Vaginal Surgery. Is apical support always necessary at the time of anterior repair?

Workshop 16
Monday 23 August 2010, 14:00 – 17:00

<table>
<thead>
<tr>
<th>Time</th>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>14:10</td>
<td>Introduction, background information</td>
<td>Renaud de Tayrac</td>
</tr>
<tr>
<td>14:10</td>
<td>14:40</td>
<td>Functional anatomy of the anterior &amp; apical vaginal compartment</td>
<td>Kindra Larson</td>
</tr>
<tr>
<td>14:40</td>
<td>15:00</td>
<td>Vaginal surgery with no mesh: is apical support always necessary at the time of anterior repair?</td>
<td>Michele Meschia</td>
</tr>
<tr>
<td>15:00</td>
<td>15:20</td>
<td>Review of the different techniques for apical support: high uterosacral ligament vault suspension, sacrospinous suspension, transischioanal tape or posterior mesh?</td>
<td>Michelle Fynes</td>
</tr>
<tr>
<td>15:20</td>
<td>15:30</td>
<td>Q&amp;A</td>
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<td>15:30</td>
<td>16:00</td>
<td>Break</td>
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<tr>
<td>16:00</td>
<td>16:20</td>
<td>Vaginal surgery with mesh: is apical support always necessary at the time of anterior repair?</td>
<td>Brigitte Fatton</td>
</tr>
<tr>
<td>16:20</td>
<td>16:40</td>
<td>Concomitant anterior mesh and anterior sacrospinous suspension: rational and US experience</td>
<td>Roger Goldberg</td>
</tr>
<tr>
<td>16:40</td>
<td>16:50</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>16:50</td>
<td>17:00</td>
<td>Take home messages</td>
<td>Renaud de Tayrac</td>
</tr>
</tbody>
</table>

**Aims of course/workshop**

Many mesh kits are currently available for anterior repair: anterior mesh, total mesh and anterior mesh with anterior sacrospinous fixation.

Main objectives of that workshop are to determine if apical support is always necessary at the time of anterior mesh repair and in which indications we should use the sole anterior mesh, a total mesh or an anterior mesh with concomitant anterior sacrospinous suspension.

**Educational Objectives**

Although anatomical studies have shown that apical support is critical to cystocele (DeLancey JO. Am J Obstet Gynecol. 2002;187:93-8), and although the use of mesh for anterior repair has been shown superior to traditional repairs, there is currently limited evidence about the need of apical support at the time of anterior repair with or without mesh.
Functional Anatomy of the Functional Anatomy of the Anterior and Apical Compartments

Kindra Larson, MD
ICS-IUGA 2010
Pelvic Floor Research Group
Department of Obstetrics and Gynecology
University of Michigan, Ann Arbor, MI
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What’s wrong?

Central Defect  Paravaginal Defect

What do you think causes a cystocele?

Elevating apex reduces cystocele

2-D MR imaging

3-D Models

Tools to unravel the mystery of the cystocele

Poor cystocele, you’re sitting there
Between the bladder and the air
Bulging out from where you hide
Ashamed they’ll see your wounded pride.

Misunderstood, neglected too
You’ve cringed when science bored at you
Passed-by along the road to fame
You’re destiny seemed filled with shame.

But now you’re modeled – spun around
Shown off in 3D shows with sound;
On video you’re gaining fame
Soon all will think you’re not the same.

So cystocele please don’t despair
Your unjust burden bravely bear
For though your cause is still conjecture
At least you have this fall lecture.

Ode to a Cystocele
by John O. L. DeLancey

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Inspirato by Ode to the Urethra
Fritz C. Westerhout, Jr. MD
© DeLancey
Pelvic Floor Research Group

Improving prevention and treatment of women’s pelvic floor disorders

Gynecologists, Engineers, Nurses, Physiologists, Midwives, Urologists, Radiologists, Physiatrists, Statisticians, Epidemiologists, Health Services Researchers, Economists, Endocrinologists, Physical Therapists, Cell Biologists, Veterinarians

What is normal support?

Principal Elements of Pelvic Organ Support

Those infamous “Levels”
Typical View of Uterosacral ligament with Uterus pulled upwards and patient supine

Distance Measurements of Bladder and Cervix from Normal

Cystocele and Uterine Descent

Apical Descent and the Cystocele

~55% of bladder descent associated with apical descent
Does this fit with clinical observations?

Elevating apex reduces cystocele

Prolapse after mesh repair

Methods

• Study population:
  – 11 asymptomatic women
  – Normal support (POP-Q points ≥ 1 cm above the hymen)
• Magnetic resonance imaging
• 3D models


How do we make a 3D model?
Where do the manufacturer’s recommend placement of these kits?

<table>
<thead>
<tr>
<th>Anterior Kits</th>
<th>Anchoring Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perigee®</td>
<td>2 cm from spine</td>
</tr>
<tr>
<td>Anterior Prolift®</td>
<td>1 cm from spine</td>
</tr>
<tr>
<td>Anterior Prolift®</td>
<td>1 cm from the pubic arch</td>
</tr>
<tr>
<td>Anterior Avaulta®</td>
<td>&quot;at ischial spine&quot;</td>
</tr>
<tr>
<td>Model Assumption</td>
<td>1.5 cm from spine</td>
</tr>
<tr>
<td></td>
<td>Level of bladder neck</td>
</tr>
</tbody>
</table>

Superior Suspension Point

- Inferior Suspension Point
Rest:

Above: 11/11 subjects
40% of vaginal length (SD 14%)

Behind: 9/11 subjects
15% of vaginal length (SD 6%)

Valsalva:

Above: 8/11 subjects
29% of vaginal length (SD 12%)

Behind: 11/11 subjects
24% of vaginal length (SD 24%)

Change: Mesh kits may not be appropriate for patients with significant apical prolapse

But it isn’t all about the apex, is it?

Anterior Vaginal Wall Length

17% additional effect from vaginal length

The Exposed Vagina


© DeLancey

Anterior Vaginal Wall Length

17% additional effect from vaginal length
What would it look like if we could make a 3-D model of this?

Aisha A. Yousuf, MD, Patricia Pacheco, HR, Kenda Larson, MD, James A. Ashton-Miller, PhD, John O.L. DeLancey, MD.

The Correlation between Unsupported Anterior Vaginal Wall Length and the Most Dependent Bladder Point at Maximal Valsalva in Dynamic MRI. AUGS presentation.

MR Imaging

Rest
Methods

- Study population
  - 10 women with a cystocele ≥ 1 cm beyond the hymen
  - 10 women with normal support (controls)
- MR imaging
- 3-D models

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cases (n=10)</th>
<th>Controls (n=10)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)*</td>
<td>56.3 ± 6.7</td>
<td>62.9 ± 13.1</td>
<td>0.17</td>
</tr>
<tr>
<td>BMI (kg/m2)*</td>
<td>27.2 ± 4.4</td>
<td>25.2 ± 4.5</td>
<td>0.32</td>
</tr>
<tr>
<td>Median parity</td>
<td>2</td>
<td>3</td>
<td>0.49</td>
</tr>
<tr>
<td>POP-Q*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aa</td>
<td>1.5 ± 1.0</td>
<td>-1.7 ± 0.9</td>
<td>0.0001</td>
</tr>
<tr>
<td>Ba</td>
<td>2.2 ± 1.6</td>
<td>-1.6 ± 1.0</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>-3.2 ± 1.6</td>
<td>-6.0 ± 1.1</td>
<td>0.0002</td>
</tr>
<tr>
<td>D</td>
<td>-6.6 ± 1.1</td>
<td>-8.9 ± 1.1</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

* Data are mean ± SD unless otherwise specified

3 Cardinal Features

- Downward Translation
- Vaginal Cupping
- Distal Pivot
But what can we do with this information?

- Quantification
- Quantification
- Quantification
What about the sidewall?

Arcus Tendineus
- Fascia Pelvis
- Levator Ani

Levator Ani M.

Major Levator Ani Defects:
Case-Control Study of Pelvic Organ Prolapse

Levator Ani Defects %

Normal: N=134
Prolapse: N=151

Odds Ratio 7.3

Odds 55.0%

15.5%

Methods

- Study population: 14 women with unilateral levator defects
- MR imaging
- 3-D models
- Quantify using local coordinate systems!

Key paravaginal structures are in a different location in women with levator defects

- The ATLA extends lower (more caudally)
- The ATFP extends lower (more caudally)

- Fits with paravaginal defect concept – a breaking away from the pelvic sidewall (down, medial, away from pubic bone)
No significant difference in vaginal width . . . not a central defect

Clinical importance: “So what?”

- Re-suspending the apex is important in certain cystoceles
  - Apical support important to cure of cystocele (i.e. Vaginal Hysterectomy)
- Excess length of the anterior vaginal wall should be considered in surgical management
- Anterior repair restores normal vaginal length
- The vagina does seem to break away from the side wall
How to you really know what’s cause and effect?

Create a lesion and see what happens?

Volunteers?

3D Finite Element Model of Anterior Vaginal Wall

Layun Chen, Ph. D
James Ashton-Miller, Ph. D
Yvonne Hsu, MD
J.O.L. DeLancey, MD
First Place: Journal of Biomechanics Award 2008

Vaginal surgery with no mesh: is apical support always necessary at the time of anterior repair?

**Michele Meschia, Italy**

Successful treatment of anterior vaginal prolapse remains one of the most challenging aspects of pelvic reconstructive surgery. Anterior repair has been for decades the standard surgical procedure for anterior vaginal wall prolapse although it has been documented that recurrences may be as high as 40-50% of treated cases. However it is disappointing to note how heterogeneous are data on this regard including case series where anterior repair was performed with or without other additional reconstructive procedures, making difficult to draw any sound conclusion regarding the role of the anterior repair in the management of anterior vaginal prolapse and associated pelvic floor defects.

Critical for the maintenance of anterior vaginal support is to ensure an adequate support (at the level of the ischial spines) for the apical vaginal site (cervix-cuff and culd-de-sac). It has been demonstrated that women with anterior vaginal wall descent had quite universally a posterior detachment of the arcus tendineus fascia pelvis (ATFP) from the ischial spines allowing the vagina to swing caudally (1).

The relationships between the anterior and apical vaginal compartments have been clearly demonstrated with figures that show that almost 80% and 55% of women with anterior vaginal prolapse at least 2 cm outside the hymen had a descent of the apical segment to at least 2 cm inside the hymen and > 2 cm outside the hymen respectively (2). The authors concluded that recurrent prolapse might be partially due to a modifiable factor, which is a failure to diagnose and treat apical support defects.

Richardson et al (3) focused on site specific defects of the endopelvic fascia showing that a transverse cystocele represent a detachment of the pubocervical fascia from the cervix
or apex, which results in the bladder herniating beneath the anterior vaginal fornix. Surgical repairs of transverse defects must include reattachment of the upper endopelvic fascia to the pubocervical fascia therefore as more than 80% of patients have multiple defects of the endopelvic fascia an apical prolapse repair procedure has to be accomplish in the majority of patients with a predominant anterior vaginal prolapse.

Different vaginal procedures without using a synthetic graft have been used to adequately suspend the apical compartment at the time of anterior vaginal repair including the uterosacral ligament suspension, the sacrospinous ligament suspension, the ilio-coccygeus fixation or the high levator myorrhaphy. All the procedures can be accomplished at the time of vaginal hysterectomy or can be scheduled for the treatment of a coexistent cuff prolapse or cervix descent.


2. Rooney K, Kenton K, Mueller E et al Advanced anterior vaginal wall prolapse is highly correlated with apical prolapse

Vaginal Cystocele Repair: Correcting concomitant Apical Descent
Miss Michelle M Fynes MD MRCOG DU
Lead Consultant Urogynaecologist & Honorary Senior Lecturer

Objectives
- Review of the different techniques for vaginal restoration of apical support:
  - Historical perspective
  - High uterosacral ligament vault suspension,
  - Sacrospinous and iliococcygeus fixation
  - Colpocleisis/ colpectomy
  - Trans-ischioanal tape - Mesh Kits
  - Posterior mesh

Cystocele
Analysis of 'Well women' population
- For women who entered the WHI protocol without cystocele. At some point during the study the following type of POP was diagnosed:
  - 1 in 4 Cystocele
  - 1 in 6 Rectocele
  - 1 in 100 Uterine prolapse

George White (1866-1926)
- On reviewing the failure of anterior repair:
The reason for failure seems to be that the normal support of the bladder has not been sought for and restored, but instead an irrational removal of part of the anterior vaginal wall has been resorted to, which could only result in disappointment and failure.

What's wrong with anterior vaginal wall support?
Is the anterior wall -
- Not as well supported by the levators countering the effects of gravity & abdominal pressure as with the posterior wall?
- Are the attachments to the pelvic sidewall or apex weaker?
- Is the connective tissue support more elastic or less dense compared to the posterior wall?
- Is it more susceptible to childbirth injury or weakening with aging or loss of oestrogen?

Anterior Compartment

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Follow-up</th>
<th>Failure (variably defined)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midline fascial plication</td>
<td>1 – 20 yrs</td>
<td>3.38%</td>
</tr>
<tr>
<td>Site-specific fascial repair</td>
<td>6 mths – 2 yrs</td>
<td>10-32%</td>
</tr>
<tr>
<td>Vaginal-paravaginal repair</td>
<td>6 mths – 6 yrs</td>
<td>30-67%</td>
</tr>
<tr>
<td>Abdominal paravaginal repair</td>
<td>6 mths – 6 yrs</td>
<td>20%</td>
</tr>
<tr>
<td>Concomitant sling support</td>
<td>17 mths – 4 yrs</td>
<td>2.67%</td>
</tr>
</tbody>
</table>
Surgical Management of Cystocele

- Disappointing results with ‘standard’ vaginal repair.
- Recurrence rates vary with definition of failure: Weber et al 2001 (56%) & Sand et al 2001 (43%).
- Mesh kits: Commercial success but significant concerns regarding mesh erosion, dyspareunia and other adverse events.

So why does POP surgery fail?

Depends on:
- Type of operation:
  - Primary / Secondary
- Other risk factors:
  - Surgical skill / volume cases
  - Definition failure/follow-up
  - Other outcome parameters
  - Follow-up period
  - Technique

Failure to recognise Apical Descent

Prevention – Peri-cervical ‘cuff’ of support

Classification of procedures for Apical Support at Cystocele Repair

- High Uterosacral Ligament Suspension
- Sacrospinous fixation
- Iliococcygeus Fixation
- Colpocleisis / colopectomy
- Mesh Suspension Kits
- Capio and other fixation devices +/- mesh

Dr Robert Shull
High Uterosacral Ligament Suspension

- Remnants of the US plicated across the midline with 2-4 nonabsorbable sutures.
- Delayed absorbable sutures used to suspend anterior & posterior walls with underlying fascia to the plicated US ligaments.

HUSLS
Outcome HUSLS

Transvaginal approach to repair of apical and other associated sites of POP with uterosacral ligaments.

Shull et al

**DESIGN:** (1994-1998) 302 consecutive cases apical + other defects. Transvaginal repair with native tissue. All cases ≥ G1 apical POP and other sites, 281 (93%) ≥ 1 F/U. Durability via life table analysis for 6 vaginal sites.

**RESULTS:** 251 (87%) no POP. 38 (13%) had ≥ G1 apical + one or more sites with at least G1 POP. 14 (5%) > G2. The anterior segment (bladder) was the site with most persistent or recurrent POP. The urethra and cuff most durable repairs. Morbidity: 1% transfusion, 1% ureteral injury, 0.3% postoperative death.


Sacralspinous Ligament Suspension

Sacrospinous and Prespinous Fixation

Nichols 1952

Inmon 1963

**Technique**
- SSF - The tip of the ligature carrier is penetrates the ligament at a point 2 finger breadths medial to the ischial spine. 2 permanent sutures. Unilateral
- PSF - Caudal to spinous process and bilateral insertion

Sacrospinous Fixation

<table>
<thead>
<tr>
<th>YEAR</th>
<th>N</th>
<th>TYPE</th>
<th>NEW</th>
<th>CYSTO</th>
<th>NERVE</th>
<th>F/U</th>
<th>MEAN</th>
<th>FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lantzsch 2001</td>
<td>1988-99</td>
<td>200</td>
<td>R UL</td>
<td>8%</td>
<td>7.5%</td>
<td>6-108 MTHS</td>
<td>4.8 YRS</td>
<td>3%</td>
</tr>
<tr>
<td>Meschia 1999</td>
<td>63 T</td>
<td>40 P</td>
<td>R UL</td>
<td>?</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozcan 1999</td>
<td>1999</td>
<td>54</td>
<td>R UL</td>
<td>3(5.5%)</td>
<td>4</td>
<td>28 MTHS</td>
<td>2/54</td>
<td></td>
</tr>
<tr>
<td>Shull 1992</td>
<td>81</td>
<td>R UL</td>
<td>13/81</td>
<td>?</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sacrospinous Ligament
Bilateral attachment of vaginal cuff to iliococcygeal fascia: an effective method of cuff suspension.
Shull BL, Capen CV, Riggs MW, Kuehl TJ.
AMJOG 1993

DESIGN: 42 suspension of the vaginal cuff via ICF and repair of coexisting pelvic support defects between 1987-1992. The findings at the 6-week postoperative visit and subsequent visits were compared for support of the vaginal cuff and adductors for the urethra, bladder, cul-de-sac, and rectum.

RESULTS: 2 (5%) recurrent cuff prolapse (1 further surgery). The other patient 5 previous repairs was asymptomatic.

CONCLUSION: 95% no persistence or recurrent cuff prolapse 6 weeks - 5 years after the procedure.

Comparative Studies

SSF versus Sacrocolpopexy

Benson 1996
48 Bilateral SSF vs 40 Sacrocolpopexy (SCMI)
Failure rates - 29% SSF vs 16% SCMI
Conclusion: Abdominal > Vaginal approach

Drutz 1996
125 SSF vs 80 SCMI
Failure rates - 2.4% vs 1.3%

SSF versus ICF

Maher CF, Murray CJ, Carey MP, Dwyer PL, Ugoni AM


RESULTS: 36 matched pairs, study power of 50% to detect a 20% difference in success rates between the two groups.

Subjective success ICF 91% VS 94% for SSF (P = .73).
Objective success rate 53% VS 67% (P =.36), satisfaction with surgery 78/100 and 91/100 (P =.01).
No significant difference was seen in the incidence of postoperative cystoceles or damage to the pudendal neurovascular bundle.

CONCLUSION: SSF AND ICF are equally effective procedures for vaginal vault prolapse and have similar rates of complications.

Obliteration of the Vagina

Colpectomy & Colpocleisis

Obliterative Procedures

Apposes the anterior & posterior vaginal walls
Used only as a last resort to cure prolapse

Leaves a non-functional vagina
Commonly used in the elderly, medically fragile, no other treatment options except indefinite pessary use.
Colpectomy & Colpocleisis

Obliterative Procedures

Advantages:
- Performed quickly
- Minimal risk of blood loss
- Performed safely under regional or local anaesthesia

Disadvantages:
- Sexual intercourse not possible
- Subsequent hysterectomy difficult
- Subsequent risk of de novo incontinence

Post-op urinary stress incontinence rate - 30%
- Fusion of anterior rectal wall to the base of the bladder causing descent & flattening of the bladder neck & proximal urethra
- Perform simultaneous bladder neck plication or mid-urethral tape is advisable. Pre-op urodynamics?

<table>
<thead>
<tr>
<th>Study</th>
<th>Specimen</th>
<th>N</th>
<th>Post-op SUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmanly et al</td>
<td>30</td>
<td>32</td>
<td>48%</td>
</tr>
<tr>
<td>Fitzgerald et al</td>
<td>2003</td>
<td>30</td>
<td>26%</td>
</tr>
<tr>
<td>De Lancey</td>
<td>1997</td>
<td>33</td>
<td>15%</td>
</tr>
<tr>
<td>Deval et al</td>
<td>2005</td>
<td>30</td>
<td>16%</td>
</tr>
</tbody>
</table>

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Colpectomy

Obliterative Procedures

Surgical options

Uterus

No uterus

LeFortes Hysterectomy & Colpectomy

Partial colpectomy

Complete colpectomy

LeFortes’ Colpocleisis

LeFortes’ Colpocleisis

Obliterative Procedures

Technique:
- Uterus in situ/ D&C
- Catheterise & local anaesthetic block
- Mark out areas to be denuded
  - 2 cm from cervix
  - 5 cm from urethra
- Shave off mucosa to maximise underlying fascia

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LeForté’s Colpocleisis
Obliterative Procedures
- Appose anterior & posterior walls, interrupted sutures
- Vagina/uterus pushed inwards
- Close transversely at end
- Bilateral tunnels to allow cervical secretions/blood
- Mid-urethral tape
- Perineorrhaphy

Colpectomy & Colpocleisis
Obliterative Procedures

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Patients (n)</th>
<th>Duration of follow-up (mos)</th>
<th>No. cured (%)</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Langmade &amp; Oliver 1986</td>
<td>102</td>
<td>12-144</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>DeLancey &amp; Morley 1997</td>
<td>33</td>
<td>35</td>
<td>37</td>
<td>1 (vault)</td>
</tr>
</tbody>
</table>

Mesh Kits Anterior Cystocele and Apical Prolapse

Potential advantages
Minimally Invasive Surgical (MIS) kits for POP
- Minimise operating and preparation time
- Disposable trochars
- Standardised approach
- Day procedure?
- Easy?
- Cost offset by above advantages?
Which Kits are currently available?

- Gynecare – TVM (Total vaginal mesh)
- AMS – Apogee and Perigee
- Boston Scientific – Pinnacle / Uplift
- Bard – Avaulta

And Many Other Kits ……………..
Choosing Your Material

Synthetic Mesh
- Permanent “for better or worse”
- Erosion rates 5 - 13%
- Long-term data still lacking
- Key functional outcomes
  - Dyspareunia?
  - Mesh Contraction?
  - Sexual function?
  - Bladder dysfunction?
  - Bowel dysfunction?

Surgical Intervention

Biological grafts & Cystocele Repair

Advantages
- Avoid erosion
- Minimise wound healing issues.
- Improved sexual function.

Disadvantages
- Cost
- Anchoring technique
- Longevity of graft
- Host versus Graft interaction
- Outcome data

Evidence?
Efficacy of MIS POP techniques?

Clear definitions of outcome

- POP in corrected compartment < grade 1
- No POP symptoms
- No new POP in another compartment
- No coital dysfunction
- No new bowel or bladder incontinence
- No new voiding or defecatory dysfunction

TVM: Prolift

<table>
<thead>
<tr>
<th>Author</th>
<th>N</th>
<th>Follow up</th>
<th>Success</th>
<th>Erosion</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fallon</td>
<td>110</td>
<td>3 mths</td>
<td>95%</td>
<td>5%</td>
<td>1 intraop bladder injury</td>
</tr>
<tr>
<td>Cosson</td>
<td>90</td>
<td>12 mths</td>
<td>82%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Murphy</td>
<td>69</td>
<td>5 mths</td>
<td>94%</td>
<td>0</td>
<td>2 bladder perforations 1 vesicovaginal fistula</td>
</tr>
<tr>
<td>Hinoui</td>
<td>29</td>
<td>6 mths</td>
<td>97%</td>
<td>7%</td>
<td>1 bladder perforation</td>
</tr>
<tr>
<td>Perschler</td>
<td>50</td>
<td>3 mths</td>
<td>12%</td>
<td></td>
<td>1 bladder perforation 2 blood transfusions 2 re-operation, 2ary to hematoma</td>
</tr>
</tbody>
</table>

Perigee

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>n</th>
<th>Follow up</th>
<th>Success</th>
<th>Erosion</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moore RD</td>
<td>IUGA 2006</td>
<td>42</td>
<td>12 mths</td>
<td>93%</td>
<td>7%</td>
<td>3 SUI 1 QAB</td>
</tr>
<tr>
<td>Dietz HF</td>
<td>IUGA 2006</td>
<td>48</td>
<td>11 mths</td>
<td>92%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Martinez Paya MJ</td>
<td>ESGE 2005</td>
<td>36</td>
<td>11 mths</td>
<td>76%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Pelosi</td>
<td>ICS 2005</td>
<td>63</td>
<td>6-8 wks</td>
<td>76%</td>
<td>4.7%</td>
<td>2 haematoma 2 de novo enterocele</td>
</tr>
</tbody>
</table>

Follow-up after polypropylene mesh repair of anterior and posterior compartments for recurrent POP. Garuder-Burnmester A et al

AIM: Analysis POP outcome at 1 year with Apogee (posterior) or Perigee (anterior) mesh repair kits. 120 recurrent cystocele and/or rectocele or combined vault POP. After 1 year (+/-31 days) POP-Q assessment, TVL, evaluation vaginal mucosa (mesh erosion).

RESULTS: 112(93%) ≤ G1, 8 (7%) G2. Erosions more common (p = 0.042) with Perigee.

CONCLUSION: Apogee/Perigee excellent short-term results at 1 year

Avaulta (Bard)

- Technique – no fascial plication, graft inserted, no skin excision, continuous vicryl suture closure
- Concomitant – SSF, VH or Mid-urethral tape as required
- Follow-up – 6 weeks, 6 mths & 1 year
- Success defined as IPOP stage 0-1, improved QoL PFDI, PIIQ, MHU, absence of dyspareunia

Complications –

- 4.2 % intra-op – 3 bladder, 1 rectal perforation
- 2 postop haematoma – 1 partial excision mesh
- 9.6% erosion by 3 months
- Dyspareunia – 14.5% (10/69) not 12.8%(10/78)

Success – (mean F/U:13 mths (R10-19)

- 92.3% anatomical cure (Stage 0-1)
- Recurrent cystocele 6.8% vs rectocele 2.6%
- PFDI & PIIQ significant improvement (p<0.0001)
Anatomic outcomes of vaginal mesh (Prolift) compared with uterosacral ligament suspension & abdominal sacrocolpopexy for POP: a Fellows’ Pelvic Research Network study.

Sanses TV, Shahryarinejad A, Molden S.

AIMS: Compare apical outcomes after Prolift (VMP) vs uterosacral ligament suspension (USLS) and abdominal sacrocolpopexy (ASC).

DESIGN: Multi-center retrospective chart review compare apical success (stage 0 or 1 based on point C or D of POP-Q) 3-6 months after POP repair at 10 US centers (2004-2007).

RESULTS: For VMP (206), USLS (231), ASC (305) there was no difference in apical success - VMP (98.8%), USLS (99.1%) or ASC (99.3%). Mean elevation of the apex was lower after VMP (-6.9 cm) USLS (-8.05 cm) and ASC (-8.5 cm) (both P < .001).

CONCLUSION: Patients VMP, USLS and ASC have same anatomic POP-Q success despite lower vaginal apex 3-6 month after surgery.

Efficacy and safety of using mesh or grafts in surgery for anterior and/or posterior vaginal wall prolapse: systematic review and meta-analysis.

Jia X, Glazener C, Mowatt G, MacLennan G, Bain C, Fraser C, Burr J. Health Services Research Unit, University of Aberdeen

OBJECTIVES: To systematically review the efficacy and safety of mesh/graft for anterior or posterior vaginal wall prolapse surgery.

SELECTION CRITERIA: Randomised controlled trials (RCTs), nonrandomised comparative studies, registries, case series involving at least 50 women, and RCTs published as conference abstracts from 2005 onwards.

ANALYSIS: 3 groups: anterior, posterior, anterior + posterior repair (not reported separately).

RESULTS: 49 studies (N=4569) mesh/graft POP repair. Median follow up 13 months (R1-51). For Anterior repair, short-term evidence that mesh/graft (any type) significantly reduced objective prolapse recurrence rates compared with no mesh/graft (relative risk 0.48, 95% CI 0.32-0.72).

CONCLUSIONS: Evidence for most outcomes was too sparse to provide meaningful conclusions. Rigorous long-term RCTs are required to determine the comparative efficacy of using mesh/graft.

Capio technique

- Cut suture in 2 to get 2 throws
- Remember needle tip

Apical Suspension: Comparing Devices

Posterior IVS apogee

- Prolift
- Capio

Capio Fixation: Advantages Over Trocar Perforation with MIS prolapse kits

- Improved Safety
  - 100% Retropitoneal
  - “Trocar-Free”
  - No Perforation of Gluteal, Obturator, Levators
  - Low Risk Rectal Perforation

- Higher Suspension
  - “Gold Standard” Sacrospinous

- More Anatomically Correct
  - No Stray Mesh Arms
  - Cheaper!!
ICS/IUGA Toronto 2010

"Arcus to Arcus" Graft

Suture Placement: “6-Point Suspension”

Paravaginal Defect Repair

Central Defect Covered

Level I Support Restored

Fascial Reconstruction Repairing Enterocele

ICS/IUGA Toronto 2010

Which Operation?

Choosing Type of Cystocele Repair +/- Apical Support Procedure

- Previous Surgery
- Type Cystocele – Clinical Evaluation
- Bladder Dysfunction – Urodynamics
- Levator, Fascial Defects, Type of Cystocele
- Likelihood of connective tissue deficiencies
- Effects of genetics, childbirth, aging and oestrogen deficiency on the pelvic floor and anterior compartment support

ICS/IUGA Toronto 2010

Cystocele: Midline Defect

- Damage to pubocervical fascia
- Fascia stretches and weakens
- Bladder sinks into the middle of the upper vaginal wall

ICS/IUGA Toronto 2010

Cystocele: Lateral Defect

- Detachment of fascia from arcus tendineus
- Fascia tears away from their attachments to the sidewalls of the pelvis

ICS/IUGA Toronto 2010

Clinical Presentation

Figures – From Dee Fenner et al

A transverse defect with loss of the anterior fornix.

A cephalad defect - loss apical attachment at ischial spines.
Residency Training

Should SSF for POP be part of a residency program procedure?

Penalver M, Mekki Y, Lafferty H, Escobar M, Angioli R.

OBJECTIVE: Safety and effectiveness of SSF as part of POP management in a residency program.


RESULTS: 160 underwent R-SSF, AVR and PVR.

Complications: 13 (8.1%), urinary retention 16 (10%), blood loss requiring transfusion 7 (4.3%), sciatic neuralgia 2 (1.2%), and rectovaginal fistula 2 (1.2%). Mean follow-up 10 months (11-83). Success gauged by recurrence 94%, no vaginal vault prolapse and 85% recurrence of any pelvic support defect. 11/24 recurrence cases underwent surgery.

CONCLUSION: R-SSF should be an essential component in the training of gynecologic residents.

Successful Surgical repair of Cystocele

- Evaluation of the type of anterior wall defect and directed repair technique
- Recognition and Correction of Apical Descent
- Reinforcement or replacement of native support tissues with a graft?
- Synthetic versus biologic graft factors?
- Stem cells?
- Effect of neurological & mechanical Levator injury
- Role of concomitant Pelvic Floor Rehabilitation

Conclusions
Vaginal surgery: is apical support always necessary at the time of anterior repair

Vaginal surgery with mesh: is apical support always necessary at the time of anterior repair

Brigitte Fatton, MD
University Hospital of Clermont-Ferrand
FRANCE

Anatomical considerations

- The apex is often involved in high grade cystoceles
- In those patients it is essential to surgically address the involvement of the middle compartment appropriately

Ant Mesh kits

- Those designed to provide anterior repair only (Level II)
  - Ant Prolift
  - Perigee
  - Avaulta

Technical considerations

Ant mesh kits

- 2 types of Anterior Mesh kits
  - Those designed for the combined repair of anterior and middle compartments (Level II and I)
    - Ant Pinnacle
    - Ant Elevate

Epidemiological considerations

Table 6. Anatomical Site of Prolapse and Incontinence Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Anterior compartment only</th>
<th>Posterior compartment only</th>
<th>Apex only</th>
<th>Anterior and posterior compartments</th>
<th>Anterior compartment and apex</th>
<th>Posterior compartment and apex</th>
<th>All compartments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 384</td>
<td>154 (40.1%)</td>
<td>28 (7.3%)</td>
<td>22 (5.7%)</td>
<td>60 (15.6%)</td>
<td>33 (8.6%)</td>
<td>18 (4.7%)</td>
<td>69 (18.0%)</td>
</tr>
</tbody>
</table>

Data are presented as n (%).

Retrospective cohort study

References

Risk of de novo prolapse of the unaffected compartments

- Deterioration (neglected prolapse) or
- De novo prolapse (non affected compartment)
  - rigorous preoperative physical examination ++

Patients with untreated compartment

Table 3 Effect on non-treated compartment at 13 months

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Stage</th>
<th>Line</th>
<th>Follow-up</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Prolift™ (n=26)</td>
<td>0</td>
<td>26 (74%)</td>
<td>89% (79-96)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>14 (44%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>10 (29%)</td>
<td>4 (13%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>25 (71%)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apical</td>
<td>0</td>
<td>26 (74%)</td>
<td>86% (74-98)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>10 (29%)</td>
<td>4 (13%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>22 (63%)</td>
<td>1 (3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>6 (18%)</td>
<td>0 (0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posterior</td>
<td>0</td>
<td>9 (26%)</td>
<td>54% (37-71)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>12 (34%)</td>
<td>0 (0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>14 (40%)</td>
<td>10 (28%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>9 (26%)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>0</td>
<td>15 (43%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>De novo stage 2H anterior compartment</td>
<td>12 (46%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De novo stage 2H posterior compartment</td>
<td>12 (46%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Concomitant non mesh surgery: 2 SSF, 7 post colporraphy

Our experience

- Tranvaginal mesh repair with Prolift procedure
  - 125 patients between March 2005 and August 2006
    - Ant and post mesh repair: 64 (51.2%)
    - anterior mesh repair only: 41 (32.8%)
    - posterior mesh repair only: 20 (16%)
  - minimal 1 year follow-up
Our experience

- Among the 41 patients with anterior mesh repair only, concurrent procedures were
  - vaginal sacrospinous fixation (Richter): 3 patients (7.3%)
  - sacrospinous hysteropexy (Richardson): 10 patients (24.3%)

68.3% of patients without concurrent apical repair

Vaginal surgery with mesh: is apical support always necessary at the time of anterior repair?

**NO!**

**But** carefully evaluate the need for reattaching the apex at the time of surgery for cystocele

**If** concurrent apical repair is needed, discuss
- Traditional surgery: SSF, USLS
- Or mesh repair

Our experience

- **Anatomical results (1y fu)**
  - 4 failures (9.7%)
    - 2 among patients with concomitant apical repair (2/13 = 15.3%)
      - 1 cystocele
      - 1 apical recurrence: failure after SSF
    - 2 in patients without apical support (2/28 = 7.1%)
      - 1 apical prolapse: de novo apical prolapse
      - 1 rectocele

De novo apical prolapse: 3.6%

Global rate of apical prolapse after Ant Prolift: 2/41: 4.9%

A good screening of patients is necessary: in women with an isolated problem with anterior compartment support, cystocele repair alone leads to good results in case of well supported apical segment
Anterior Sacrospinous and Anterior Mesh: The Combined Approach

Dr. Roger Goldberg, MD, MPH
Clinical Assistant Professor of Obstetrics & Gynecology
University of Chicago Pritzker School of Medicine
Director of Urogynecology Research,
Northshore University HealthSystem

Goals

• Discuss the “apical component” of cystoceles
  – Key Challenge in Pelvic Reconstruction
• Improving the Vaginal Approach
  – Mesh Usage – our philosophy
  – Focus on both efficacy and safety
• University of Chicago “Minimal Mesh” Approach
  – Technique steps
  – Successes to Date

Anterior & Apical Compartments: Connective Tissue Planes

• “Envelope” of Anterior & Posterior Fascia – Fused at the Apex
• Key Component of Normal Female Pelvic Anatomy
• Surgical Goal: Suspend Apex to Level I & Reinforce Fascial Attachments

Pelvic Floor Anatomy

Pelvic Sympathetic
Apical Repairs

- >170,000 seek treatment for Apical defects in US each year\(^1\)
- Yet, current repair options remain challenging
- Intimidating task for many GYN surgeons

<table>
<thead>
<tr>
<th>Standard vaginal repair</th>
<th>Vaginal kit repair</th>
<th>Abdominal repair</th>
<th>Laparoscopic repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive, unsatisfactory</td>
<td>Poor apical support &amp; tissue risks</td>
<td>Invasive procedure</td>
<td>High degree of skill required(^2)</td>
</tr>
</tbody>
</table>


Cystocele Repairs: Why Such a Challenge?

- Anterior Colporrhaphy: objective recurrence in 25-52% of women within 5 years\(^1\)

Cystocele Repairs: The \textit{“Apical Component”}

- Simulated restoration of apical support corrects 55% of cystoceles and 30% of rectoceles, demonstrating traction bulges more common than anticipated.\(^1\)
- Achieving \textit{“gold standard”} suspension at vaginal apex results in superior overall outcome for most repairs.\(^1\)
- Addressing the apex quickly, effectively and safely represents a key hurdle for many GYN surgeons.

Adding Mesh to the Apical Repair?

- Mesh usage may provide better long term support\(^1\)
  - Hiltunen: 37 of 97 women (38.5\%) in no-mesh group versus 7 of 104 women (6.7\%) in mesh group had recurrence of anterior prolapse \((p<0.001)\) at 12 months\(^1\)

Anterior & Apical Defects Routinely Coexist

- Relationship between anterior & apical supports
  - Anterior/Apical compartments strongly correlated \((r^2=0.53, p<.0001)\)
  - Loss of apical support critical to development of anterior bulge
- Advanced anterior & apical defects: strongly correlated
  - Anterior vaginal wall defects that are surgically repaired usually require a concomitant repair of the apex.

Anterior Sacrospinous Vault Suspension

- Retrospective study results:
  - Longer vaginal length than posterior sacrospinous suspension\(^1\)
  - Recurrent anterior vaginal relaxation is less likely\(^1\)
  - Provides anatomically correct outcomes\(^1\)

Anterior Sacrospinous Fixation

- "Anterior or Posterior Sacrospinous Suspension: Long-Term Anatomic and Functional Evaluation"
  - Goldberg et al, Obstet Gynecol 2001;92:199-204
  - 168 consecutive sacrospinous suspensions
    - 92 posterior, 76 anterior
    - Total vaginal length and apical suspension slightly greater after the anterior suspension
    - Recurrent anterior compartment prolapse less likely

Anterior Sacrospinous Fixation

- Evolution to Bilateral “Palpation Only” Technique
  - Eliminates vaginal narrowing or deviation
- Synergy with Anterior Graft & Mesh Augmentation
- Excellent Apical & Anterior Results
  - Botros, et al; Gamble, et al

Suture-Based Repair: Anterior Dissection

Dissection to Pubic Rami

Blunt Dissection Beyond Pubic Rami

Palpating Anchoring Sites

- Gentle “Sweep” Along Obturator Muscle
  - Pubic Tubercle to Ischial Spine
  - “Clean” Plane Against Obturator / Arcus
  - No Sharp Perforation Needed
Suture Based: Exposure of Arcus

Placement of Sutures

Avoiding Injury

- Avoid aggressive denuding of SSL
- 0.5–1.5 cm medial to spine
  - Pudendal NV bundle: 0.9–1.3 cm
  - Inferior Gluteal Artery
- Use superficial portion
  - Suture into, not over the ligament

Colporrhaphy (Optional)

Preparing Biograft
Preparing Prolene Mesh

“Trapezoid” for Anterior Compartment

Sutures Passed Through Mesh Pores

Suspending the Apex

Achieves Bilateral Sacrospinous Vault Suspension

Tying the Sutures

Vaginal Closure

“4 in 1” Repair
- Bilateral Vault Suspension
- Central Repair
- Paravaginal Defect Repair
- Enterocele Repair
Mesh-Arm Based Repair

- Address Apical Prolapse
- Address Cystocele
- Mesh Only Where it’s Needed
- Anterior Sacrospinous Approach
- Completely Intravaginal & “Trocar Free”

Two Clinical Scenarios

- Apical (Level I) coverage
- Cystocele (Level II) coverage
- Reduced mesh implant
- Intra-Vaginal Anterior SSL

Device Technique Steps

Crescent Incision

A retrospective study demonstrated that reducing the number and extent of vaginal incisions may reduce the risk of mesh exposure. ¹

Device Technique Steps

Dissection
Device Technique Steps

Leg Placement into SSL

Device Technique Steps

Anterior Plication

• Reduces surface area of anterior compartment
• Promotes “mesh only where its needed” strategy by shrinking the mesh coverage zone

Device Technique Steps

Attach to Apex with Tacking Sutures

Device Technique Steps

Activating Legs

Device Technique Steps

Sleeve Removal
Device Technique Steps

Final Mesh Adjustments

Final Placement

Horizontal incision
Evolution of Data

**Biograft-Augmented Sacrospinous Hysteropexy**
- Presented SGS 2009
- Anterior approach to SSL, plus arcus fixation points
- 33 consecutive subjects w/ complete 1 year follow up
  - Mean follow up 17 months (minimum 12)
- Anterior outcomes significantly improved vs. hysterectomy
  - Aa: 2.55 vs. 1.75 (p<0.004)
  - Ba: 2.5 vs. 1.75 (p<0.008)
  - TVL: 9.52 vs. 8.13 (p<0.002)
- Recurrent cystocele after 1 year: 10% vs 29% (p=0.08)
- No erosions
- Technical challenges of graft sizing and tensioning

**Mesh Augmented Sacrospinous Repair**
- Gamble, et al
- 39 consecutive subjects, ≥2 anterior-apical prolapse
- "Minimal mesh" repair, preceded development of Uphold
  - Suture based
  - Vertical / T-shaped incisions
- At 1 year:
  - Recurrent Cystocele: 4.2%
  - Recurrent Apical Prolapse: 2.6%
  - PFDI: 25.9 vs. 77.1 (p=0.04)
  - PISQ: 27.9 vs. 29.1 (p=0.73)
  - Dyspareunia: 21% vs. 22% (p=0.71)
  - Mesh Exposure: 12.8%
Mesh Arm (Uphold) Technique: Current Data

- University of Chicago, IL & NorthShore Hospital, NY:
  - 141 subjects, follow-up 3-18 mos
  - Entire early experience including "learning curve"
  - 94 with uterus intact, 32 vault suspension, 15 with hysterectomy
  - Standardized exam & QOL assessment
- Summary of significant POPQ differences (pre / post):
  - Aa -3.06, Ba -3.91, Bp -2.23, C -5.38
  - TVL was unchanged at -0.33 (p=0.36)
- Mesh Exposure
  - 2.6% horizontal incision both centers, 1.1% at Site 1
  - 4.26% vertical incision both centers

Uphold: Outcomes First 141 Subjects

- Overall success:
  - 8 (6.1%) had C≥-1 postop, 5 (3.8%) had C≥0
  - 8 (6.1%) had Aa or Ba≥-1, and 1 (0.8%) had Aa or Ba≥0.
- Rates of anterior success (Aa and Ba ≤-1) from 90-95%

Experiences to Date

Outcomes First 141 Subjects

- Uterus in Situ:
  - 4 (4%) had C≥-1, 2 (2%) had C≥0
  - 5 (5%) had Aa or Ba≥-1 and 0 (0%) Aa or Ba≥0.
- Post Hysterectomy:
  - 4 (12.5%) had C≥-1, 3 (9.4%) had C≥0
  - 3 (9.4%) had Aa or Ba≥-1, and 1 (3.1%) Aa or Ba≥0.
- With Vag Hyst:
  - 2 (13.3%) C≥-1 and 2 (13.3%) had C≥0
  - 2 (1.7%) Aa or Ba ≥-1, and 1 (1.7%) Aa or Ba ≥0

Anterior Sacrospinous with Mesh: Bottom Line

- Current repair showing great promise
  - "Minimal Mesh" approach
  - 75% less foreign body implant
  - 1.1-2.5% exposure rate with horizontal technique
  - Now a streamlined surgical technique
    • Mesh-arm technology
    • No trocars
- Excellent anterior and apical results
- Highly effective for uterine preservation
  - 80% fewer hysterectomies at our center

Mean Aa: 0 -2.89
Mean Ap: 0 -2.7
TVL: 9.2 9.4
Mean C: -2.1 -7.9
Maximum preoperative C point: 8.0
Dyspareunia reported by 3 patients:
  - 2 from posterior (rectocele) repair
PISQ and PFDI being completed at 12 months