carry out these critical steps, and this may lead to lapses in urodynamic technique. The most commonly utilized (and recommended) water infused catheters measure pressure via external transducers which are actually strain gauges and measure force displacement. Thus, it is critical that all tubing and catheters be filled with fluid and devoid of any air which dampen pressure transmission. Urodynamic catheters must be zeroed to atmospheric pressure before insertion. Zero pressure is the value recorded when a transducer is open to the environment and disconnected from any tubes or catheters. Furthermore, transducers must be placed at the reference height, meaning the upper edge of the symphysis pubis, when zeroed to atmospheric pressure. Thus, initial resting bladder pressures are obtained, and differ between patients and position. This is an important aspect of urodynamics technique that is commonly not adhered to, and there are several potential errors that occur by artificially setting the pressures to zero after the catheters are connected to the patient.

The clinician should strive to make the testing experience as comfortable and reassure the patient what the purpose of the testing process is, and what to expect from the procedure. If the patient leaks only in the standing position, then filling cystometry should be performed standing. If the patient voids sitting, then pressure-flow studies should be performed sitting. This is one of the most basic principles of reproducing the patient's symptoms that is commonly overlooked. Thus it is important to have an interactive discussion with the patient explaining the steps of the procedure thoroughly.

Patients are instructed to arrive with a full bladder and a catheter-free flow rate is performed first. The catheterization procedure follows. The rectal catheter is inserted just beyond the anal sphincter and 3cc of sterile water is inserted. Following this, the stopcock is turned to the off position. Using a sterile technique, the urethral catheter is inserted into the bladder until the point of urine return. It is important to advance the catheter a little beyond this point to insure secure placement into the bladder. The catheter should be secured with tape to the inner thigh, and in a way that does not alter urine flow. After all of the flushed tubing has been connected, a cough test may be performed to be certain that the vesical and abdominal pressure recordings are appropriate, resulting in a 'zero' of detrusor pressure. Beginning fill rates of 30-50 cc/min are generally chosen, and the fill rate can be altered based on the indication. Once the study begins, the urodynamicist must communicate continually with the patient. Considerable detail should be paid to assessing for measurement artifacts, that the desired information is being obtained and that the patient is providing the appropriate feedback desired. Periodic cough tests are performed to verify accurate recording of the catheters.

If the urodynamicist cannot answer the pre-determined urodynamics question, the study should be adjusted and/or repeated in a manner to obtain these answers. This is not to be delegated to a technician or someone who is not familiar with the formulation and assessment of the urodynamic questions. Simply stated, the interpretation of the study occurs in real time during the study, not after the study is complete. Once cystometry begins, bladder sensation is evaluated by questioning the patient about the degree of fullness. Patients are asked to relay the following sensory events: first sensation, normal desire, strong desire, and urgency. It is also helpful to record other patient sensations if they occur, such as pain or abnormal urgency. In normal bladder function, detrusor storage pressures remain minimal throughout bladder filling. Any detrusor pressure rise that occurs during filling is suggestive of detrusor overactivity, which is a urodynamics term applying to involuntary rises in detrusor pressure during filling. These may be associated with urge and/or leakage of urine. When detrusor overactivity is present, one should document the number of contractions, the volume at which these contractions occur, the amplitudes of the contraction, whether the contractions were spontaneous or provoked, and whether or not the patient could suppress the contractions. A compliance assessment is performed (see above). Capacity is reported as the maximum cystometric capacity and is the bladder volume at the end of filling CMG when the patient has a strong sense of urgency, they cannot delay voiding any longer, and are given permission to void. Following this, the pressure-flow study is performed to determine bladder contractility and uroflow. The determination of bladder outlet obstruction is based on the maximum flow rate and detrusor pressure at maximum flow. It is also useful to document the flow pattern, the volume voided, the presence or absence of abdominal straining, and post-void residual urine.

Clear and accurate reporting is important to insuring urodynamic quality. The previously defined urodynamic questions should be answered in the report. In addition, a standardized report utilizing standardized terminology should be completed. A template can be utilized to ensure completeness.

According to the ICS standards, a quality urodynamics investigation should be performed interactively with the patient, and the dialogue must assure that the symptoms have been reproduced during the study. In addition, artifacts should be avoided and if they occur they are to be corrected immediately. Thus, for these basic standards to be met, it seems intuitive that all urodynamic investigators have requisite technical and interactive proficiency to insure urodynamics quality. The recommendations for urody-

continued on page 12

continued from page 11

namics quality are largely based on formulating the urodynamics question, rigidly defined technique, and vigilant monitoring to insure accurate measurement. These metrics are attainable, but the evidence is convincing that urodynamics technique and interpretation varies widely – even among those clearly defined within the scope of good urodynamic practice. Regrettably, the widespread practice of performing quality urodynamics studies adhering to the technical principles of the ISC Standardization Committees of Urodynamics Best Practices and Terminology is not being realized. Most urodynamic teaching is in the form of classroom didactics, and trainees are fortunate if they can obtain time to simply observe urodynamics testing. In the United States, most urology and gynecology residents complete training without performing 1 urodynamic procedure.[1] A similar situation exists in the UK as over 50% of the clinicians performing urodynamics felt that their training was inadequate.[2] Despite these disclosures of inadequate experience, the number of urodynamics procedures performed by American urologists is increasing exponentially as determined by a review of case logs submitted for board certification.[3,4] This increase in utilization is occurring despite an absence of quality data, which objectively demonstrates the optimal use of these studies. This is problematic, as we will never determine the appropriate application of urodynamic testing in the presence of widespread lapses in urodynamic quality. As leaders in this field, we must acknowledge these problems and take aggressive steps to improve urodynamic quality for the benefit of our patients. Thus, it is up to us to raise awareness of this important problem and institute steps to correct it. We have migrated away from teaching the technique and standards of good urodynamic practice. It seems we have transitioned to teaching urodynamic findings in the context of various disease states. The initial step is to enhance the educational experience and develop educational programs focused on teaching urodynamics. These programs must encompass: best practices, the technical aspects of the study, proper interpretation, and troubleshooting. In addition, proficiency assessment should become a standard for urodynamics testing. The compelling question: How do we achieve these goals for clinicians performing urodynamics?

Fortunately we have a number of tools already in place and in development. As mentioned, the ICS standardization documents serve as cornerstone references; however, they do not provide practical experience. It seems clear, that we must introduce practical experience to enhance the learning of clinicians in formulating, performing, interpreting and reporting urodynamics studies. A variety of urodynamics workshops exist for clinicians to advance their experience. The most notable is the ICS workshop in urodynamics, and it provides comprehensive, concentrated instruction in urodynamics. Its content and approach conform to the current published recommendations of the ICS, and it provides at least 18 contact hours of instruction. The training includes the principles and techniques of urodynamics in clinical practice. Participants receive ample study materials, and they are encouraged to submit UDS studies for further interpretation. Unfortunately, these courses are time-consuming and expensive. This limits the number of clinicians who can participate, and may be impractical to implement on a widespread basis. The need for this type of urodynamic instruction is evident, as urodynamics courses are consistently the most frequently attended at the American Urologic Association Annual Meeting. A potential avenue to teach and disseminate the ICS Guidelines and best practices of urodynamics is via the internet and simulation. Urodynamics is a computer-based technology, which lends itself to this mode to teaching. Many clinicians are taught the technical aspects of catheterization during procedural aspects of training. Thus, either DVD or internet educational programs should easily serve as platforms to teach urodynamics. To date, the ICS guidelines, ICS terminology, and the American Urologic Association Core Curriculum are all completed. The European Union and the AUA are currently drafting guidelines regarding the use of urodynamics. Lastly, SUFU has participated in the development of the Urology Curriculum for Urodynamics Residents (UCUR), which will be a DVD-based educational platform focused on developing the urodynamic questions and performing a technically sound, quality study. These important initiatives may serve as a platform to create a program that will teach and test urodynamics. While DVD-based or internet programs offer a portable platform that will reach clinicians practicing urodynamics, we must strive for a higher standard – robust proficiency testing. To achieve these means, the use of simulation technology should be explored. 'Urodynamics simulation' may encompass the urodynamics core curriculum (established through the above sources) in a standardized program. It may be applicable of minimal expense to all clinicians. Most importantly, it may serve as a platform for proficiency testing – which should become a standard for all 'urodynamicists'.

There is evidence to suggest that training directors desire simulation to enhance the training experience of their residents. In urology, transurethral surgery, laparoscopy, ureteroscopy all are amenable to simulation technology. These have been embraced by program directors and also third-party vendors who desire clinicians to gain as much proficiency as possible apart from actual patients.[5] There are several types of medical simulators (Fig. 2). The technology can be very basic (peg boards) to highly advanced (3D virtual reality). Urodynamics simulation would require a high quality, intuitive computer interface. This would be considered a High-Fidelity (non-biologic) simulator, and this would be of modest expense to construct.[6] Because advanced haptic feedback would not be required, virtual reality technology would not be necessary. Thus, a curriculum can be developed in the form of a urodynamics 'simulation program'. This will facilitate instruction and most importantly testing in the form of urodynamic technique, troubleshooting, interpretation and reporting. Organized organizations, such as ICS, devoted to the advancement of the treatment of lower urinary tract disorders should explore this potential technology. These applications must be balanced in the context of its limitations, which include: costly application, lack of uniform urodynamics standardization, and a paucity of quality data that demonstrates that simulation does not actually improve outcomes. Many would agree that simulation provides ability for the student to practice basic skills, which improves confidence in mastering complex techniques. However it will always be important to recognize that simulation does not teach judgement or professionalism. Clinical instruction will always be needed to create the competent urodynamicist at a cognitive and manual level. ■

Category	Examples	Pros	Cost	Use
Low Fidelity	Peg boards	Widely available Actual inst	+	Basic tasks
High Fidelity				
Biologic	Live animals / cadavers	Dynamic anatomy Haptics	+- ++	Whole procedural training
Non Biologic	High quality Bench models	Actual inst Complex tasks	++	Basic skills Procedural training
Virtual Reality	Lap Sim	Siulates tasks and procedures	+++	Procedural training Skills

WINTERS (2)

Fig. 2: Types of Simulators (Adapted from: Wingall G, et al: J Urol 179:1690-1699, 2008.)

Author:
Jack Christian Winters
Department of Urology, Louisiana State University Health Sciences Center, New Orleans, Louisiana, USA
e-mail: cwinte@lsuhsc.edu

State of the Art 3: Urodynamics in 2009: Utilization, Education and Best Practices, Are They Aligned?, Saturday 3rd October, 10:00-10:30, Hall A

References

1. MUELLER, E, KENTON K, SCARPERO H, WINTERS J. Urodynamics Curriculum for Urology Residents (UCUR). Neurourol Urodyn. 2008;27:137.
2. HOSKER G, KILCOYNE P, LORD J, SMITH A. Urodynamic services, personnel and training in the United Kingdom. BJU. 1997;79:159-162.
3. MUELLER ER. Defining the educational gap in urodynamics training between residency in the first 18 months in practice. J Urol. 2009;1668, pp. 602.
4. MUELLER ER. Urodynamics procedures are on the rise: J Urol. 2009;1669, pp.602.
5. LE C, LIGHTNER D, VANDERLEI L, SEGURA J, GETTMAN M. The current role of medical simulation in American urological residency training programs: an assessment by program directors. J Urol 2008;177:288-291.
6. WINGALL G, et al. Surgical simulation: a urological perspective. J Urol. 2008;179:1690-1699.

Excerpts from:
SCHAFER W, ABRAMS P, LIAO L et al: Good urodynamic practices: uroflowmetry, filling, cystometry, and pressure flow studies. Neurourol Urodyn 2002; 21: 261.
ABRAMS P, CARDOZO L, FALL M et al. The standardisation of terminology in lower urinary tract function: report from the Standardisation Sub-Committee of the International Continence Society. Urology 2003;61:37.
ABRAMS P, CARDOZO L, FALL M. The standardisation of terminology in lower urinary tract function: report from the Standardisation Sub-Committee of the International Continence Society. Neurourol Urodynam 2002;21:167-178.
Scarpero H, Koski M, Kaufman M, Dmochowski R: Urodynamics Best Practices. AUA Update Series. Lesson 9, Volume 28, 2009.

ICS Notes

- The ICS 2009 AGM will take place Friday 2nd October from 15:30-16:30. Please note the new time of the AGM. If you renewed your membership before 20th September 2009 you will qualify for ICS 2009 membership and are encouraged to attend and vote. Members who have joined for 2010 may attend but will have no voting rights. We recommend that you make your way to the AGM during the coffee break to allow for attendees to be recorded on entry. This will allow the AGM to run to schedule
- If you have any questions or queries regarding your membership, ICS educational courses or require any other information on the ICS, please visit the ICS exhibition booth where a member of ICS staff will be able to assist you
- Visit the ICS booth to review abstracts and watch videos. Also renew your membership for 2010 or join the ICS! Also visit the booth to exchange your evaluation form for the certificate of attendance

Promising in vitro data for intended clinical application

A new collagen-based urothelial transplant for reconstructive surgery of the lower urinary tract

TÜBINGEN – The urethra can be reconstructed by self-healing after surgery (urethrotomy, excision, reanastomosis) or by transplantation of free grafts (e. g. buccal mucosa). In recent years, tissue engineering has become a promising technique for the reconstruction of the lower urinary tract.

The methods of tissue engineering aim to develop biological structures to restore, maintain, or improve functions of mammalian tissue. There are two main objectives regarding tissue engineering in reconstructive urology: (1) to provide the surgeon with autologous tissue for urogenital reconstructive purposes and (2) to create the framework for experimental investigations to better understand the structure and function of the tissues involved. Basic techniques for tissue engineering of the lower urinary tract are the isolation of urothelial cells, primary cell culture, and expansion of urothelial cells. Monolayered urothelial cell cultures are then stratified to obtain matrix-free urothelial tissue or seeded on biodegradable matrices. Implantation of such engineered tissue equivalents might be an option for urethral and ureteral reconstruction especially in patients for whom autologous grafts are not available. Suitable matrices have to be biocompatible, induce tissue regeneration, and must be subject to rapid degradation in vivo. Aim of the study was to prove adherence, viability, and growth pattern of human urothelial cells seeded on a new factory-made bovine collagen I-based matrix.

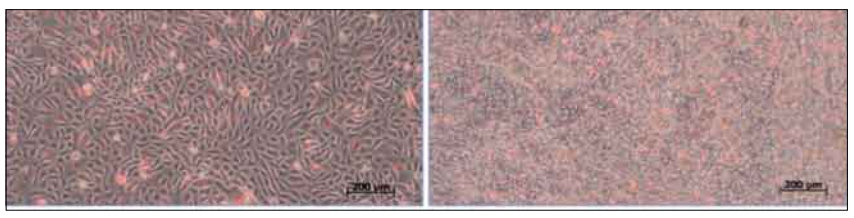


Fig. 1: PKH26-labeled human urothelial cells seeded on standard plastic surface (left) and collagen matrix (right). PKH26 labeled urothelial cells red.

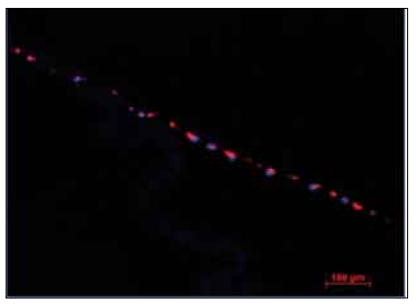


Fig. 2: Cryostat section of urothelial-matrix construct on culture day three. PKH26 labeled urothelial cells red, cell nuclei blue.

Materials and methods

Ureter tissue specimens were obtained from adult patients undergoing open tumor surgery following informed consent according to the ethics committee approval (project number 100/2006V). Urothelial cells were isolated and cultivated in complete keratinocyte serum-free medium (KSFMc). Subconfluent monolayers in culture passage four were detached with trypsin/EDTA, labeled with the red fluorescent cell linker PKH26, seeded on the collagen matrix, and cultivated in KSFMc. As control, cells were seeded on standard plastic surface. The growing urothelial cultures were examined microscopically up to culture day three. Cell adherence was indirectly ascertained by counting non-adherent cells in the culture supernatant. Growth behavior was studied by phase contrast microscopy and cryosections of the populated matrix. Viability of human urothelial cells seeded on the collagen matrix was analyzed with the WST-1 assay.

FEIL (5)

Gerhard Feil

Results

Human urothelial cells grown on the collagen matrix were as homogeneously spread as cells seeded on standard plastic surface (Fig. 1, Fig. 2). At day one after seeding the fraction of non-adherent human urothelial cells was slightly increased (2.2%) compared to the controls (0.3%), whereas at day 3 both groups revealed similar rates (0.4% and 0.3%, respectively, Fig. 3). Viability of human urothelial cells growing on the matrix revealed 111% of the control group at day three (Fig. 4). The cell-matrix constructs could be easily detached from the culture dish and were manageable with surgical instruments.

Although surgical techniques for urological reconstruction have advanced considerably in recent years, the quest for the ideal substitute for sustained urothelial regeneration continues. Tissue-engineered autologous urothelial transplants might expand the reconstructive toolbox. Direct application of tissue-engineered autologous urothelial transplants could replace flaps in open urethral surgery and might be used in endoscopic urethroplasty.

Concluding message

In the last years urothelial cell culture has become a routine laboratory technique. There is sufficient cellular output after isolation and propagation to seed cells as single cell suspensions on biodegradable matrices for the construction of cell-matrix implants. In this study, a good in vitro biocompatibility of the new bovine collagen I-based matrix was demonstrated. We conclude that the matrix might be well suitable for construction of urothelial cell-matrix implants for reconstructive surgery of the lower urinary tract. Further experiments with urothelial multilayers established from bladder washings and grown on the collagen-based matrix will be performed. Especially, tissue-engineered urothelial implants will be characterized by epithelial cell markers. The outcome of the implants will be investigated in an animal model. ■

Authors:
[1]Gerhard Feil, [1]Sabine Maurer, [2]Lothar Just, [1]Jutta Krug, [3]Konrad Kohler, [1]Arnulf Stenzl, [1]Karl-Dietrich Sievert
[1]Department of Urology, Eberhard Karls University, Tübingen, Germany
e-mail: gerhard.feil@med.uni-tuebingen.de
[2]Institute of Anatomy, Eberhard Karls University, Tübingen, Germany
[3]Center for Regenerative Biology and Regenerative Medicine, Eberhard Karls University, Tübingen, Germany

Session 23 (Podium) - Reconstructive Surgery LUT, Saturday 3rd October, 11:00-12:00, Hall B

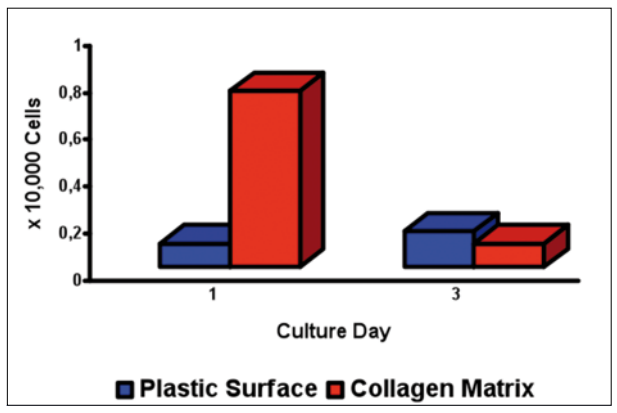


Fig. 3 Amount of non-adherent cells counted in the supernatant of urothelial cultures grown on standard plastic surface (control) and on the collagen matrix.

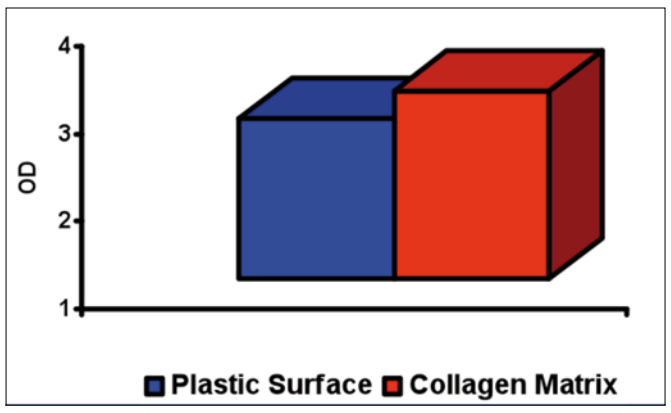


Fig. 4 WST-1 assay for metabolic activity of human urothelial cells seeded on standard plastic surface and collagen matrix.

Treating patients with idiopathic detrusor overactivity

A double blind, placebo controlled, randomised, cross over study of trigone specific injections of Botulinum toxin B

SWANSEA – The biggest question regarding the optimal technique for bladder botulinum toxin injection is whether or not to include the trigone.

The known increased density of sensory receptors in the trigone offers it as an attractive site for the injection in the treatment of idiopathic detrusor overactivity (IDO). However, injecting the trigone, is traditionally avoided as it may be painful, and cause ureteric reflux or stress incontinence if injected too close to the bladder neck. The aim of this double blind, placebo controlled, randomised, cross over study was to assess the feasibility, efficacy and morbidity of TRIGONE SPECIFIC injections of botulinum toxin type B (neurobloc) compared to placebo as a treatment for IDO refractory to conservative therapies.

Materials and methods

Patients with urodynamically proven IDO, refractory to at least 2 anticholinergic therapies, were randomised and given trigone specific injections with either Botulinum Toxin Type B (BTX B) 5000units (chosen deliberately for its known short duration of action) or placebo (normal saline). After 10 weeks they were crossed over to receive the other treatment. All injections were administered using the same anaesthetic method for each patient. 1ml of either placebo or BTX B was injected, using a rigid cystoscope, into 3 sites on the trigone only. Randomisation was computer generated, and patients, practitioners and assessors were blinded to the treatment given. 3 day diaries measured urinary frequency, incontinence episodes, mean functional capacity, nocturia and pad usage at baseline and 2 and 10 weeks post each injection. Quality of life (as assessed by the King's Health Questionnaire and UDI-6) was also assessed at baseline and 2 and 10 weeks post each injection.

Assuming an 80% improvement with BTX B and a 30% improvement with placebo, 20 patients would be required in each group to detect this difference with 80% power (alpha = 0.05). As this is a crossover study 20 patients were required in total.

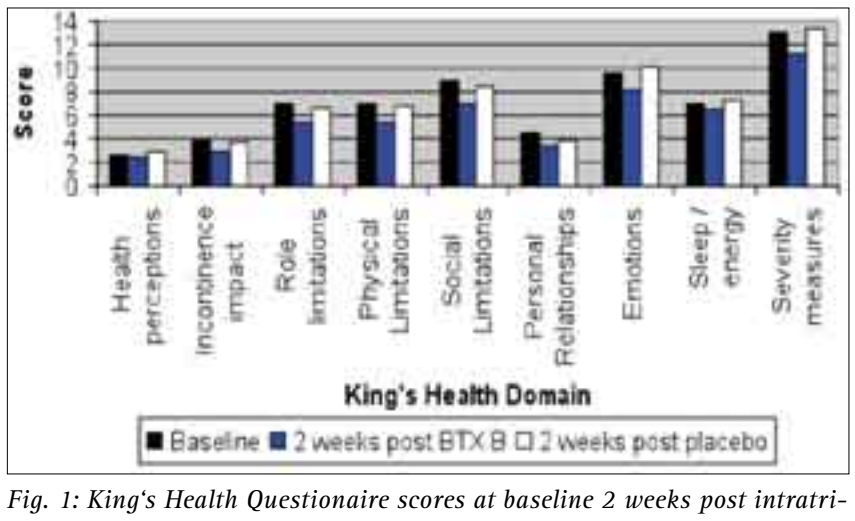


Fig. 1: King's Health Questionaire scores at baseline 2 weeks post intratrigonal BTX B/placebo injection

Results

20 patients with IDO proven on urodynamics were recruited into the study (19 female and 1 male).

The following table summarises the results from the voiding diaries.

Mean UDI-6 score improved from 1.87 at baseline to 1.39 two weeks after trigonal BTX B injection (p=0.02) but this significant improvement was lost by week 10. Mean UDI-6 score was 1.65 two

continued on page 14

continued from page 13

weeks after injection of placebo into the trigone (p=0.06).

The following graph illustrates the results of the King's Health Questionnaires at baseline and 2 weeks post trigonal injection of BTX B or placebo. There was significant improvement in 6 domains following trigone specific BTX B injection. Following 40 injections, 22 patients complained of pain on day one post injection, with a mean pain score of 1.95/10. Interestingly, there was similar rates of muscle weakness and flu-like illness in both the placebo and the BTX B group. Other adverse events recorded were urinary retention, urinary tract infection, and haematuria. Episodes of these events were similar in both the BTX B and placebo groups. All adverse events were self limiting.

Parameter	Botulinum toxin B (p value Vs baseline)	Placebo (p value Vs baseline)	p value BTX B Vs placebo
Mean Voids / 24 hrs:			
Baseline	11.5	11.5	
2 weeks	9.65 (0.009)	10.2 (0.17)	0.008
10 weeks	9.46 (0.013)	9.76 (0.02)	0.35
Incontinence episodes /24 hrs: Baseline			
2 weeks	5.5	5.5	
10 weeks	3.12 (0.0001)	4.17 (0.006)	0.03
	4.19 (0.02)	4.25 (0.02)	0.28
Mean functional capacity: Baseline			
2 weeks	350	350	
10 weeks	386 (0.03)	359 (0.10)	0.35
	357 (0.46)	364 (0.13)	0.40
Nocturia:			
Baseline	1.9	1.9	
2 weeks	1.62 (0.08)	1.98 (0.41)	0.14
10 weeks	1.49 (0.04)	1.89 (0.23)	0.45
Pads used:			
Baseline	3.75	3.75	
2 weeks	2.33 (0.0004)	3.52 (0.29)	0.03
10 weeks	2.88 (0.001)	3.82 (1)	0.27

Table 1: Results of voiding diaries at baseline, 2 and 10 weeks post BTX B and placebo trigone specific injection. p value is determined by 1 tailed student t-test.

MOORE (3)

Katie Moore

Interpretation of results

Trigone specific injection of BTX B gives significant improvements in most measured outcomes at 2 weeks when compared to placebo, without significant adverse events. These effects have worn off by week 10, reflecting the known short duration of action of BTX B. There was minimal change in the measured parameters following trigone specific placebo injection. This finding justifies further investigation of the clinical utility of BTX A in trigone specific or trigone inclusive, compared to trigone sparing injections.

Concluding message

Whilst being short acting, TRIGONE SPECIFIC injection of botulinum toxin B improves the symptoms of idiopathic detrusor overactivity without apparent serious risk. ■

Author:
Katie Moore
Department of Urology, Morriston Hospital, Swansea, UK
e-mail: katiemoore@doctors.org.uk

Session 21 (Podium) - Detrusor Overactivity, Saturday 3rd October, 09:00-10:00, Hall A

Persistent post prostatectomy incontinence

Behavioral therapy with or without biofeedback and pelvic floor electrical stimulation

BIRMINGHAM – Although severe incontinence is temporary for most men after radical prostatectomy, persistent incontinence is not uncommon and has significant impact on quality of life.

While perioperative pelvic floor muscle training has been shown in several high-quality randomized, controlled studies to improve post-operative recovery of continence, there have been no randomized trials of non-surgical therapy for post-prostatectomy incontinence persisting for more than 1 year after surgery. The roles of the technologies of biofeedback and pelvic floor electrical stimulation as adjuncts to electrical stimulation remain to be defined.

GOODE (3)

Patricia S. Goode

Aim of study

The aim of this study was to evaluate the effectiveness of conservative therapies for persistent post-prostatectomy incontinence by comparing a behavioral therapy program with and without biofeedback and pelvic floor electrical stimulation to a no-treatment control condition.

Design

This study was a randomized controlled trial of behavioral therapy with and without biofeedback and pelvic floor electrical stimulation for incontinence persisting 1 year or more after prostatectomy. Between January 2003 and March 2008, volunteers from a University medical center and 2 Veterans Affairs medical centers were stratified by site and by type and frequency of incontinence and randomized to 8 weeks of:

1) Behavioral therapy (pelvic floor muscle exercises & bladder control strategies)
2) Behavioral therapy with in-office, computer-assisted, dual-channel biofeedback and daily home pelvic floor electrical stimulation at 20 Hz, pulse width 1 msec, current up to 100 mÅ,
3) No treatment control (delayed treatment).

Outcome measures:

- 1-week bladder diary
- Expanded Prostate Index Composite (EPIC)
- Patient's Global Perception of Improvement
- AUA Symptom Index Quality of Life Question

Results

208 Men were randomized, and of these 173 (83 %) completed 8 weeks of treatment and were followed for 1 year. There were no group differences in attrition and no difference between completers and non-completers on the baseline variables. The results presented are based on the completer's analysis.

Characteristics of the Participants:

- Age: 51-84 years of age (mean 67 years)
- Race: 26% African American, 72% white, 2% other
- Type of Incontinence: 44% stress incontinence, 2% urge incontinence, and 54% mixed stress and urge
- Time Since Prostatectomy: 1 to 17 years post-prostatectomy (mean = 4 years)

The main outcome was accidents per week as recorded on bladder diary. See figure. Other outcomes are summarized in the Table.

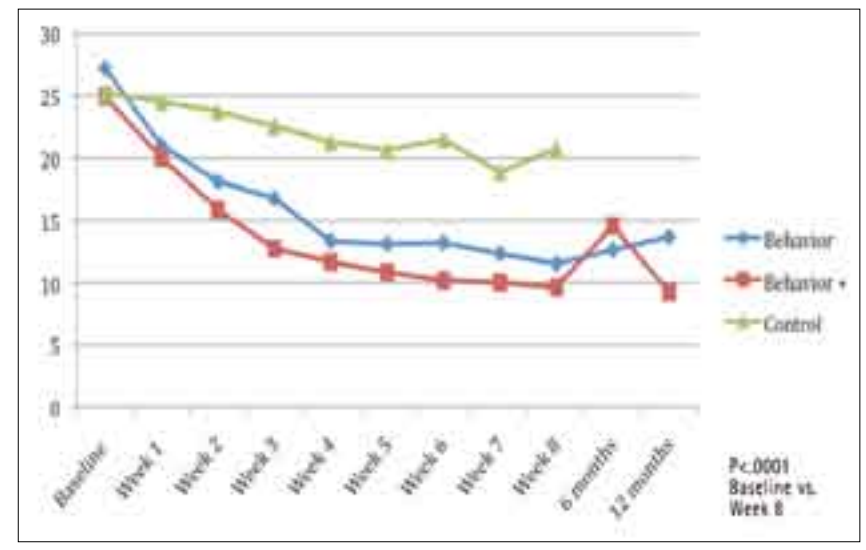


Fig. 1: Accidents per Week on Bladder Diary

	Behavior	Behavior + BF & STIM	Control	p-value
Percent Improvement in Accidents on Bladder Diary [n= 173], mean (std)	61% (39)	65% (39)	29% (58)	<.0001
Change in accidents/ week	27 to 12	25 to 10	25 to 21	
Change in EPIC Urinary Domain [n= 172], mean (std)	12 (10)	8 (9)	3 (8)	<.0001
Change in EPIC Urinary Domain	66 to 77	69 to 78	64 to 67	
Change in EPIC Incontinence Subscale [n= 172], mean (std)	13 (15)	12 (14)	3 (12)	<.0001
Change in EPIC Incont. Subscale	42 to 55	44 to 56	39 to 42	
Patient Perception of Improvement: "Overall leakage is better or much better" vs. "Same, worse or much worse" (n=171)	52/58 (90%)	48/53 (91%)	6/60 (10%)	<.0001
AUA-SI QOL: "If you were to spend the rest of your life with your urinary problem the way it is now, how would you feel about that?" [n=168], n, (%)				.0041
Delighted	2 (3%)	3 (6%)	0 (0%)	
Pleased	11 (19%)	7 (13%)	0 (0%)	
Mostly satisfied	14 (24%)	13 (25%)	8 (14%)	
Mixed	15 (26%)	19 (36%)	17 (30%)	
Mostly dissatisfied	9 (16%)	3 (6%)	14 (25%)	
Unhappy	6 (10%)	6 (11%)	14 (25%)	
Terrible	1 (2%)	2 (4%)	4 (7%)	

BF = biofeedback; STIM = pelvic floor electrical stimulation, EPIC = Expanded Prostate Cancer Index Composite; AUA-SI QOL = American Urologic Association Symptoms Index Quality of Life Question

Conclusions

§ Behavioral therapy (pelvic floor muscle exercises and bladder control strategies) is effective for post-prostatectomy incontinence persisting more than 1 year after surgery. The effectiveness is durable to 1 year following treatment.

§ In-office, computer-assisted, dual-channel biofeedback and home pelvic floor electrical stimulation did not increase the effectiveness of the behavioral therapy.

§ Behavioral therapy should be offered as a first line treatment to men with urinary incontinence persisting after radical prostatectomy, since it can yield significant durable improvement in incontinence and quality of life, even years after the prostatectomy. ■

Authors:
Patricia S. Goode, Kathryn Burgio, Olivio Clay, David Roth, Theodore Johnson II, Jeffrey Burkhardt, Muta Issa, L. Keith Lloyd
Departement of Urology, University of Alabama, Birmingham, USA
e-mail: pgoode@uab.edu

Session 9 (Poster) - Male Incontinence, Thursday 1st October, 16:00-17:30, Hall C

Do tears increase the risk of prolapse recurrence?

Assessment of levator identifies patients at high risk after pelvic floor surgery

SYDNEY – Childbirth-related tears of the puborectalis muscle ('avulsion')[1,2] are likely to be an etiological factor for female pelvic organ prolapse[3], especially cystocele and uterine prolapse.[4]

To determine whether such tears are a risk factor for prolapse recurrence we undertook a long-term audit of anterior colporrhaphy.

Materials and methods

Between 1.1.2002 and 31.12.2005 a total of 242 traditional anterior colporrhaphy procedures had been performed by 7 different surgeons at Nepean Hospital, Sydney. We invited these patients for follow-up including clinical assessment and 4D-translabial-ultrasound (US).[5] All participants gave written informed consent, and ethics approval had been obtained. US volume data was stored and subsequently analysed, blinded against clinical data. An avulsion was diagnosed on tomographic ultrasound (TUI)[6], if at least 2 out of three slices obtained at the level of the plane of minimal hiatal dimensions and immediately above were abnormal on one side. Overall diagnosis and TUI score as explanatory parameters were tested against the outcome parameters of a) symptoms of prolapse, b) significant cystocele ≥ grade 2 on ICS POP-Q, and c) significant cystocele on US (leading edge of the bladder ≥ 10 mm below the symphysis pubis on maximal Valsalva).

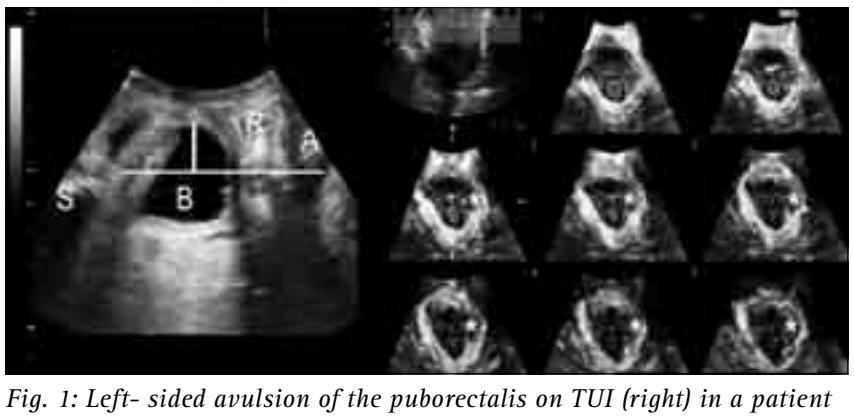


Fig. 1: Left- sided avulsion of the puborectalis on TUI (right) in a patient with symptomatic recurrent cystocele as seen in the midsagittal plane (left) 6 years after vaginal hysterectomy and anterior colporrhaphy. There also is a rectocele. S= symphysis pubis, B=bladder, R= rectocele, A= anal canal.

Results

Of 242 eligible patients we were able to contact 171 women (71 %), of whom 91 agreed to attend (53 %). Eight patients were excluded due to later surgery affecting the anterior vaginal wall (n=5) or because they had not undergone an anterior colporrhaphy. One other patient suffering from an incidentally discovered urethral diverticulum was also excluded, leaving 83. All analysis relates to this dataset. Mean age at assessment was 61 (34-86), mean follow-up interval was 4.5 (3-6.4) years. 35 women had also undergone a vaginal hysterectomy, 41 a posterior repair, and 12 a suburethral sling. Mean BMI was 28.4 (18-45). Median vaginal parity was 3 (1-9), and 24 (29 %) reported a previous hysterectomy. Of 83 women, 54 (65 %) were satisfied with the outcome, and 59 (71 %) felt improved or cured. Symptoms of recurrent prolapse were reported by 24 (29 %). On clinical examination the mean for point Ba was –1 (range, -3 to 6). In 33 cases (40 %) we diagnosed a recurrent cystocele (ICS POP-Q stage 2 or higher). There was one uterine prolapse (stage 2+), three enteroceles and 22 rectoceles (27 %). In total, we found a prolapse of stage 2 or higher in 45 women (54 %).

Hans-Peter Dietz

DIETZ (3)

In total, 34 (41 %) women were found to have a significant cystocele on US (leading edge ≥ 10 mm below the symphysis pubis). Levator avulsion was detected in 28 women (34 %). It was more commonly found on the right (n=24) than the left (n=15), was unilateral in 17 (21 %) and bilateral in 11 (13 %). The median TUI score was 2 (range, 0-16). There was no association between recurrent symptoms of prolapse, patient satisfaction or subjective cure/ improvement and objective prolapse (p= 0.34, p= 0.59 and p= 0.64).

A significant cystocele was detected on US in 23/ 29 women with avulsion (79 %), and in 11/54 (20 %) of those without (p< 0.001). This equates to a relative risk of 3.9 (CI 2.4-5.8). Similar figures were obtained on clinical examination: of 54 women without avulsion, 13 (24 %) had a cystocele stage 2 or higher, whereas this was the case for 69 % of those with avulsion (20/29). Table 1 shows relative risks for recurrence. TUI scores were higher in women with a significant cystocele seen on US (7.7 vs. 2.5, P< 0.001) or on clinical examination (3 vs. 7, p= 0.002), but there was no association between prolapse symptoms and avulsion.

	Clinical cystocele	Cystocele to >= 10 mm below
	Stage 2+ ICS POP-Q	the symphysis on US
No avulsion	1	1
Unilat. avulsion (n=17)	RR 2.9 (1.7-4.4)	RR 3.8 (2.1- 5.5)
Bilat. avulsion (n=12)	RR 2.8 (1.4-4.3)	RR 4.1 (2.2-5.4)

Table 1: Relative risks (Confidence Intervals) for clinical and sonographic recurrence of significant cystocele in women with avulsion. US= translabial ultrasound

Discussion

Cystocele recurrence after traditional anterior colporrhaphy is common at follow-up after 3-6 years. In this series we detected a recurrent cystocele in 40 % on clinical examination, and in 41 % on ultrasound. Recurrence was strongly associated with levator trauma. The relative risk of prolapse recurrence in women with avulsion was 3.9 (CI 2.4-5.8) when ultrasound criteria of recurrent cystocele were used, and 2.9 (CI 1.7-4.5) when using the criterion of a stage 2+ cystocele on ICS POP-Q assessment. Patient satisfaction was relatively low at 65 %, even though recurrent prolapse often was asymptomatic. Prolapse symptoms were not associated with avulsion, probably because of the confounding effect of prolapse in other compartments. Rectoceles were common (stage 2+ in 27 % or all women), and this condition is known not to be associated with avulsion.

Conclusion

In conclusion, levator avulsion carries a relative risk of 3-4 for cystocele recurrence after anterior colporrhaphy. Levator assessment can identify patients at high risk of recurrence and may be useful as a selection criterion prior to mesh implantation. ■

Authors:
Hans Peter Dietz, Varisara Chantarasorn, Ka Lai Shek
Department of Obstetrics, Gynaecology and Neonatology, Nepean Clinical School, University of Sydney, Australia
e-mail: hpdietz@bigpond.com

Session 27 (Poster) - Pelvic Floor & Lower Bowel, Saturday 3rd October, 13:30-14:30, Hall E

References

1. Obstet Gynecol 2005;106:707-712.
2. Obstet Gynecol 2006;107(1):144-9.
3. Obstet Gynecol 2007;109(2):295-302.
4. Br J Obstet Gynaecol 2008;115:979-984.
5. Obstet Gynecol 2004;23(6):615-625.
6. Ultrasound in Obstetrics & Gynecology 2007;29:329-334.

Association between stimulation parameters

Implantation of sacral nerve stimulator and explantation after successful implantation

TORONTO – Sacral neuromodulation is a relatively new technique which has been proven to be an effective treatment modality for voiding dysfunction refractory to conservative and medical treatment.

In 1997 and 1999, the U.S. Food and Drug Administration has approved, the InterStim® devise (Medtronic, Minneapolis, Minn), for refractory urge urinary incontinence, urinary frequency and urgency, and non obstructive urinary retention respectively.

The procedure carried out initially as screening test, percutaneous nerve evaluation (PNE), then permanent implantation for respondent patients. Since its introduction, several modifications in the technology have lead to changes in the surgical technique and subsequently reducing the system related complications. Despite all modifications failures of the implanted system and loss of its efficacy without determined mechanical causes have been occurring. This study was sought to determine the association between stimulation parameters at the time of implantation and the loss of neurostimulation efficacy over long-term follow-up.

Yahia Ghazwani

GHAZWANI (3)

Materials and Methods

Between 2002-2007 we had 120 patients who underwent sacral neuromodulation for voiding dysfunction using InterStim ®, of which, 14 patients (11.6 %) were permanently explanted due to pain (5/14) and loss of efficacy (9/14). We retrospectively reviewed the charts of patients who were explanted due to lack of efficacy, and compared their voiding behaviour (voided volume/void) and stimulation parameters (amplitude and impedance) to a group of 12 positive responders who were well-matched for sex, age, duration of symptoms, waiting period for implant and duration of implantation. Prior to implantation, all patients were required to pass a PNE-screening-test that showed >50 % improvement in voiding parameters over a 1-week period. A 2-tailed t-test was used to determine differences in voiding parameters and stimulation parameters between both groups. The significance was set at p<0.05.

Results

All 9 patients who had loss of efficacy were females, mean age was 47.31 ± 14.42 years, 6 patients (67 %) were implanted for urgency/frequency symptoms, and 3 patients (33 %) were implanted for urinary retention. The duration of stimulation was 3.87 ± 2.72 years, the duration of symptoms was 5.32±1.5 years, and the waiting period for implantation was 2.9 ± 0.63 years.

Comparison was done to 12 female patients, mean age was 45.28 ± 11.89 years, 7 patients (58 %) were implanted for urgency/frequency symptoms, and 5 patients (42 %) were implanted for urinary retention. The duration of stimulation was 4.53 ± 1.06 years, the duration of symptoms was 5.24 ± 1.42 years, and the waiting period for implant was 2.6 ± 0.8 years. All patients had their implantable pulse generator implanted at the upper gluteal area, and tined leads were used for all patients. Improvement in voided volume/void in the urge/frequency patients was significantly lower in the explanted group due to loss of efficacy (43.6 ± 3.2 ml) than non-explanted group (75.2 ± 11.37 ml) (p=0.028). The base line amplitude levels in patients who lost the efficacy were significantly higher than non-explanted group (2.08 ±

continued on page 16

continued from page 15

0.35v) vs (1.27 ± 0.25v) (p=0.008). The amplitude difference between the baseline and 4 years follow-up was significantly higher in explanted group than non-explanted (3.1 ± 1.2v) vs (0.7 ± 1.8v) (p=0.04). The impedance levels in explanted group were significantly higher than non-explanted group (1032.4 ± 181 Ω) vs (590 ± 44.6 Ω) (p=0.025).

Discussion

Loss of efficacy leading to explantation of the entire InterStim® system was reported to be 5.6 %. Those patients had normal impedance testing levels, and there were no clear reasons to be identified other than disease progression, interference at the lead/tissue interphase with impulse or central nervous system factors. (A. Hijaz et al 2006). Sutherland et al. 2007 reported a long term study on InterStim®-therapy in one institute authors pointed out that the loss of efficacy is more prevalent in non-tined leads compared to tined leads. Complications leading to explantation in our study were pain and loss of efficacy. There were no mechanical reasons to be attributed to the lack of efficacy after a period of good response. The impedance testing which was within normal range became significantly higher in patients who had loss off efficacy.

Also, the amplitude measurements were significantly higher in this group of patients whether at initial stimulation or during follow-up programming sessions. These high amplitudes could be related to interference at the lead/tissue level, and might have progressed over time to complete loss of efficacy.

Conclusions

High stimulation parameters at the time of implantation may contribute to loss of efficacy and explantation on the long term follow-up. ■

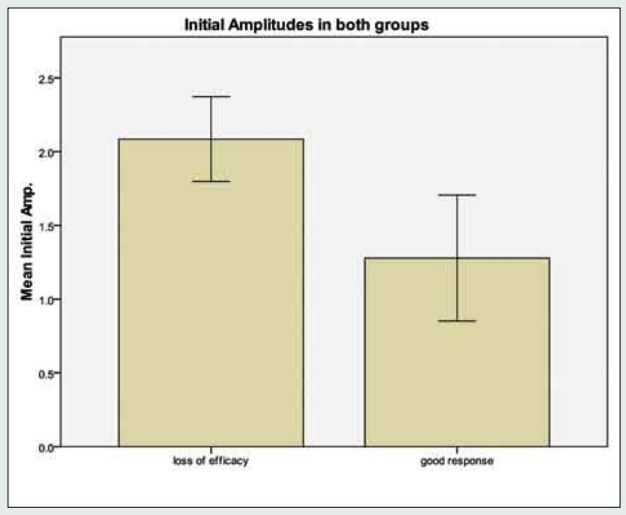


Fig. 1

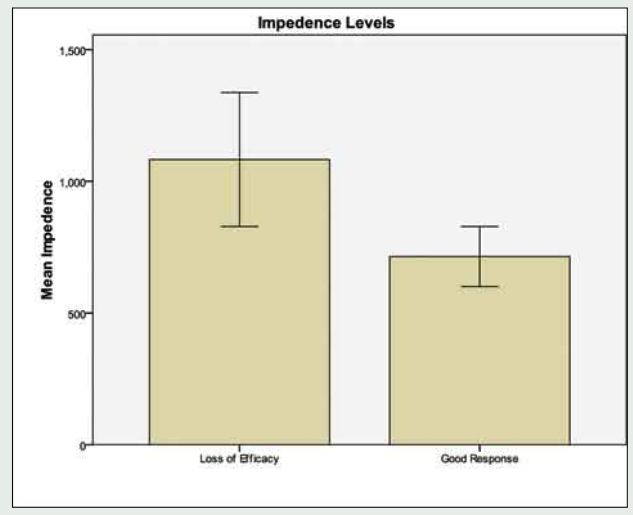


Fig. 2

Authors:
Yahia Ghazwani, Mohamed Elkelini, Magdy Hassouna
Toronto Western Hospital, University Health Network, University of Toronto, Canada
e-mail: yahia_ghaz@hotmail.com

Session 5 (Poster) - Neurourology (Clinical), Thursday 1st October, 13:30-15:30, Hall B

References:

HIJAZ A, VASAVADA SP, DANESHGARI F, FRINJARI H, GOLDMAN H, RACKLEY R. Complications and troubleshooting of two-stage sacral neuromodulation therapy: A single-institution experience. Urology 2006;68,3:533-7.

SUTHERLAND SE, LAVERS A, CARLSON A, HOLTZ C, KESHA J, SIEGEL SW. Sacral nerve stimulation for voiding dysfunction: One institution's 11-year experience. Neurourology and Urodynamics 2007;26,1:19,28; discussion 36.

Potential on becoming first line tool: the Argus-System

Adjustable transobturator sling for the treatment of post radical prostatectomy urinary incontinence (PRPUI)

SAO PAOLO – Slings have been used to treat PRPUI in many people suffering from this condition; particularly those seeking less expensive and simpler options than an artificial sphincter.

Slings have proven efficacy in the short-term but many continent patients after a sling procedure present with recurrence of incontinence after some months. Adjustable slings were developed to permit postoperative modification of sling tension leading to the recovery of continence in some cases; as well as to reduce the tension in the slings in cases of postoperative urinary retention. One of the major concerns in using slings in men was bladder perforation. Patients with removal of the prostate can have the bladder very close to pubic bone making careful cystoscopy obligatory in this surgery.

The Argus system comprises a 4.2x2.6x0.9 cm thick silicone foam pad for soft bulbar urethral compression (Fig. 1). This pad is attached to the silicone cone columns that, after being passed with needles from the perineum to the abdominal wall, are adjusted with silicone washers to regulate and keep the desired tension against the urethra. The pad and washers are radio-opaque, which allows their position to be assessed during follow-up.

The Argus-T® uses the same sling pad placed and fixed through the transobturator foramen. The surgical approach consists of a perineal midline incision and dissection of bulbous urethra along with the bulbospongiousus muscle. The dissection continues in order to identify the penile crus bilaterally. A one centimeter incision is made bilaterally 3 cm bellow the insertion of the major aductor muscle. An special needle (Fig. 2) is inserted in this incision through the obturator foramen towards the region lateral to the dissected urethra and beneath the penile crus and the ischipubic ramus. The sling end is attached to this needle and withdrawn through the foramen bilaterally (Fig. 3). The ends of the sling are fixed in the subcutaneous tissue using an adjustable silicone whashers to permit late postoperative adjustments if necessary.

We evaluated the efficacy and safety of Argus-T® to treat post prostatectomy urinary due to sphincter deficiency in 37 patients at 5 centers in 3 countries. Of the 37 patients, 30 had undergone radical prostatectomy and 7 adenomectomy. Mean age was 69 years. Preoperative and postoperative evaluation included pad weights, Quality of Life evaluation (QoL) using a visual analogue scale (VAS) as well as the International Consultation on Incontinence Questionaire – Short Form (ICIQ-SF). All patients underwent preoperative urodynamic evaluation. Follow-up ranged from 7 to 19 months (mean = 10 months).

There was a significant reduction in incontinence as expressed by the pad weight, decreasing from a mean of 100 to 1500 ml/day (mean= 750 ml) to 50 to 500 ml/day (mean= 67.5 ml) ($p < 0.001$). At last follow up 28 patients (75.7 %) were dry or wearing one pad a day, 5 (13.5 %) improved and 4 (10.8 %) unchanged. QoL improved significantly; the observed reduction in ICIQ-SF score was a reduction from 18.81 (12 to 21) to 3.0 ($p < 0.05$). QoL also improved as evaluated by VAS from 8.9 to 2 ($p< 0.05$).


ROCHA (4)

Flavio Trigo Rocha

Adjustments is order to recover continence were necessary in five patients (13 %). No operative complications were recorded. Adverse events included perineal pain in two patients and erosion in one.

We concluded that Argus T® is a safe, effective treatment for PRPUI. The adjustability allows recovery of continence in patients who are dry initially but begin to leak again. Argus-T® may become a first line tool for treating PRPUI however longer follow-up is necessary to confirm its efficacy and safety. ■

Author:
Flavio Trigo Rocha
Division of Urology, São Paulo University, São Paulo, Brazil
e-mail: trigorocha@hotmail.com

Session 17 (Podium Video) - Videos - Surgical Techniques II , Friday 2nd October, 13:30-14:30, Hall A

Fig. 1: Foam pad for soft bulbar urethral compression

Fig. 2: Special needle

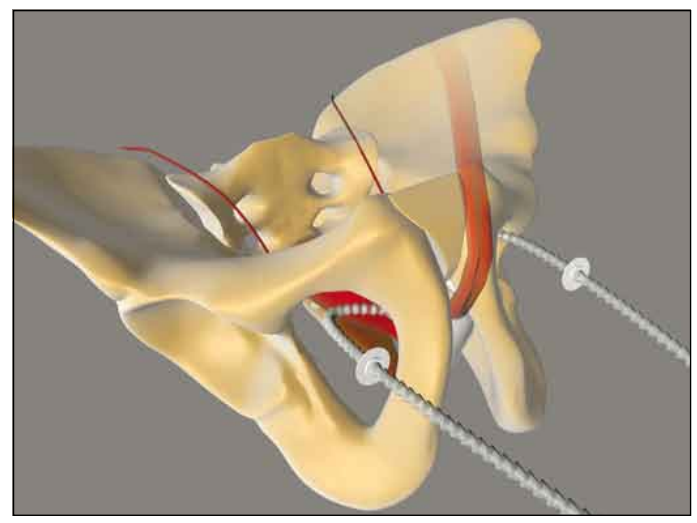


Fig. 3: Insertion of the Argus System in the foramen bilaterally

Call for larger studies

Real-time measurement of oxyhemoglobin concentration changes in the frontal micturition area: an fNIRS study

SAKURA – The frontal cortex has been regarded the higher center for micturition. The reason for this claim is the fact that lesions in the frontal cortex, e.g., the prefrontal cortex, the medial superior/middle frontal gyri, the anterior cingulate cortex and the supplementary motor area, produce marked lower urinary tract dysfunction in humans.

Functional neuroimaging in normal volunteers, using SPECT, PET and fMRI, is able to show brain activation in response to bladder fullness and urination. The activated areas strikingly overlap the lesions described in clinical studies. However, question arises what occurs in the brain in between the onset and offset of bladder filling, or the onset and offset of urination. In order to answer this question, we aimed to real-time measure cortical activity in the frontal micturition area using functional near-infrared spectroscopy (fNIRS), in response to a quasi-natural, continuous bladder filling and urination in a sitting position.

Materials and methods

We recruited 9 subjects with informed consent. Control group comprised 5 subjects; one man and four women; mean age 61 years (38-70), with normal detrusor, and detrusor overactivity group comprised 4 subjects; all men; mean age 55 years (33-65). One of them also had a low compliance detrusor. The probe array for fNIRS is equipped with 16 light emitting and 17 detector probes, 52 channels can be measured simultaneously (Fig. 1). Concentration changes in oxy-Hb were calculated based on a modified Beer-Lambert approach. The probe array covers the area 8, 10, 44, 46, and more anterior parts of the frontal cortex.

Results

In the control group, 1) slight increase of oxy-Hb before first sensation occurred, 2) continuous increase of oxy-Hb during bladder filling to the point just after start voiding, 3) continuous decrease of oxy-Hb after voiding, 4) in subjects who were unable to urinate, oxy-Hb also decreased after attempting to void, 5) the area activated are bilateral, lateral, prefrontal area, particularly Brodmann's area 8, 10 and 46 (Fig. 2). In the detrusor overactivity group, 6) increase of oxy-Hb before first sensation was rare and frontal cortical activation was weak. Otherwise the results were almost the similar with those in the control group.

Interpretation of results

fNIRS has some technical issues to be explored, e.g., it is not possible for fNIRS to measure deep brain structures such as the basal ganglia and the thalamus. Spatial resolution of fNIRS is not superior to PET and SPECT, and quantification of fNIRS data is not completely comparable between subjects. Nevertheless, the 'mismatch' between bladder filling volume and bladder sensation was observed during continuous bladder filling by fNIRS, e.g., brain activation started before the subjects had the first sensation. The results may indicate that activation in the prefrontal cortex is related with the bladder volume more than subjective bladder sensation. Another 'mismatch' was observed by fNIRS that brain activation subsided in subjects with unsuccessful urination, where interaction between efferent copy (even urination was unsuccessful) and afferent inputs seemed not negligible.

SAKAKIBARA (3)

Ryuji Sakakibara

Concluding message

We performed real-time measurement of oxy-Hb changes in the frontal micturition area using fNIRS in response to quasi-natural, continuous bladder filling and voiding in a sitting position. The present study calls for a larger study to ascertain relationship between brain and micturition in a natural environment. ■

Author:
Ryuji Sakakibara and colleagues
Neurology Division, Department of Internal Medicine, Sakura Medical Center, Toho University, Sakura, Japan
e-mail: sakakibara@sakura.med.toho-u.ac.jp

Session 30 (Poster) - Anatomy & Imaging, Saturday 3rd October, 15:00-16:00, Hall D

Relevant references

ANDREW J, NATHAN PW. The cerebral control of micturition. Proc Roy Soc Med. 1965;58,553-555.
DASGUPTA R, KAVIA RB, FOWLER CJ. Cerebral mechanisms and voiding function. BJU International. 2007;99:731-734.
GRIFFITHS D, TADIC SD, SCHAEFER W, et al. Cerebral control of the bladder in normal and urge-incontinent women. NeuroImage. 2007;37,1–7.
HOSHI Y. Functional near-infrared spectroscopy: potential and limitations in neuroimaging studies. Int Rev Neurobiol 2005;66:237-266.
SAKAKIBARA R, HATTORI T, YASUDA K, et al. Micturitional disturbance after acute hemispheric stroke: analysis of the lesion site by CT and MRI. J Neurol Sci. 1996;137,47-56.
STRANGMAN G, BOAS DA, SUTTON JP. Non-invasive neuroimaging using near-infrared light. Biol. Psychiatry 2002;52:679-693.

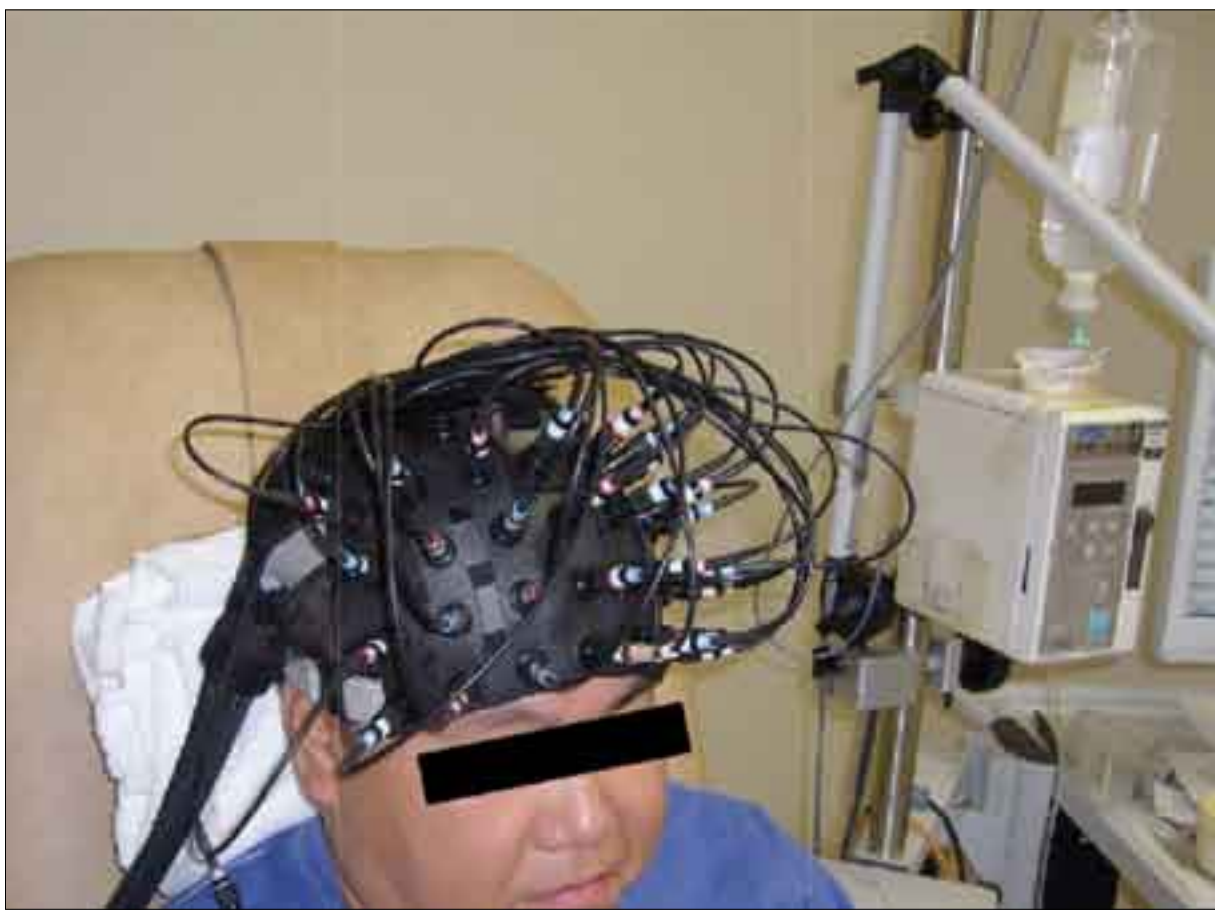


Fig. 1: Head gear with the probe array for fNIRS. Upper panel: The head gear is small and light (hundreds of grams). Lower panel: The head gear is equipped with 16 light emitting and 17 detector probes, and 52 channels can be measured simultaneously.

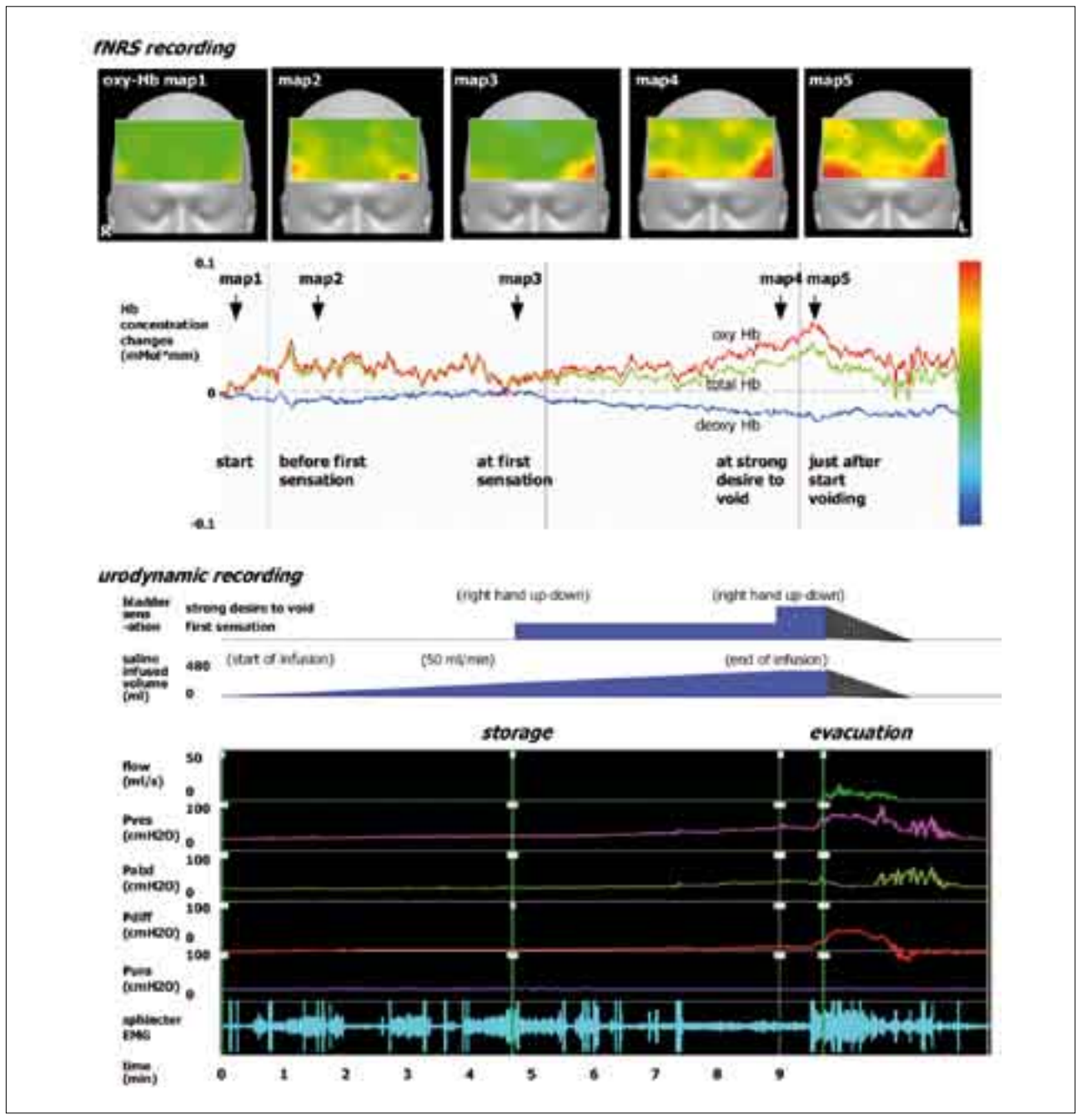


Fig. 2: Urodynamic and fNIRS recordings (normal detrusor, urination successful).Upper panel: fNIRS recording. Lower panel: urodynamic recording. fNIRS: functional near-infrared spectroscopy, Pves: vesical (bladder) pressure; Pabd: abdominal (rectal) pressure; Pdiff: differential detrusor pressure = Pves - Pabd; EMG: electromyography. In the storage phase, water cystometry (infusion rate of 50 ml/min) showed a normal volume at the first sensation of 231 ml and at the bladder capacity of 484 ml. Oxyhemoglobin (Oxy-Hb) concentration increased gradually during the storage phase, which started before the first sensation. In the evacuation phase, she could contract her bladder voluntarily. The sphincter EMG sound disappeared completely during voiding. Just after voiding started Oxy-Hb had its peak, then gradually returned to the baseline. The location of the peak Oxy-Hb increase within the probe array corresponded to Brodmann's areas 10 and 46 of the prefrontal cortex bilaterally.

There are still gaps in our knowledge

The role of prognostic indicators associated with poor outcome in stress urinary incontinence

MAASTRICHT – Stress urinary incontinence (SUI) is a common health problem with a major burden on the health care system, implying increasing costs to society.

Pelvic floor muscle training (PFMT) is generally considered as the first-line intervention for women with stress UI. It is relatively cheap and has hardly any adverse effects. Systematic reviews of randomized clinical trials have shown that PFMT alone (or with adjunctive therapies) is an effective intervention for women with stress UI, with ‚cure/improvement' rates ranging from 50 % to 97 %. However, definitions of 'cure' or 'improvement', as well as the populations, type and duration of interventions studied were highly variable and the presence of prognostic factors may differ between and within these studies. There are still gaps in our knowledge on prognostic indicators associated with poor outcome.

For this reason we started this prospective, multi-centre, cohort study from August 2002 until December 2004. Data were collected among women with a primary or recurrent episode of SUI referred for physiotherapy intervention by general practitioners (GPs) or urogynaecologists. Stress UI was defined as involuntary leakage during effort, exertion or sneezing and/or coughing. 71 physiotherapists experienced in women's health, who had commented on the draft Dutch physiotherapy guideline on 'Stress UI in adult women' during its development, were invited to participate in this study. 36 of the 71 eligible physiotherapists (51%) agreed to participate and were given a short training. They were also prepared for this study in two interactive educational meetings. Instructions were given for using the standardized patient questionnaires, outcome measures and physical examination to collect patient data. The cohort of patients treated by these physiotherapists was followed from the initial visit to the end of physiotherapy intervention. Physiotherapy intervention ended when no further improvement was expected.

We defined two primary outcomes: the 'Leakage Severity' subscale of the PRAFAB-questionnaire (PRAFAB-Q) and the binary GPE score. Scores on the LS scale range from 3 to 12. A higher total score indicates more severe condition. Recovery on the binary LS scale was defined as ≤ 4 points, which is almost the best attainable score for the items of frequency, amount and protection.

All 267 women included in the cohort completed the baseline questionnaire items, PRAFAB-Q scores and the outcome measurements 12 weeks after the initiation of physiotherapy intervention. The mean number of women included per physiotherapist was 7.8 (SD = 2.4; min-max = 4-12). 54 % of the women had been referred by GPs, the others by urogynaecologists. The median time span between the first symptoms of stress UI and enrolment was 2 years (1st-3rd IQ range = 1-10), with about 60 % enrolling within 3 years. The majority of included women (85 %) were classified as having stress UI and 15 % as mixed but predominantly stress UI. About two-thirds of the included women were over 45 years of age. The mean baseline UI severity in terms of total PRAFAB-Q score was 12.2 (SD = 2.4; min-max 8-18 points) while 30 % (n = 81) were classified as having severe baseline stress UI (≥ 14 points on the PRAFAB-Q). The physiotherapists recorded a mean number of 9.5 sessions (SD=3.2) per patient. 235 (88%) patients ended the physiotherapy intervention within 12 weeks (mean = 9.2 weeks). The remaining 32 patients ended the intervention within 16 weeks (mean = 13.6 weeks). The sessions lasted approximately 30 to 40 minutes. There were no significant differences in mean number of sessions between improved and non-improved women. None of the patients reported adverse effects. About 43 % (n = 116) of the patients were recovered as defined on the binary LS scale, and 59 % (n = 158) as defined on the binary GPE score. The association between age as a continuous indicator and the log odds of poor outcome showed no association until the age of 45, and a continuous linear effect above this age. Most of the selected prognostic indicators were univariately associated with a poor outcome in both the outcome measures.

The final multivariable logistic regression analyses resulted in 12 prognostic indicators associated with recovery based on the binary LS scale (P-value ≤ 0.1), 11 of which were associated with a poor outcome. They included lower education compared to those with a high education, mixed UI, severe stress UI, peri- and post-menopausal status, POP-Q stage III, poor outcome of physiotherapy intervention for a previous UI episode, prolonged second stage of labour (> 90 minutes), BMI greater than 30, high psychological distress, poor physical health and co-morbidity.

The results of the final multivariable logistic regression analyses of factors associated with a poor outcome on the GPE score comprised eight prognostic indicators, seven of which coincided with those found on the binary LS scale. Indicators associated with a poor outcome were severe stress UI, POP-Q stage III, poor outcome of physiotherapy intervention for a previous UI episode, three or more vaginal deliveries, prolonged second stage of labour (> 90 minutes), BMI > 30, high psychological distress and poor physical health. Two indicators with a P-value ≥ 0.50 were not included in the multivariable logistic regression model based on the binary GPE score, viz. co-morbidity and age.

Conclusions

This study provides consistent evidence of clinically meaningful prognostic indicators of poor short-term outcome. These findings need to be confirmed by replication studies. ■

Author:
Erik J.M. Hendriks
Department of Epidemiology, University, Maastricht, School for Public Health and Primary Care, CAPHRI at Maastricht University, Centre for Evidence Based Physiotherapy, Maastricht University, Maastricht, The Netherlands
e-mail: Erik.Hendriks@EPID.unimaas.nl

Session 14 (Poster) - Epidemiology, Friday, 2nd october, 11:00-12:30, Hall C

Changing pattern of urinary incontinence in middle-aged women

Combined effect of decreased incidence and increased remission rates

BERGEN – UI is a subjective symptom that can be presented in a variety of ways depending on type, frequency and amount of leakage. It can be perceived as a part of normal life without any negative impact or it can be a major physical or psychological health issue.

Many factors can affect the development, progression and remission of UI, and together they increase the complexity of the natural history of UI, which is not yet fully understood. In particular, the transitional state of menopause in middle-aged women induces many hormonal changes. Reviews have revealed an intriguing pattern of an increasing prevalence by age reaching an early peak in midlife and then, after a slight decrease, a further steady increase among the elderly. Principally a decrease in prevalence can be due to treatment of UI patients, remission of existing UI or decreased incidence. The latter can be due to several mechanisms and factors; a true biological effect, a reduced magnitude or level of precipitating factors (e.g. sports or physical activity), an increased acceptance of existing symptoms as non-significant or also an age-dependent change in how women respond to surveys. So far, there are no studies scrutinizing reason(s) of this change.

In order to analyze details of the natural history of UI in middle age women, we used data from a prospective cohort study with several follow-ups and detailed information about UI. The aim of this prospective cohort design study was to investigate the prevalence, incidence and remission patterns of UI in middle aged women including type and severity. We especially wanted to search for a possible prevalence peak, using information from the same group of women during several waves of data recording. If such a peak was found, we wanted to determine how it was influenced by changes in incidence and remission rates.

JAHANLU (3)

David Jahanlu

The cohort was established in 1997 based on the Hordaland Health Study (HUSK). From the HUSK female source population aged 40–44 (n=14.349), 2.230 women consented to take part in the study. Postal questionnaires, which were almost identical each time, have been sent to the participants every second year. In 2008 the cohort reached to the tenth year of follow-up with six waves included. The age range of the participants was 41-45 in the first, and 51-55 in the sixth wave of the cohort. A total of 1.430 (64.1 %) women answered all six questionnaires and are included in the present analyses. They were sorted by age in different waves and in the age span of 41-55 years we defined eight age groups (age span of two years in first 7 groups and age 55 solely in the last one). An incontinence severity index (ISI) developed by Sandvik et al. was used to characterize the severity of incontinence. "Continent" was defined as ISI equal to zero, all other women were defined as having "any UI".

Our study confirms that the point prevalence of any UI in middle-aged women steadily increases by age until it reaches a peak in the age groups of 51-52 years. There is then a decrease in prevalence. We have found, however, the decrease is due to a combined effect of decreased incidence and increased remission rates. The mechanisms behind the decreased incidence, increased remission and thus the reduction in prevalence are not known, and dimensions like physiological changes, treatment effects and explanations associated with epidemiological methodology should be further investigated. ■

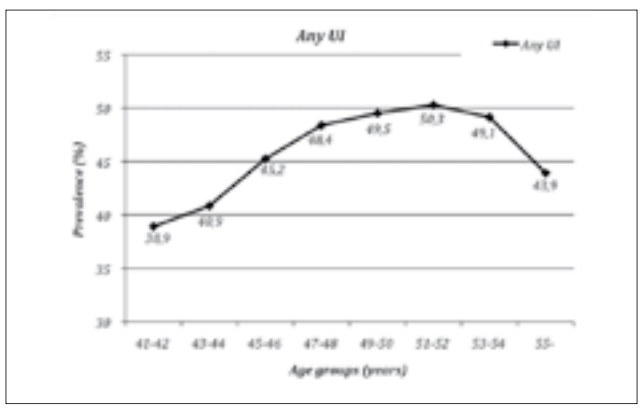


Fig. 1: Shows the prevalence of any UI in the eight age groups. The prevalence increased by age up to the sixth age group and then decreased in the seventh and eighth age group. Relative increase in prevalence rate from the first age group to the peak was 29% (p<0.001) for any UI.

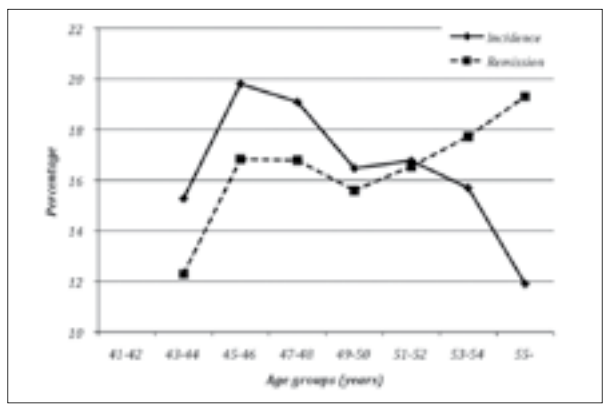


Fig. 2: Shows the two-year incidence and remission of any UI by age groups. The patterns for incidence and remission of any UI are very similar up to the sixth age group, then the curves markedly separated as incidence decreases and remission increases for the seventh and eighth age groups.

Authors:
David Jahanlu, Steinar Hunskaar
Section for General Practice, Department of Public Health and Primary Health Care, University of Bergen, Norway
e-mail: Steinar Hunskår steinar.hunskar@isf.uib.no

Session 12 (Podium) - Epidemiology, Friday 2nd October, 08:30-10:30, Hall A

Effect of "The Knack" on the Pelvic Floor

Evaluated by 2D Real Time Ultrasound and Image Processing Methods

SOUTHHAMPTON – Despite extensive investigation, in part due to the lack of suitable instrumentation, the mechanisms by which pelvic floor muscle (PFM) training in women with stress urinary incontinence (SUI) does or does not work are poorly understood.[1]

Successful conservative treatment has concentrated upon strength training of the PFM in addition to adding "The Knack" which is a PFM contraction prior to and during activities that increase intra-abdominal pressure (IAP).[3-5] Most PFM measurement tools have concentrated on the ability to measure strength of voluntary PFM contraction, whereas other qualities of PFM function may be at least as critical for effective treatment. Further complicating our understanding about how and why PFM training reduces urine leakage is the fact that many research studies that report an emphasis on strength training also imply that "The Knack" manoeuvre was taught at the same time.[6-10]

In an attempt to understand the therapeutic mechanisms of "The Knack, two studies have examined "The Knack" manoeuvre as a treatment approach alone, without concurrent strength training.[11,12] These studies suggest that "The Knack" temporarily increases both the stiffness in the support of the urethra and pressure within the urethra, thereby resisting leakage during rises of IAP.

Yet there still remains only partial understanding of the how "The Knack" may work and why in a proportion of women it fails to show any reduction in leakage volume.[12] In their latest study[12], twenty percent of their study failed to show any reduction in leakage volume in comparison to a cough without any PFM pre-contraction.

The aim of this current study was therefore to gain greater understanding of the mechanisms of "The Knack", describing the kinematic properties of the PF in continent and SUI women by measuring the displacement, velocity and acceleration of the ano-rectal angle (ARA) and the urethra. We hypothesised that during "The Knack" there would be less dorso-caudal displacement, velocity and acceleration of the urethra in continent women than in women with SUI.

Methods

With the ultrasonic transducer placed on the perineum in a mid sagittal orientation (Fig. 1a), 32 women performed "The Knack" with the command "Squeeze around the back passage, as if you were trying to prevent breaking wind (flatus); bring that feeling forward towards the urethra/pubic bone and then lift, as if you were elevating the PFM. Whilst holding this contraction, cough as hard as you can". The segmentation methodology for the urethra[13], motion tracking algorithms for the pubic symphysis (PS) and ARA[14], and inter-tester reliability have been reported in detail elsewhere[15]. Displacements of the urethra and ARA are measured with respect to an orthogonal co-ordinate system fixed on the PS, parallel and vertical to the urethra at rest (Fig. 1b).

When the tissues move, the co-ordinate system will maintain its original position and the subsequent trajectory of urogenital structures can be measured relative to this fixed axis. In order to accurately map the trajectory of the ARA and urethra, the apparent motion of the PS, created by movement of the transducer during the cough, is tracked and subtracted from the displacements of the ARA and urethra.

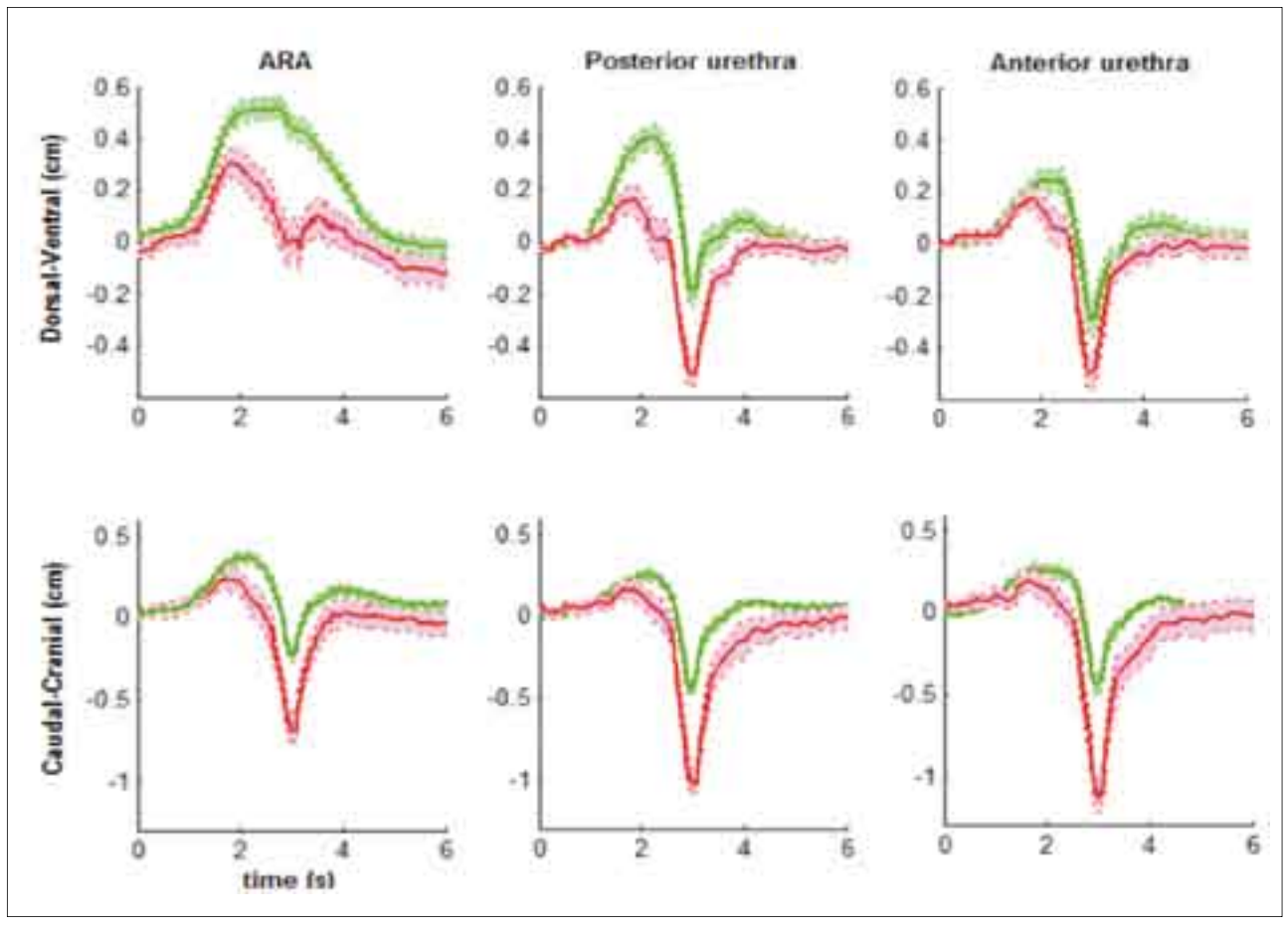


Fig. 2: Comparison of the dorso-ventral and caudo-cranial displacements of the ARA, and both edges of the urethra during the Knack in supine continent (n = 23; green line) and SUI (n = 9; red line) women. The shaded area represents the SE.

Results and Discussion

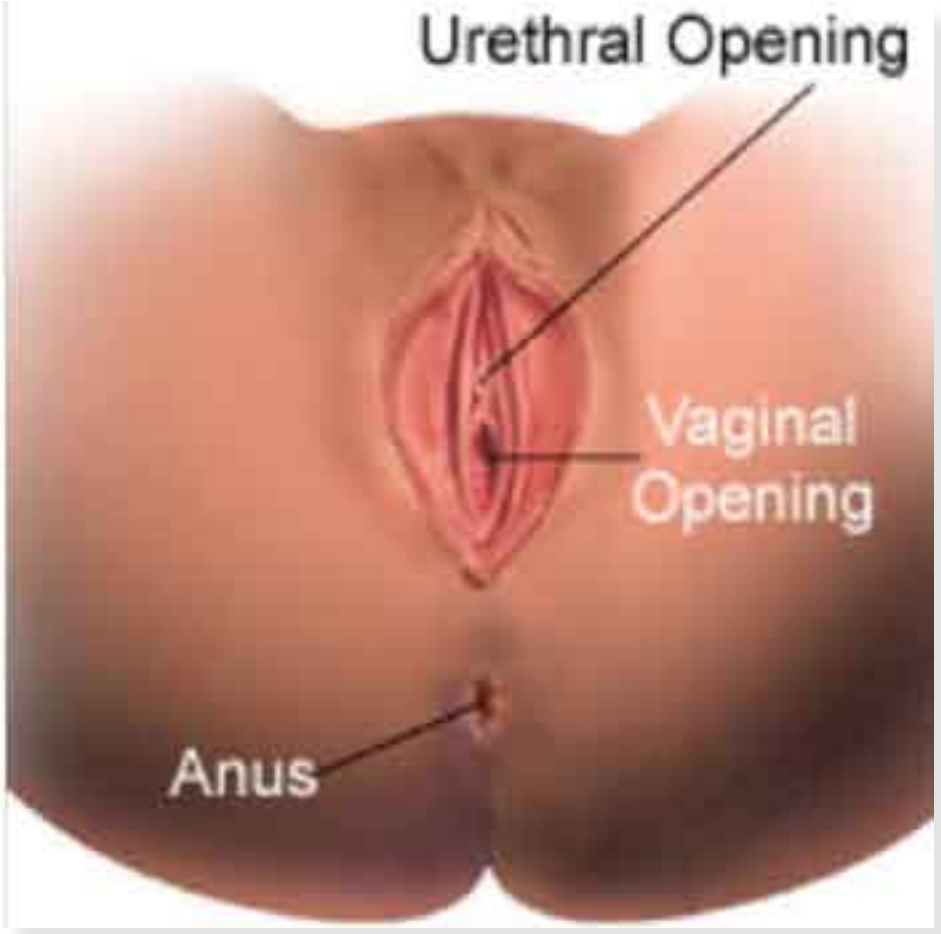
TP ultrasound combined with IPM is specific enough to be able to distinguish between a Knack and the cough and informs us whether or not there is a coordinated, effective PFM contraction, sufficiently able to support the urethra during a cough.

In both groups, the Knack has three basic stages:

1. During the active PFM contraction there is an initial cranio-ventral displacement of both the ARA and urethra;
2. During the cough component, there is a dorso-caudal displacement of the urethra and the ARA of SUI women and a predominately caudal displacement of the ARA in continent women;
3. On return to the resting position. The urethra of both groups returns to the original starting position, however the ARA of SUI women tends to rest in a position slightly further dorso-caudal and the ARA of continent women slightly more dorso-cranial than their original start position.

Significant differences occur between the behaviour of both, the urethra and ARA of continent and SUI women during "The Knack. Decomposing the trajectory into the dorso-ventral and cranio-caudal components emphasised the direction specific differences between groups (Fig. 2).

continued on page 20



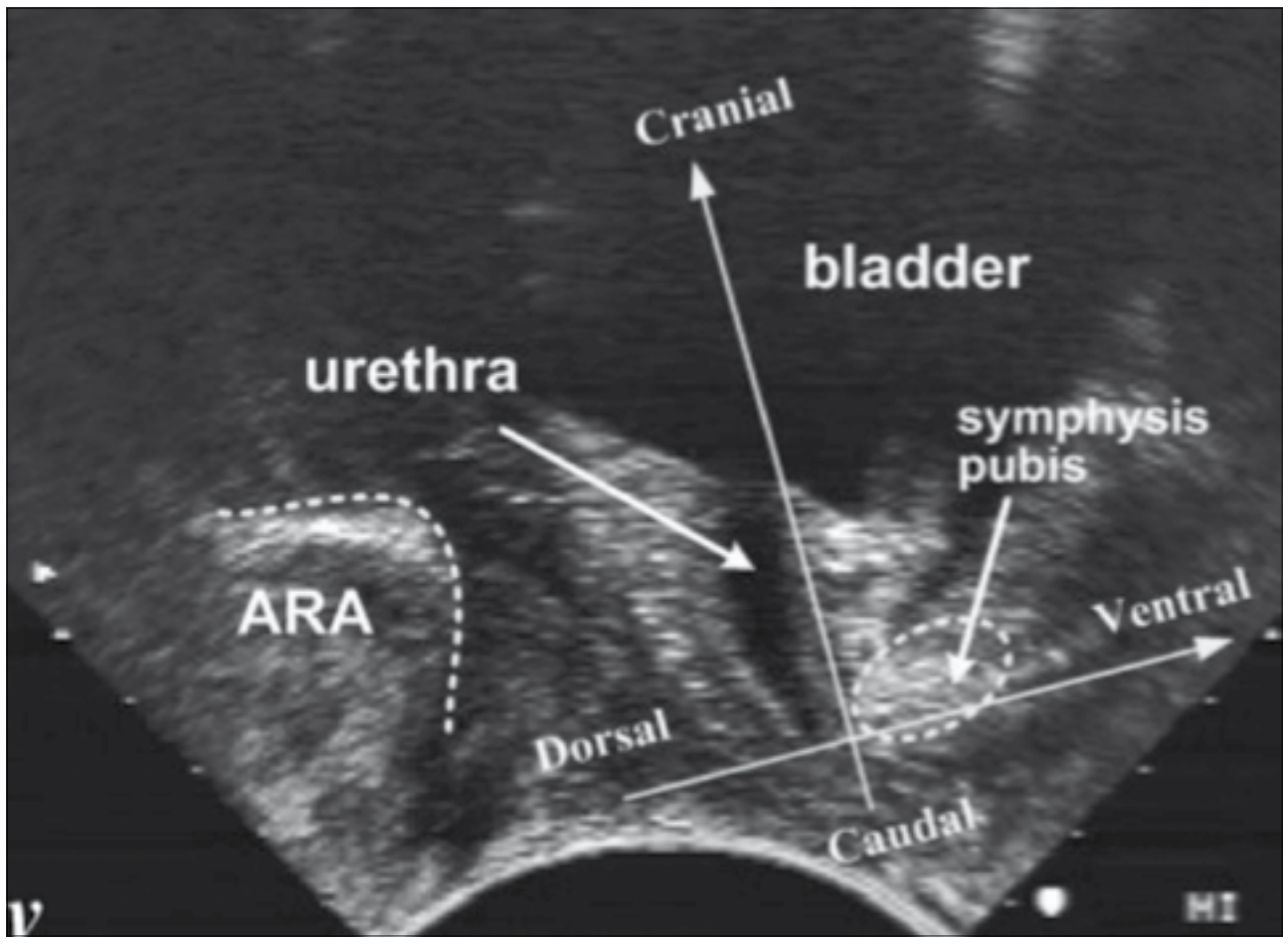


Fig. 1: (a) Mid sagittal position of transducer during transperineal (TP) imaging; (b) Typical transperineal view on an ultrasound scan with co-ordinate system placed on symphysis pubis, parallel and vertical to the urethra. P = posterior edge of the urethra; A= anterior edge of urethra. Reproduced with kind permission [2]

continued from page 19

In the initial PFM component of "The Knack", the ARA of the continent group had significantly more ventral displacement than that of the SUI group (p=0.02). Unlike the ARA of the SUI group, the continent group was able to maintain most of its ventral displacement throughout the cough part of the manoeuvre. Cranio-caudally the overall displacement pattern was more similar but there were significant differences in magnitude of displacement. Through the cough part of "The Knack", both groups lost much of the caudal displacement created by the PFM component of "The Knack", although the ARA of the SUI group descended over twice the distance of the ARA of the continent group. There was also over twice as much displacement of the urethra in the SUI groups compared to the continent group although the overall urethral angles of displacement were similar. In addition, there was significantly more ($p < 0.05$) initial ventral displacement of the posterior edge of the urethra in the continent (0.42 ± 0.21cm) than in the SUI group (0.26 ± 0.14cm). These results illustrate how the PFM of continent women are better able to resist the force created by the cough component of "The Knack", which implies greater stiffness of the PF.

JONES (4)

Ruth Lovegrove Jones

During "The Knack" in SUI women, particularly in supine, even with the addition of a PFM contraction, the anterior edge of the urethra is still displaced significantly more caudally than that of a continent woman coughing.[2] This may provide an alternative explanation of why some women with SUI fail to significantly reduce leakage volume with the use of "The Knack" manoeuvre and why the addition of an active PFM contraction is insufficient to adequately compensate for the significant fascial or ligamentous injury.[12] In the future, the use of IPM combined with TP ultrasound may provide us with the opportunity to decide whether surgical intervention may then be indicated, if after adequate training, the PFM are still unable to compensate for this stability loss. ■

Author:
Ruth Lovegrove Jones[1,2,3]
[1]School of Health Professions & Rehabilitation Sciences, University of Southampton, SO15 7PR, UK, Stanford University School of Medicine, CA, USA
[2]PAVA Medical Centre & Department of Urology, Stanford University School of Medicine, CA, USA
[3]School of Health Professions & Rehabilitation Sciences, University of Southampton, SO15 7PR, UK
e-mail: ruthlovegrove@gmail.com

Session 8 (Poster) - Pelvic Floor, Thursday 1st October, 16:00-17:30, Hall B

References:

1. BO K. Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work?. [Review] [68 refs]. International Urogynecology Journal 2004;15:76-84.

2. LOVEGROVE JONES RC, PENG Q, STOKES M, HUMPHREY VF, PAYNE C, CONSTANTINOU CE. Mechanisms of Pelvic Floor Muscle Function and the Effect on the Urethra during a Cough. European Urology In Press, Corrected Proof.

3. BERGHMANS LC, HENDRIKS HJ, BO K, HAY-SMITH EJ, DE BIE RA, VAN WAALWIJK VAN DOORN ES. Conservative treatment of stress urinary incontinence in women: a systematic review of randomized clinical trials. British Journal of Urology 1998;82:181-191.

4. DUMOULIN C, LEMIEUX MC, BOURBONNAIS D, GRAVEL D, BRAVO G, MORIN M. Physiotherapy for persistent postnatal stress urinary incontinence: a randomized controlled trial. Obstetrics & Gynecology 2004;104:504-510.

5. MILLER JM, ASHTON-MILLER JA, DELANCEY JO. A pelvic muscle precontraction can reduce cough-related urine loss in selected women with mild SUI. Journal of the American Geriatrics Society 1998;46:870-874.

6. CAMMU H, VAN NM, DERDE MP, DEBRUYNE R, AMY JJ. Pelvic physiotherapy in genuine stress incontinence. Urology 1991;38:332-337.

7. BO K, TALSETH T. Long-term effect of pelvic floor muscle exercise 5 years after cessation of organized training. Obstetrics & Gynecology 1996;87:261-265.

8. WYMAN JF, FANTL JA, MCCLISH DK, BUMP RC. Comparative efficacy of behavioral interventions in the management of female urinary incontinence. Continence Program for Women Research Group. American Journal of Obstetrics & Gynecology 1998;179:999-1007.

9. BURGIO KL, ZYCZYNSKI H, LOCHER JL, RICHTER HE, REDDEN DT, WRIGHT KC. Urinary incontinence in the 12-month postpartum period. Obstetrics & Gynecology 2003;102:1291-1298.

10. DUMOULIN C, HAY-SMITH J. Pelvic floor muscle training versus no treatment for urinary incontinence in women. A Cochrane systematic review. [Review] [32 refs]. European journal of physical & rehabilitation medicine 2008;44:47-63.

11. MILLER JM, PERUCCHINI D, CARCHIDI LT, DELANCEY JO, ASHTON-MILLER J. Pelvic floor muscle contraction during a cough and decreased vesical neck mobility. Obstetrics & Gynecology 2001;97:255-260.

12. MILLER JM, SAMPSELLE C, ASHTON-MILLER J, HONG GR, DELANCEY JO. Clarification and confirmation of the Knack maneuver: the effect of volitional pelvic floor muscle contraction to preempt expected stress incontinence. International Urogynecology Journal 2008;19:773-782.

13. PENG Q, JONES RC, CONSTANTINOU CE. 2D Ultrasound image processing in identifying responses of urogenital structures to pelvic floor muscle activity. Annals of Biomedical Engineering 2006;34:477-493.

14. PENG Q, JONES R, SHISHIDO K, Constantinou CE. Ultrasound evaluation of dynamic responses of female pelvic floor muscles. Ultrasound in Medicine & Biology Vol 33(3)()(pp 342-352), 2007;342-352.

15. LOVEGROVE JONES RC, PENG Q, STOKES M, HUMPHREYS VF, CONSTANTINOU CE. The Inter-tester Reliability of 2D Ultrasound and Image Processing Methods to Evaluate the Pelvic Floor Muscles (PFM) and Urethra During a Cough in Continent and Stress Urinary Incontinent (SUI) Women. Neurourology & Urodynamics . 2008.

Different mechanisms of injury

Do urinary incontinence and anal incontinence share the same obstetrical risk factors?

VILLEJUIF – The first delivery can be complicated by urinary or anal incontinence (UI or AI). Main suspected mechanisms are a lack of side urethral support and urethral sphincter incompetence for UI and anal sphincter rupture for AI. While injuries are different, both diseases share some common risk factors such as age and obesity.

Obstetrical risk factors are specific to the disease as spontaneous vaginal delivery for UI and third perineal tear or instrumental delivery for AI. To our knowledge there is no analysis of these obstetrical risk factors on a single population of women after delivery. Our goal is to clarify which are the risk factors common to the urinary and anal incontinence and those specific to each incontinence. Our hypothesis is that if mechanisms of injury during vaginal childbirth differ for UI an AI then obstetrical risk factors would be specific to each incontinence, UI and AI, while common factors are the result of a congenital or acquired individual susceptibility (aging, neurological, etc.).

Materials and Methods

The study included nulliparous women who gave birth in 1996 in 2 university maternities at a term of 37–41 weeks to a live born singleton child in cephalic presentation and who had an up-to-date mail address in 2000. Data on the mother (age, height, weight) and delivery (epidural, second active phase, mode of delivery, child weight) were collected at delivery. Data on incontinence comes from a questionnaire mailed in 2000. From the register of birth, 1.323 primiparous met the inclusion criteria, for 548 (41 %) the address was no longer valid and 1 had died so that only 774 (59 %) have actually received the postal questionnaire. Of these, 627 (81 %) responded and constitute our population. One maternity had a systematic policy of episiotomy, the other a restrictive policy. Women who answered "yes" to "Do you have involuntary loss of urine?" were considered to have UI. Women who answered "yes" to "Do you have involuntary loss of flatus or stool?" were considered to have AI. A multinomial logistic regression analysis was conducted to identify common and specific risk factors for each incontinence. Two reports about the same population have been previously published.

Characteristics at first delivery	UI only 141 women OR (CI 95%)	AI only 41 women OR (CI 95%)	UI+AI 41 women OR (CI 95%)
Maternity with a systematic episiotomy policy	0.79 (0.48-1.33)	1.45 (0.61-3.50)	7,38 (2.07-26.3)
Age at delivery > 30 years	2.17 (1.40-3.37)	1,38 (0.67-2.86)	2.66 (1.26-5.59)
Body Mass Index > 25 kg/m²	1.83 (0.91-3.68)	2,43 (0.90-6.59)	1.26 (0.37-4.35)
Epidural	1.07 (0.57-2.02)	0,71 (0.27-1.84)	0.27 (0.10-0.71)
Second active phase > 20 min	1.24 (0.60-2.59)	3.40 (1.32-8.73)	2,70 (0.85-8.58)
Caesarean Instrumental delivery	0.74 (0.26-2.09) 1.03 (0.65-1.64)	0.59 (0.13-2.77) 1.11 (0.52-2.37)	0.28 (0.05-1.70) 1.04 (0.46-2.35)
Episiotomy	1.50 (0.79-2.84)	0.68 (0.24-1.91)	0.26 (0.06-1.04)
Third perineal tear	3.49 (0.21-59.4)	24.2 (1.97-297)	21.2 (1.28-350)
UI before first pregnancy	6.37 (2.11-19.3)	1.86 (0.19-17.7)	27.1 (7.28-101)
UI during first pregnancy	3.67 (2.24-5.99)	1.53 (0.61-3.84)	1.92 (0.78-4.73)

Table 1

Results

The prevalence of UI was 28.9 % (181) and the prevalence of AI was 13.1 % (82), 22.3 % (140) had only UI, 6.5 % (41) only AI, and 6.5 % (41) both incontinences. Variables "weight of the first new-born more than 4kg", "new birth since 1996" and "pregnant at the time of the questionnaire" were not significant and were excluded from the final model.

FRITEL (2)

Xavier Fritel

We found specific and distinct associations between obstetric risk factors and UI and/or AI. Risk factors significantly associated with UI four years after first childbirth were age at first childbirth, pre-existing UI and AI during pregnancy. On the other hand, risk factors significantly associated with AI were length of the second active phase (> 20 min) and occurrence of a third perineal tear. Significant predictors of UI and AI (i.e., for women who had both UI and AI) were maternity policy, epidural, third perineal tear, and UI before first pregnancy. After adjustment for the variables included in the model as noted above, mode of delivery was not significantly associated with UI, AI, or UI and AI; although for all three outcomes, the adjusted odds ratios were less than one.

Conclusions

In our population, four years after first delivery, UI and AI do not share same obstetrical risk factors. The results of our study are consistent with the hypothesis that the mechanism of injury during delivery is different for UI and AI. ■

Authors:
Xavier Fritel, Babak Khoshnood, Arnaud Fauconnier
Epidemiological research on perinatal health and women's and children's health, Villejuif, France.
e-mail: fritel.xavier@orange.fr

Session 28 (Poster) - Saturday 3rd October,15:45-15:50, Hall B

The Optimal Anterior Repair Study (OARS)

A randomized double-blind clinical trial of standard colporrhaphy versus vaginal paravaginal repair

SAN DIEGO – The high rate of recurrence after anterior vaginal wall prolapse repair is well described in the literature.[1] Growing evidence suggests that the use of graft reinforced repairs may result in higher cure rates.[2-7]

However, the optimal graft material remains unclear. The objective of this study was to compare cure rates of traditional anterior colporrhaphy to graft augmented vaginal paravaginal repairs using porcine dermis or polypropylene mesh in a randomized double blinded clinical trial.

Materials and methods

Institutional Review Board approval was obtained for this randomized, double-blind clinical trial of 99 women ≥ 18 years of age with POP-Q point Ba ≥ 0. The study was performed at two clinical sites by 1 of 4 fellowship trained urogynecologists between July 2006 and September 2008. Subjects were randomly assigned to one of three treatment arms: 1) standard anterior colporrhaphy (C) using midline plication with delayed absorbable suture 2) vaginal paravaginal repair with porcine dermis graft (Pelvicol™, CR Bard, Murray Hill, NJ) (P) or 3) vaginal paravaginal repair with polypropylene mesh (Polyform™, Boston Scientific, Natick, MA) (M). All graft material was secured to the arcus tendineus fascia pelvis using a Capio™ device (Boston Scientific, Natick, MA) with 3 permanent monofilament sutures on each side. Concomitant procedures were performed at the surgeon's discretion.

Baseline characteristics were obtained including demographics, medical and surgical history, physical examination (including POP-Q measures),[8] and validated quality of life instruments. Outcomes were assessed at 6 weeks as well as at 12 and 24 months, postoperatively. The primary outcome was anatomic success; defined as anterior vaginal wall prolapse of stage 1 or 0 (Ba < -1) at a minimum of 1 year follow-up. Symptomatic recurrence was defined as subjective complaint of vaginal "bulge" and the presence of stage 2 (Ba ≥ -1) anterior prolapse. Secondary outcomes included impact on degree of bother and quality of life as measured using the Pelvic Floor Distress Inventory (PFDI) and Pelvic Floor Impact Questionnaire (PFIQ). Sexual function was also assessed using PISQ (Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire). Estimated blood loss, graft erosion and re-operation were also recorded. Power calculations were based on previously published data of anatomic cure rates of 50 and 90 % respectively for colporrhaphy and graft assuming a two-tailed hypothesis test with 5 % type I error and 80 % power.[9-16] Assuming a 30 % drop-out rate, 33 patients in each arm would be needed to detect at least a 40 % difference in recurrent stage 2 or greater prolapse. Proportion of subjects with anatomic success was compared across groups using chi-squared statistics. Median QOL scores were compared using Mann Whitney U test. T-tests were used for continuous variables and chi-square or fisher exact tests were used to compare demographics, baseline characteristics and post operative complications.

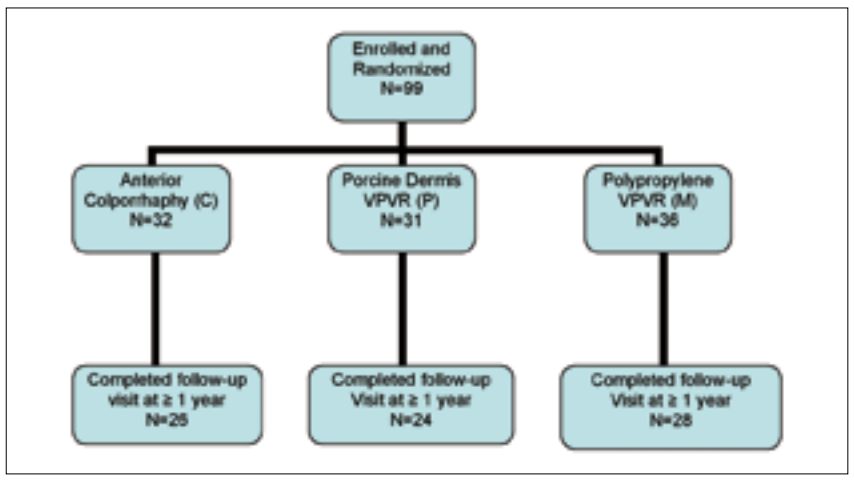


Fig. 1: Patient Enrolment and Follow-up

Results

There were no differences in terms of clinical history or demographic data among the 32 women in the anterior colporrhaphy, 31 in the porcine dermal graft and 36 in the polypropylene mesh groups. A total of 78 women had completed a minimum 1 year follow up at the time of this interim analysis (Figure 1). The mean follow-up period for these women was 20 ± 6 months. The mean age was 63 ± 10 years with a median of Stage III (range II-IV) anterior prolapse. Only 6 % had a prior anterior repair. Concomitant procedures were common; 40 % hysterectomy, 56 % mid-urethral sling, 67 % apical prolapse procedure.

The anatomic success rates were 54 %, 63 % and 89 % in the anterior colporrhaphy, porcine dermis graft and polypropylene mesh groups, respectively. Symptomatic recurrence of the anterior vaginal wall occurred in 7 % overall; with 3 (12 %) in the colporrhaphy group, 3 (12 %) in porcine dermis group and 1 (4 %) in the synthetic mesh group. The two patients who elected to undergo re-operation for recurrent anterior wall prolapse were in the porcine dermis group. Estimated blood loss was higher in the graft augmented groups with an average of 227ml ± 123 compared to 171ml±118 in the anterior colporrhaphy. No deaths or serious adverse events occurred. Graft erosion rates in the mesh group were 14 % compared to 4 % (p=0.413) in the porcine group and only one in the mesh group required excision (Table 1). All groups had a reduction in their prolapse and urinary symptoms without significant differences between groups, as measured by the respective subscales of the PFDI and PFIQ (Table 2).

	Colporrhaphy (C) N = 26	Porcine P N = 24	Mesh (M) N=28	C v P p	C v M p	M v P P
Anatomic Success	14 (54%)	15 (63%)	25 (89%)	0.530	0.004*	0.022*
Symptomatic Recurrence	3 (12%)	3 (13%)	1 (4%)	0.623	0.284	0.284
OR Time (Mean±SD)	140±52	151±46	168±65	0.469	0.100	0.295
EBL (Mean±SD)	171±118	229±103	225±144	0.048*	0.099	0.910
Erosions	N/A	1(4%)	4(14%)	-	-	0.413

Values are expressed as n (%) unless otherwise specified.
Chi Squared test with Fischer's exact used to calculate p values for success (Stage I or 0) and Symptomatic recurrence .
Student t-test used to calculate p values for OR time and EBL

Table 1: Objective outcomes based on repair

	Colporrhaphy (C) N = 26	Porcine (P N = 24)	Mesh (M) N=28	C v P p	C v M p	M v P P
POPDI*	-33 (-79 to 8)	-46 (-100 to 8)	-33 (-100 to -8)	0.061	0.788	0.138
UDI	-25 (-90 to 13)	-38 (-100 to 46)	-21 (-92 to 13)	0.924	0.903	0.813
POPDI*	-14 (-76 to 0	-33 (-95 to 3)	-29 (-100 to 0	0.064	0.447	0.320
UIQ*	-21 (-81 to 10)	-33.3 (-91 to 38)	-14 (-100 to 0)	0.129	0.932	0.347
PSIQ*	0 (-32 to 20)	-5 (-24 to 11)	0 (-28 to 14)	0.401	0.397	0.124

*Change in the Prolapse and Urinary Subscales scores for the PFDI (POPDI and UDI) and PFIQ (POPIQ and UIQ) as well as for the PSIQ. Values expressed as Median (Range).
Mann Whitney U test used to calculate p-values.

Table 2: Subjective outcomes based on repair

Interpretation of results

Polypropylene mesh had the highest anatomic success rate compared to standard colporrhaphy and porcine dermis. All groups had improvements in urinary and prolapse symptoms with no significant difference between groups. A trend towards an approximately 50 ml higher estimated blood loss was noted with graft augmentation. Polypropylene mesh has a 14 % risk of erosion.

Concluding message

With careful patient education synthetic mesh placement may be considered for primary or recurrent prolapse repair in patients willing to accept the risk of erosion to achieve a higher anatomic success rate. ■


DYER (4)

Keisha Dyer

Authors:
[1,3]Keisha Dyer, [2]Jennifer Nguyen, [4]Armanda Simsiman, [3]Emily Lukacz, [1]Karl Luber, [1]Shawn Menefee
[1]Kaiser Permanente, San Diego CA
[2]Kaiser Permanente, Bellflower, CA
[3]University of California, San Diego, CA
[4]Naval Medical Center, San Diego, CA

Session 27 (Poster) - Pelvic Floor & Lower Bowel, Saturday 3rd October, 13:30-14:30, Hall E

References:

1. HAMILTON BOYLES S, EDWARDS R. Repair of the Anterior Vaginal Compartment. Clinical Obstetrics and Gynecology;48(3):682-690.

2. JIA X, GLAZENER, MOWATT G, MACLENNAN G., BAIN C, FRASER C, BURR J. Efficacy and safety of using mesh or grafts in surgery for anterior and or posterior vaginal wall prolapse: systematic review and meta-analysis. BJOG 2008;115:1350-1361.

3. CHEN CCG, RIDGEWAY B, PARAISO MF. Biologic Grafts and Synthetic Meshes in Pelvic Reconstructive Surgery. Clin Obstet Gynecol 2007;50(2):383-411.

4. ELMER C, ALTMAN D, ELLSTROM ENGH M, AXELSEN S, VAYRYNENE TAPIO, FALCONER C. for the Nordic Transvaginal Mesh Group. Trocar-Guided Transvaginal Mesh Repair or Pelvic Organ Prolapse. Obstet Gynecol 2009;113:117-126.

5. NGUYEN JN, BURCHETTE RJ. Outcome After Anterior Vaginal Prolapse Repair: A Randomized Controlled Trial. Obstet Gynecol 2008;111:891-898.

6. SIMSIMAN AJ, LUBER KL, MENEFEE SA. Vaginal Paravaginal repair with porcine dermal reinforcement: Correction of advanced anterior vaginal prolapse. Am J Obstet Gynecol 2006;195:1832-1836.

7. MESCHIA M, PIFAROTTI P, BERNASCONI F., MAGATTI F., RIVA D., KOJANCIC E. Porcine skin collagen implants to prevent anterior vagina wall prolapse recurrence: A muticentre, randomized study. Journal of urology 2007;177:192-5.

8. BUMP RC, WEIDNER AC. Terminology of Pelvic Organ Prolpase. Curr Opin Obstet Gynecol. 1997;5:309-12.

9. SAND PK, KODURI S, LOBEL RW, WINKLER HA, TOMEZSKO J, CULLIGAN PJ, GOLDBERG R. Prospective randomized trial of polyglactin 910 mesh to prevent recurrence of cystoceles and rectoceles. Am J Obstet Gynecol 2001;184:1357-64.

10. FITZGERALD MP, EDWARDS SR, FENNER D. Medium-term follow-up on use of freeze-dried, irradiated donor fascia for sacrocolpopexy and sling procedures. Int Urogynecol J Pelvic Floor Dysfunct. 2004 Jul-Aug;15(4):238-42.

11. FITZGERALD MP, MOLLENHAUER J, BRUBAKER L. The fate of rectus fascia suburethral slings. Am J Obstet Gynecol. 2000 Oct;183(4):964-6.

12. SOERGEL TM, SHOTT S, HEIT M. Poor surgical outcomes after fascia lata allograft slings. Int Urogynecol J Pelvic Floor Dysfunct. 2001;12(4):247-53.

13. GOLDMAN HB, HALE DS, HATANGADI S, HERSCHORN S, JULIAN T, KIRKEMO AK, LIND LR, LUCENTE V, MILLER DP, ROGERS RM. Gynemesh PS: A new mesh for pelvic floor repair. White Paper. Gynecare.

14. DE TAYRAC R, GERVAISE A, FERNANDEZ H. Cystocele repair by the vaginal route with a tension-free sub-bladder prosthesis. J Gynecol Obstet Biol Reprod 2003;32:77-8.

15. BADER G, FAUCONNIER A, ROGER N, HEITZ D, VILLE Y. Cystocele repair by vaginal approach with a tension-free transversal polypropylene mesh. Techniques and results. Gynecol Obstet Fertil 2004;32:280-4.

16. ADOUTE F, SOYEUR L, PARIENTE JL, LE GUILLOU M, FERRIERE JM. Use of transvaginal polypropylene mesh (Gynemesh) for the treatment of pelvic floor disorders in women. Prospective study in 52 patients. Prog Urol 2004;14:192-6.

Relationship between OAB and POP

Do OAB symptoms improve after surgery for POP?

NIJMWEGEN – Symptoms of a overactive bladder (OAB) are often seen in patients with pelvic organ prolapse (POP). OAB is defined as urgency with or without urge incontinence, usually with frequency and nocturia.[1]

It is generally accepted that OAB is a highly prevalent disorder that increases with age in both sexes and that has a profound impact on quality of life. Seventeen percent of women have symptoms of an overactive bladder.[1] Fifteen percent of the women aged 20-29 years reported to have symptoms of OAB. This percentage increased to 21 % for women older than 70 years.[1] Since both POP and OAB are frequently seen in the elderly female population it is expected that the two conditions are frequently encountered in the same patient. However it is unclear whether there is a causal relationship it can be expected that OAB symptoms improve after successful treatment of POP. The goal of this review is to search if OAB symptoms improve after pelvic surgery for pelvic organ prolapse.

Materials and Methods

In this study we did not only use the OAB syndrome as described in the official definition, but we also studied the various symptoms of OAB such as urgency, urge incontinence, frequency and nocturia. We searched on Medline and Embase ending on 22nd March 2009 for studies with the following terms: ("overactive bladder" OR "urgency" OR "frequency" OR "nocturia" OR "urge incontinence" OR "micturition") AND "prolapse" AND ("repair" OR "operation" OR "surgery").

We selected 328 studies which might be answering our research questions. On the basis of the abstract we selected 43 studies with possible relevant information which were studied in detail. Finally we identified 12 studies with relevant and analyzable data. In the research finally selected, we cross checked the reference list to check for missing studies. We only included studies in which actual data about the prevalence of OAB symptoms were available. Studies which mentioned only a conclusion without actual data were excluded. Studies with concomitant operations for stress urinary incontinence (SUI) were only included if the patients with concomitant SUI operations could be identified. These patients were not included in the analysis. The reason for excluding concomitant incontinence surgery is that it is a well known risk factor for de novo OAB symptoms.

Results

Table 1 shows the studies with patients with OAB symptoms before and after pelvic organ prolapse surgery. As mentioned earlier only cases without concomitant SUI surgery were included. In total we included 12 studies. The type of surgery describes the type of operation and the operated compartment. Three studies had overactive bladder syndrome as the parameter, the rest studied one or more symptoms of overactive bladder. The overall follow-up was 90 % or more and showed an improvement of the OAB symptoms after operation. The prevalence of OAB symptoms before operation vary and most studies showed an improvement after surgery. "De novo" are patients who acquired the symptoms of overactive bladder. Only one study provides relevant information on "de novo" OAB symptoms . For computing RR we divided the frequency of OAB symptoms preoperative by the total postoperative symptoms (including also "de novo"). All relative risks are equal or greater than 1 indicating that there is an improvement of OAB symptoms after surgery for POP.

DE BOER (2)

Tiny de Boer

Conclusions

In practically all studies we found an improvement of the OAB symptoms after pelvic organ surgery. We did not find any relationship between the compartment of the prolapse, method of surgery, parameter or stage of prolapse and the results after POP surgery. The results strongly suggest that there exists a relationship between OAB and POP and that after POP surgery the OAB symptoms improve or disappear. On the basis of these data we believe that it is highly likeable that symptoms of OAB will disappear after surgery for POP and that women should be informed accordingly. Women with vaginal prolapse and symptoms of OAB can expect an improvement of these symptoms after POP surgery. ■

Study no	n	Type of surgery	Stages and compartments of women with POP	Outcome Parameter	Frequency of OAB symptoms preoperative	Frequency of OAB symptoms post operative	RR (pre/post)
1	44	anterior colporrhaphy and hysterectomy	cystocele : 34 apical descent :15 enterocele: 1	urgency	20.5% (9/44)	12.5% (3/24)	1,6
				urge incontinence	27.3% (12/44)	4.2% (1/24)	6,5
				frequency	15.9%(7/44)	0% (0/24)	∞
2	16	posterior colporrhaphy and/or Manchester repair and anterior colporrhaphy	anterior and/or posterior prolapse	urge incontinence	87,5% (14/16)	63% (10/16)	1,4
3	10	anterior colporrhaphy	all grade III or IV	urge incontinence	40% (4/10)	20% (2/10)	2,0
4	38	uterine and/or vaginal vault prolapse	grade II 34.2% grade III 55.3% grade IV 10,5%	"overactive bladder"	100% (38/38)	36.8% (14/38)	2,7
5	30	infracoccygeal sacropexy	grade II 5 grade III 12 grade IV 3 uterine prolapse 10	urgency	53.3% (16/30)	13.3% (4/30)	4,0
				nocturia	46.7% (14/30)	6.7% (2/30)	7,0
6	32	anterior and posterior mesh	all stage II-IV	urge incontinence	16% (5/32)	16% (5/32)	1,0
				urgency	50% (16/32)	40% (13/32)	1,3
7	165	sacrocolpopexy	stage II 15.2% stage III 67.9% stage IV 17.0%	urge incontinence	28.1% (45/160)	11.9% (18/151)	2,4
				urge symptoms	90.6% (145/160)	80.9% (123/152)	1,1
8	93	fascial anterior repair vaginal hysterectomy and/or posterior repair	>=stage II	urge incontinence	62.3% (58/93)	17.2% 16/93)	3,7
				urgency	100% (93/93)	30.1 (28/93)	3,3
				frequency	100% (93/93)	41% (38/93)	2,4
9	49	anterior repair	grade II or more	overactive bladder	100% (49/49)	46.7% (23/49)	2,1
10	111	anterior repair	cystocele	urge incontinence	27.9% (31/111)	18.0% (20/111)a	1,6
11	78	hysterectomy, cystocele and/or rectocele repair	stage>=II	urge incontinence	64.1% (50/78)	14.1% (11/78)	4,5
				Frequency	66.7% (52/78)	20.5% (16/78)	3,3

Table 1 Prevalence of OAB symptoms before and after POP surgery without concommitant incontinence surgery.

Author:
Tiny de Boer
Radboud University Nijmegen Medical Centre, Netherlands
e-mail: T.deBoer@obgyn.umcn.nl

Session 2 (Podium) - Pelvic Organ Prolapse, Thursday 1st October, 11:45-12:00, Hall A

References

1. TEMML C, HEIDLER S, PONHOLZER A, MADERSBACHER S. Prevalence of the overactive bladder syndrome by applying the International Continence Society definition. Eur. Urol. 2005;48:622-627.

More large randomised studies needed

Effects of combined use of trospium chloride and melatonin on in vitro contractility of rat urinary bladder

ELAZIG – Overactive bladder (OAB) syndrome is usually characterized by urinary urgency and/or urge incontinence with frequency and nocturia. Current pharmacological management of OAB consists of use of different antimuscarinic drugs.

However, the lack of specificity and selectivity both for organ and receptor may limit their clinical usefulness and cause drug withdrawals in the long term.

The challenges for the development of a new method in treatment of OAB and efforts to decrease the incidence of adverse events during anticholinergic use are continuing. In this study, we hypothesised that combining an existing antimuscarinic agent at a lower dose with melatonin, which is a potent antioxidant and a smooth muscle relaxator, can inhibit detrusor overactivity, thereby we may need much lower doses of antimuscarinic drugs in treatment of OAB. We therefore examined the effects of combined use of trospium chloride (TCl) and melatonin on in vitro contractility of normal and partially obstructed rat urinary bladder.

The protocol of our study has been reviewed and approved by the institutional ethics committee on animal experimental research. We examined isolated bladder strips in an organ bath obtained from 30 male Wistar rats with and without partial bladder obstruction. Contractions were evoked by the well known agonist acetylcholine (Ach) at a dose of 10 µM. Initially, we performed preliminary experiments to determine the effective concentration of TCl, which is provided by the manufacturer (Dr. R. Pfleger GmbH, Bamberg, Germany), to inhibit the contractions. We also determined the concentration of melatonin which lowers the amplitude of contractions to the basal level. In the next step, we examined combined use of melatonin and trospium. To determine the combination dose, we tested half dose, one fourth and one tenth of initially applied dose of trospium by combining to the lowest inhibitory dose of melatonin (100 µM).

Increasing concentrations of trospium (1 µM, 3 µM and 5 µM), gradually decreased the mean peak amplitudes ($p<0.05$) of contractions. Similarly, the mean peak amplitude of contractions was significantly inhibited by melatonin in a con-

continued on page 23

continued from page 22

centration dependent manner (100 µM, 200µM and 300µM) ($p<0.05$) (Fig. 1).

We further evaluated the combined use of trospium and melatonin on ACh-induced contractions. The effects at three different combination doses; lowest dose of melatonin and one tenth of trospium (100µM melatonin + 100nM, 300nM and 500nM of Trospium, respectively) significantly lowered the area under curve (AUC) of contractions ($p<0.05$) (Fig. 2). Similarly, we also observed significant inhibition compared to individual drug administrations in strips obtained from partially obstructed bladders (Fig. 2).

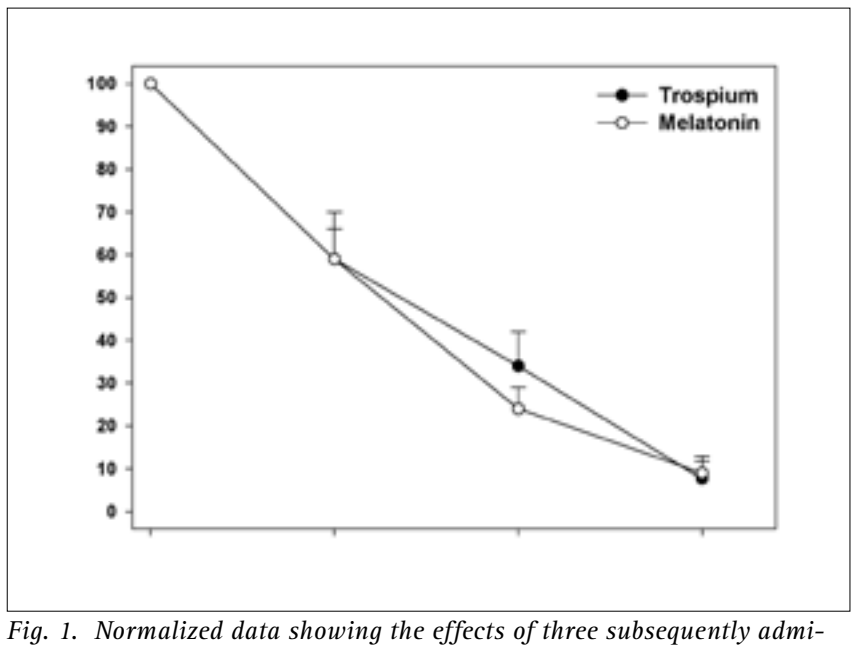
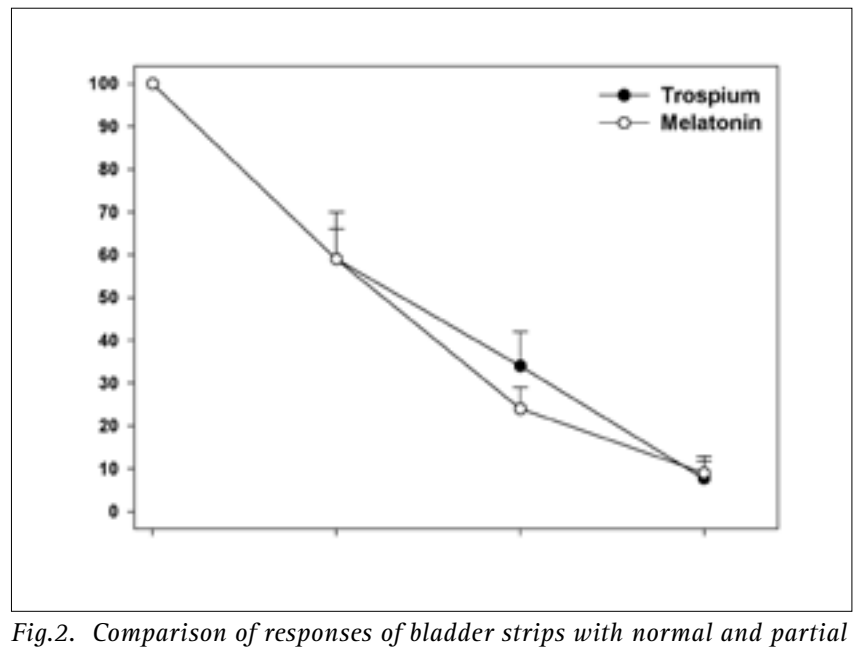


Fig. 1. Normalized data showing the effects of three subsequently administered (adm.) concentrations of trospium and melatonin on mean amplitude of contractions induced by acetylcholine (ACh)



RAHMIONUR (2)

Fig.2. Comparison of responses of bladder strips with normal and partial obstruction (Obs.) to subsequently administered (adm.) trospium and melatonin shown by the area under curve.

Melatonin, which is an endogenous hormone and the most powerful known antioxidant, has recently been used for its inhibitory effect on smooth muscle cells of different organs. In our previous study we showed that melatonin inhibited ACh and KCl induced contractions of isolated guinea pig urinary bladder strips in a concentration dependent manner. Similarly, in the present study, we also showed that melatonin significantly reduced the peak amplitudes of contractions induced by ACh in isolated rat urinary bladders. By combining melatonin with a lower dose of TCl, we showed the same degree of inhibition. Our results showed that using one third of melatonin dose (100 µM) and combining it with a very low dose of TCl showed the same efficacy compared to the efficacies obtained by each drug separately. This in vitro effect proved the synergy of these two agents for inhibition of smooth muscle activity. Thus, by using trospium as an antimuscarinic at a lower dose and combining it with melatonin, we may have a lower profile of side effects in the clinical setting. Our results also showed that combined use of trospium and melatonin had strong in-vitro inhibitory capability for partially obstructed bladder strips.

The treatment of OAB with antimuscarinic drugs aims to eliminate all symptoms related to this syndrome and to have lower side effects due to antimuscarinic use. Our study is the first offering an insight for lowering the dose of an antimuscarinic by combining it to an endogenous hormone, melatonin. Since we administered trospium at a dose of one tenth of its initial dose, we believe that using this dose with combination of melatonin would bring no or slight side effects and may help to decrease the rate of withdrawals in therapeutic trials. However, these findings need to be confirmed in large randomised and controlled series for possible in vivo use. ■

Authors:
[1]Rahmi Onur, [1]Mete Ozcan, Ugur Tuygun, Tunç Ozan, [2]Ahmet Ayar, □rfan Orhan
[1]Departments of Urology, Biophysics and [2]Physiology, Faculty of Medicine
Firat University, Elazig, Turkey

Session 18 (Poster) - Detrusor Overactivity Non-Clinical, Friday 2nd October, 13:30-14:30, Hall B

Suprameatal urethrolysis with Martius flap

Minimize recurrent scarring from the dissection in the retropubic space

LOS ANGELES – Obstructive voiding and urinary retention are rare complications of anti-incontinence surgery. Transvaginal urethrolysis allows resumption of normal voiding in most circumstances; however, some patients remain obstructed despite multiple attempts at transvaginal urethrolysis.

Clean intermittent catheterization (CIC) is not the only option. Suprameatal urethrolysis allows direct vision of the periurethral and retropubic space with ideal exposure for removal of foreign body or mesh in the retropubic space. Retrospective analysis of the last 8 years of cases by one surgeon (SR) identified 12 cases of suprameatal urethrolysis with Martius flap. Chart review was performed to assess presenting symptoms, prior surgery and subsequent procedures.

Methods

A 16F Foley catheter is placed and a weighted speculum and ring retractor are used to enhance exposure. A semicircular incision is made between the urethral meatus and clitoris. The dissection is directed toward the periostium of the pubic symphysis 2 cm above the urethra. Bovey cautery is used to dissect the subcutaneous tissue directly on top of the pubic bone. This area is quite vascular and careful hemostasis must be maintained. A Heaney retractor is placed superiorly to expose the pubic bone and a curved Mayo with curved tip pointing up is passed directly under the pubic bone to enter the retropubic space. Careful dissection frees the bladder from the pubis and lysis of adhesions with removal of residual mesh, if present, is performed. The urethra and bladder are dissected until completely free in the retropubic space. A moist sponge is packed in the retropubic space while a Martius flap is harvested from the labia.

A vertical skin incision directly over the labial fat pad is made. Dissection is performed laterally and medially to isolate the Martius flap. A right angle flap is passed under the flap and a Penrose drain is used to secure it. With downward traction on the Penrose drain a large clamp is used to control the superior blood supply and the flap is transected

The superior stump is secured with a 2-0 Vicryl (polyglactin) suture. Metzenbaum scissors are used to dissect a tunnel from the suprameatal opening to the Martius flap. Enough space is created to ensure the flap and it's blood supply are not constricted. 3-0 Vicryl (polyglactin) sutures are placed on the anterior and lateral surfaces of

continued on page 24

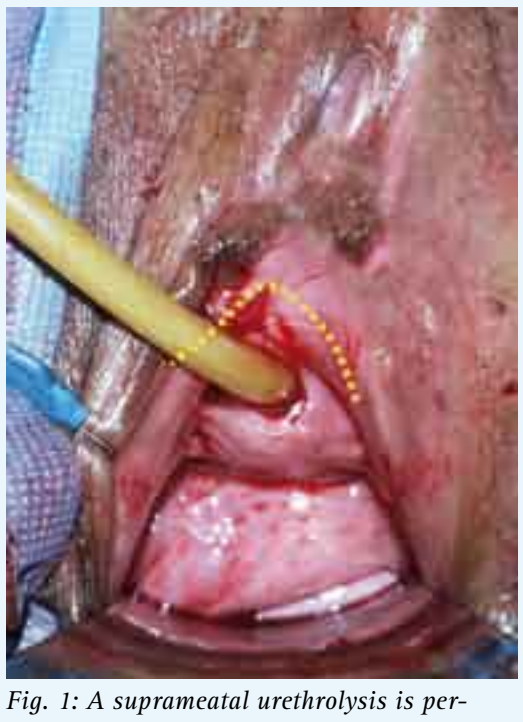


Fig. 1: A suprameatal urethrolysis is performed through a semi-circular incision between the urethral meatus and clitoris (yellow dashed line indicates line of incision).

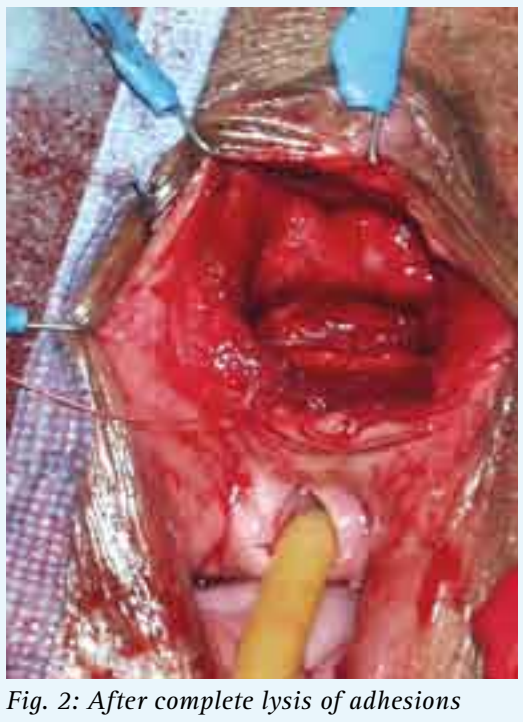


Fig. 2: After complete lysis of adhesions the urethra and bladder are separated from the pubic symphysis and a moist sponge is packed in the retropubic space.

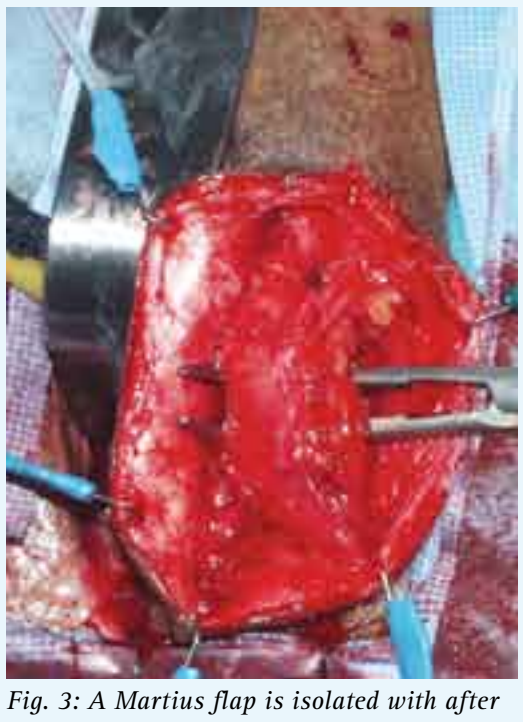


Fig. 3: A Martius flap is isolated with after careful dissection laterally and medially.

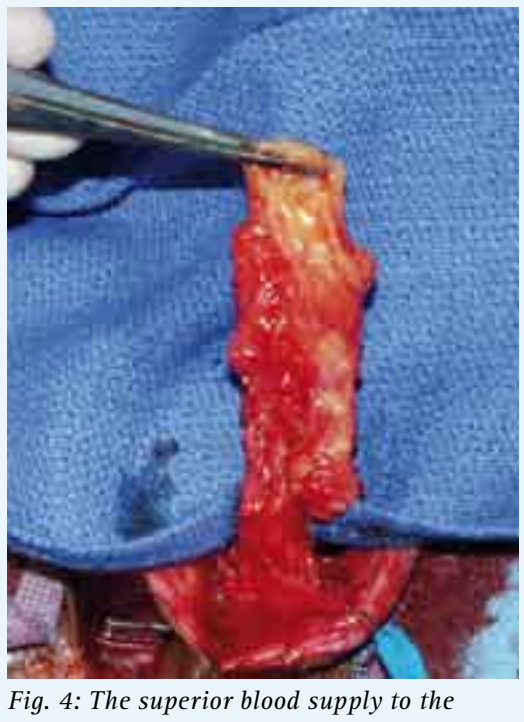


Fig. 4: The superior blood supply to the Martius flap is transected and maximum length preservation of the flap is maintained.

continued from page 23

the bladder. These sutures are used to secure the Martius flap in place and prevent migration and recurrent scarring around the urethra. A right angle clamp is used to transfer the Martius flap into the suprameatal position and the previously placed sutures secure the flap in place. The subcutaneous tissues are then re-approximated over the Martius flap and the vaginal skin is closed in an interrupted fashion. The labial incision is closed after careful hemostasis.

Results

Twelve cases of persistent obstruction requiring suprameatal urethrolysis were identified. All 12 patients were referred from outside institutions and all had undergone between 1 and 4 attempted transvaginal urethrolyses prior to presentation. All patients had undergone retropubic anti-incontinence surgery as the etiology of their obstruction. All patients reported difficulty or inability to urinate volitionally and 10/12 patients were performing CIC on presentation. Post operatively, 11/12 patients were able to void >75 % of bladder capacity and did not require CIC. In our series there was 1 failure requiring repeat suprameatal urethrolysis, after which volitional voiding to completion was achieved. 33 % of patients developed incontinence post operatively and all 4 patients underwent successful subsequent anti-incontinence surgery.

Conclusions

Suprameatal urethrolysis has been used successfully in patients with persistent obstruction after retropubic slings and failed transvaginal urethrolyses. We recommend the use of the Martius flap to minimize recurrent scarring from the dissection in the retropubic space.

The risk of recurrent incontinence is about 30 %, however, these patients respond well to subsequent sling placement. We report a 92 % primary success rate in our series. ■

Author:
Ariana L. Smith, Ja-Hong Kim, Andrea Staack, Chad Baxter, Larissa V. Rodrique, Shlomo Raz
Department of Urology, University of California, Los Angeles, California, USA
e-mail:: arianasmith@hotmail.com

Session 4 (Podium Video) - Videos - Surgical Techniques I, Thursday, October 1st, 13:30-15:30, Hall A

SMITH (5)

Ariana L. Smith

Is convenience void more convenient?

Impact of convenience void in bladder diary which includes urinary perception to assess OAB

KYOTO – Self-reported evaluation of bladder sensation during daily life can be evaluated by scoring the grade of perception of fullness in a bladder diary. This way, frequency-volume charts with evaluation of perception of fullness might provide an initial non-invasive tool to study bladder sensation.

Moreover, a relatively new term convenience void (CV), which describes voiding episodes without a desire to void for social reasons, has been advocated to be considered for inclusion in bladder diaries used in research. At the time of CV, the bladder will be emptied for social reasons, such as before joining a meeting, before going out on a long journey or before retiring to bed at night. We considered that for men or women with OAB, the frequency of CV might be an indicator of how they controlled their voiding behavior in order to avoid urgency.

The aim of this study was to assess CV by a bladder diary with bladder perception grades, and to evaluate the relationship between CV and OAB in community-dwelling women during a mass-screening program in Japan. A total of 310 women (mean 58 years old, range 40 to 84) were asked to keep a 3-day bladder diary with grade of bladder perception. The grade of perception was defined by scores from 0 to 5; 0=no bladder sensation, 1=sensation of bladder filling without desire to void (voiding can easily be delayed for more than 60 min), 2=desire to void (voiding can easily be delayed for more than 30 min), 3=strong desire to void (voiding cannot be delayed for more than 15 min), 4=urgent desire to void (voiding cannot be delayed for more than 5 min) and 5=urge incontinence episode with urgent desire to void. In this study, two definitions of CV were used: CV in the narrow sense and in the broad sense. CV in the narrow sense was voids at perception grade 0, while CV in the broad sense was voids at perception grade 0 and 1. Additionally, the incidence of CV was calculated by the frequency of CV in the narrow sense or the broad sense of urinary frequencies per day in each women. The subjects with OAB were abstracted from the medical interview at the time of the mass-screening program by a definition of OAB of eight or more voids per day and one or more urgency episodes per week, as described in a previous epidemiological study in Japan. As for the results, 310 women, 48 (15.5 %) had OAB symptoms, including 37 (11.9 %) without urge incontinence (OAB-dry), and 11 (3.5 %) with urge incontinence (OAB-wet). The other 262 women were classified as the normal group. In the analysis of bladder perception grades in the normal group, 111 (35.8 %) women had voids at grades 4 or 5 that indicated urgent desire (normal with stronger perception group), while 151 (48.7 %) did not (normal perception group). The mean age of the OAB-wet group was significantly ($p<0.01$) higher than those in any other group. There were no significant differences in the incidence of CVs in the narrow sense among the four groups while the incidences of CV in the broad sense in the normal with urgency group was significantly ($p<0.01$) less than that in the normal without urgency group. In the analysis of each CV, there were no statistical differences in the mean voided volume of CV in the narrow sense among the four groups. While in the analysis of CV in the broad sense the mean voided volumes in the normal without stronger perception group was significantly larger than those of the normal with stronger perception group ($p=0.0002$), in the OAB-dry group ($p=0.02$) and in the OAB-wet group ($p=0.0001$). On the other hand, there was no significant difference between the normal with stronger perception group and in the OAB-dry group. The voided volumes of CV in the broad sense in the OAB-wet group were significantly smaller than those in the normal without stronger perception group ($p=0.0001$), in the normal with stronger perception group ($p=0.03$) and in the OAB-dry group ($p=0.03$). Our results demonstrated that the incidence of CV increased according to the strength of bladder perception, indicating women with OAB or stronger perception went to toilet earlier than normal women.

In conclusion, the incidence and voided volumes of CV were strongly related to severity of OAB symptoms as well as strength of bladder perception. The CV potentially becomes a clinical tool to relate with the storage dysfunction or bladder sensitivity. Further study of self-reported bladder perception grade in a bladder diary is warranted to assess the role of CV in relation to the etiology of bladder hypersensitivity or OAB. ■

HONJO

Hisashi Honjo

Author: Hisashi Honjo, Meiji University of Integrative Medicine, Kyoto Prefectural University of Medicine, Kyoto, Japan
e-mail: honjo@meiji-u.ac.jp

Session 5 (Poster) - Neurology (Clinical), Thursday 1st October, 14:25-14:30, Hall B

Effective reduction of urge-incontinence

Pelvic floor muscle training in the treatment of lower urinary tract symptoms in women with multiple sclerosis

LUCIÓ (6)

Adélia Correia Lució

CAMPINAS – Lower urinary tract symptoms (LUTS) occur in up to 90 % of the patients with multiple sclerosis at some time in the course of their disease, due to the autoimmune attack to the myelin. Urgency, with or without urge incontinence usually with frequency and nocturia are the most common symptoms.

Pelvic floor muscle training (PFMT), developed by Kegel, primarily used for treatment of stress urinary incontinence, have been effective in the treatment of these symptoms. This blind, randomised and prospective trial aimed at investigating the comparison of PFMT and a sham treatment in women with multiple sclerosis (MS) with relapsing remitting form.

Materials and methods

27 patients with symptoms of urgency, with or without urge incontinence, frequency and nocturia were recruited and randomized, by the envelope method, into two groups: treatment (G-I) (n=13) and sham (G-II) (n=14). Evaluation consisted of 24-hour pad testing; 3 day bladder diary; and post void residual volume, maximum cystometric capacity, detrusor overactivity and maximum flow rate were recorded by urodynamic study. All patients were assessed before and after treatment. The intervention was performed by a physiotherapist for a period of 12 weeks in both groups with participants attending twice a week. The G-I intervention consisted of PFMT in lying supine position with assistance of a Perina (Quark, São Paulo, Brazil) perineometer and was instructed to practice the exercises daily at home, without the assistance of any device, in other positions such as sitting and/or standing. They were also advised to integrate the exercises into their daily lives activities and the regimen was reviewed weekly according to the initial vaginal assessment using the PERFECT system. The G-II received a sham treatment which consisted of the introduction of a perineometer inside the vagina with no contraction required.

Results

Data analysis was to compare the beginning and the end of each intervention and the Repeated-measures ANOVA was used. A P-value of 0.05 was considered significant.

continued on page 25

continued from page 24

Demographic data were calculated by the Mann-Whitney test and there were no significant differences between the groups. After the treatment, in 24-hour pad testing results G-I showed a significant reduction in the weight of pads (p-value <0.0001) no differences were observed in the G-II (Fig. 1). In G-I a significant decrease of daytime frequency (p-value=0.0348) (Fig. 2) and nocturia (p-value <0.0001) (Fig. 3) was observed in the 3 day bladder diary. On the other hand, no changes were observed in G-II. No difference was observed in maximum voided volumes, in detrusor overactivity and maximum cystometric capacity in both groups, but a significant decrease in post void residual volume (p-value=0.0014) (Fig. 4) and a significant increase in maximum flow rate was observed in G-I (p-value=0.0024) (Fig. 5), while G-II remained the same.

Conclusions

The PFMT has been used as a treatment modality in the LUTS in MS, alleviating urinary symptoms. This symptoms reduction was verified in quantitative evaluations as pad testing with the reduction of urge urinary incontinence and bladder diary with the reduction of frequency and nocturia in G-I. In contrast with the findings, the urodynamic study showed few changes: There were significant differences only in post void residual volumes and maximum flow rate. G-II had none differences in any aspect. In concordance with previous studies, this improvement of G-I is due to the fact that PFMT helps to postpone voiding and manages urinary urgency, and to aid bladder emptying by relaxation of muscles. After inhibition of the urge to void, patients may gain enough time to reach the toilet and thereby prevent urge incontinence. Although good results were found on the signs above. No changes were found in detrusor overactivity and maximum cystometric capacity in the urodynamic study in G-I. According to previous studies, changes in symptoms are not necessarily correlated with changes in bladder and urethral function, furthermore, pelvic floor rehabilitation promotes good changes in symptoms but not significative improvement in the urodynamic finding. Findings from the current study suggest that pelvic floor muscle training is effective in the reduction of signs of urinary urge-incontinence, frequency and nocturia also enhancing maximum flow rate and reducing post void residual volume, caused by lower urinary tract dysfunction in MS. ■

Author:
Adélia Correia Lució
Division of Urology, University of Campinas School of Medicine , Campinas, Brazil
e-mail: adeliac@fcm.unicamp.br

Session 19 (Poster) - Rehabilitation, Friday October 2nd, 13:50-13:55, Hall C

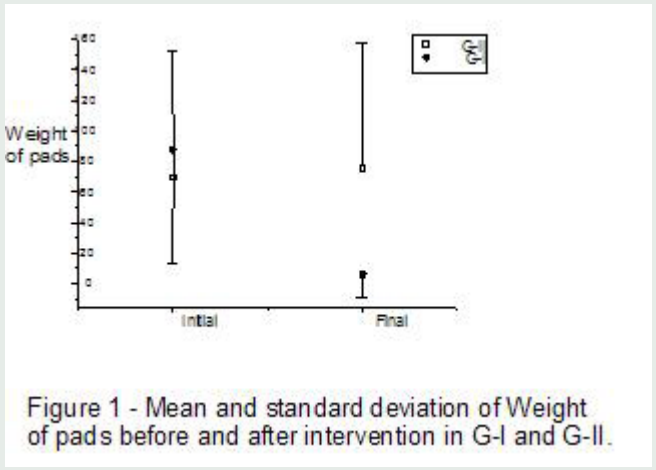


Figure 1 - Mean and standard deviation of Weight of pads before and after intervention in G-I and G-II.

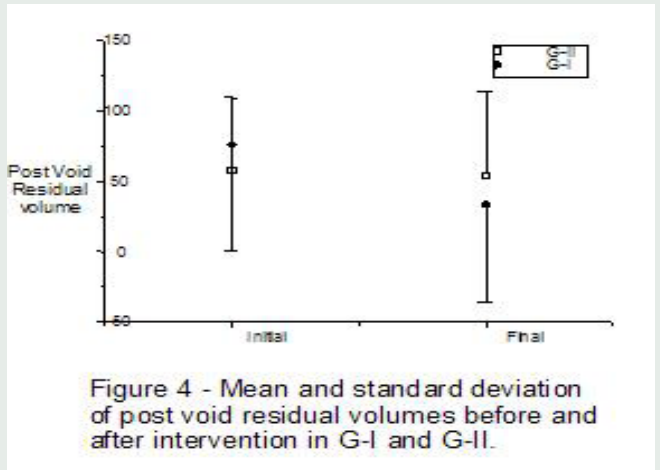


Figure 4 - Mean and standard deviation of post void residual volumes before and after intervention in G-I and G-II.

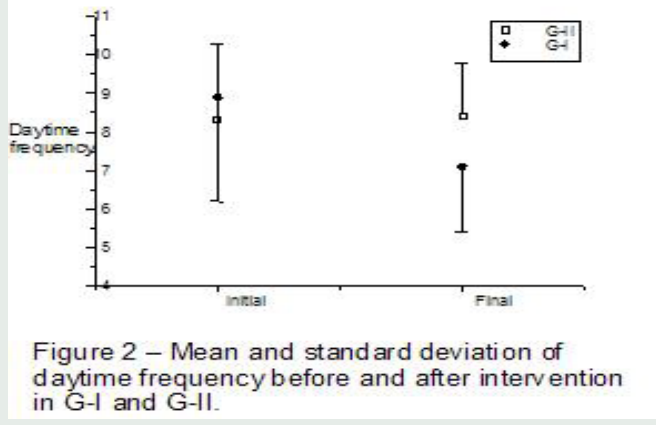


Figure 2 – Mean and standard deviation of daytime frequency before and after intervention in G-I and G-II.

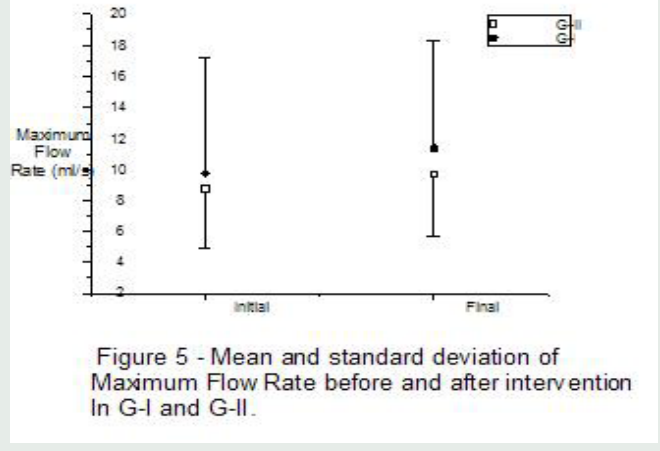


Figure 5 - Mean and standard deviation of Maximum Flow Rate before and after intervention in G-I and G-II.

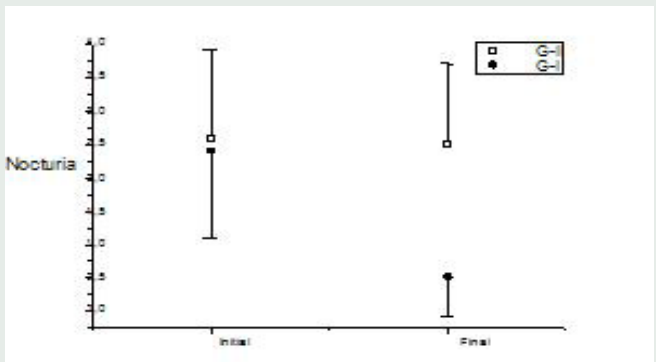


Figure 3 – Mean and standard deviation of nocturia before and after intervention in G-I in G-I and G-II.