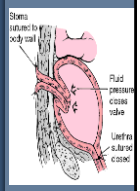
Destroyed Bladder Outlet
&
Continent Diversion

Sherif Mourad
ICS General Secretary
Professor of Urology, Ain Shams University
Head of Voiding Dysfunction Unit



Objectives

What is a Devastated Bladder Outlet

- What are the most commonly used urinary diversions in such cases ??

"Nonreconstructible" Devastated Bladder Outlet

- **This term describes :**

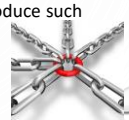
  a group of patients with intractable urinary incontinence secondary to a functionally or anatomically destroyed bladder outlet

Litwiller SE, and Zimmenr PE: Closure of bladder neck in the male and female, in Graham Jr SD (Ed): Glenn's Urologic Surgery, 5th ed. Philadelphia, Lippincott-Raven, 1998, pp. 407–414.

"Nonreconstructible" Devastated Bladder Outlet

It is usually challenging :

- Patients have often undergone multiple, unsuccessful surgical procedures fraught with complications.
- Furthermore, the resulting operative changes produce such unfavourable tissue characteristics

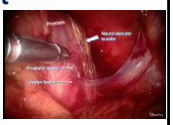


Ullrich NF, and Wessells H: A technique of bladder neck closure combining prostatectomy and intestinal interposition for unsalvageable urethral disease. J Urol 167: 634–636, 2002.

"Nonreconstructible" Devastated Bladder Outlet

Most Prevalent Aetiologies :

- Radical Prostatectomy
- **Neurogenic Bladder**
- Urethral Stricture
- Rectourethral Fistula
- Spinal Cord injuries
- Patients had previously undergone multiple surgical attempts for urethral repair.



Devastated Bladder Outlet
Management Options

They are multiple :

TABLE 1. *Treatments before bladder neck closure*

Treatment	n
Conservative (n = 13)	
Indwelling Foley catheter	9
Condom catheter	2
Diapers/pads	2
Surgical (n = 31)	
Indwelling suprapubic tube	10
Artificial urinary sphincter	6
Urethral bulking agents	5
Pubovaginal sling	5
Bladder augmentation	5
Sphincterotomy	4
Bladder neck closure (failed)	3
Bladder neck reconstruction	2
Penile prosthesis	1

- (The Last Resort) Bladder neck closure (BNC) and continent vesicostomy:

Provide urinary storage, protect the upper urinary tract and preserve renal function, establish continence and offer a suitable method of complete bladder emptying by using clean intermittent catheterization

Bladder Neck Closure (BNC)

BNC Approaches

Suprapubic, Perineal , Transvaginal

- **Suprapubic bladder neck** closure offers **several advantages** to other methods.
  - ✓Direct visualization and separation of the bladder neck and prostate (or urethra in women).
  - ✓With the ability to mobilize the bladder better for tension-free closure
  - ✓And to separate the bladder from the urethral stump.
  - ✓Avoids extensive dissection below the pubis, because the bladder neck is taken off the prostatic base rather than the apex.
  - ✓Facilitates tissue interposition after bladder neck closure at the same session

Bladder Neck Closure (BNC)

Literature Results

- **Jayanthi et al** presented the largest series to date in 1995, when they described BNC and concomitant Mitrofanoff appendicovesicostomy in 28 children with an initial **urethral leakage rate of 14%.**
- Other series of pediatric patients showed urethral leakage rates between **0% and 24%.**
- **Ullrich and Wessells** performed radical prostatectomy and bladder augmentation with interposition of an ileocecal patch over the BNC with **1% rate of urethral leakage**
- **Khoury et al** mobilized a leaf of the posterior bladder base anterior to avoid apposing suture lines between the bladder and urethral stump with good outcomes
- **Levy et al** performed primary transvaginal BNC or combined transvaginal/abdominal BNC and they noted significantly better outcomes with the combined procedure.

URINARY DIVERSIONS FOR THE MANGEMENT OF URINARY INCONTINENCE

TYPES OF URINARY DIVERSION

- ***Incontinent Diversion:*** Ileal conduit is still the most common diversion used.
- ***Continent Diversion:***
  - Internal (Uretero-sigmoidostomy) with all its known modifications & complications (mainly metabolic) is the least common diversion used.
  - *Continent Cutaneous diversion: the most appealing.*

URINARY DIVERSION - INDICATIONS

- Neurogenic Bladder usually with DO and or DSD.
- Severe anatomic problems which can be
  - *congenital* as in bladder extrophy or
  - *acquired* due to severe urethral trauma.
- Bladder tumors after cystectomy when there is contraindication for orthotopic substitution (diversion).

URINARY DIVERSION.. WHEN?

- ***When*** the patient is unable to void per urethra because of severe urethral trauma and failed urethral reconstruction.
- ***When*** the normal sensation of native urethra prevents compliance with routine C.I.C. as in neurogenic bladder patients with DSD.
- ***When*** urine leakage is expected despite proper augmentation as in patients with spastic neurogenic bladder.
- ***When*** the urethra is partially or totally excised as in cases of Bladder TCC.

CONTINENT CUTANEOUS URINARY DIVERSION

- Is the technique by which you provide patient with skin stoma that is:
  - Accessible, easily catheterizable
  - Continent and cosmetically appealing
  - With preservation of kidney functions
- Continent cutaneous urinary diversion has dramatically changed the quality of life of many patients who would otherwise be incontinent or be faced with wearing a bag to collect urine.

URINARY DIVERSION.. When Not?

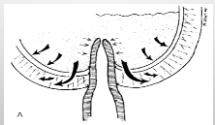
- ***When*** patient refuses the operation.
- ***When*** Serum creatinine is above 1.8 mg/dl and/or creatinine clearance < 60 ml/min.
- ***When*** Patient has liver dysfunction.
- ***When*** Patient has advanced malignancy (> T_3, N_0, M_0).
- ***When*** patient is unable to perform intermittent catheterization and/or not motivated.
- ***When*** patient has history of chronic diarrhea, bowel resection or heavy irradiation.

CONTINENT URINARY DIVERSION.. CONTINENCE TECHNIQUES

1. Nipple Valve.
2. Ileocecal Valve.
3. Penn Pouch.
4. *Flap Valves (Mitrofanoff Principle).*

NIPPLE VALVES
CONTINENCE MECHANISM

Creation of intussuscepted nipple inside an ileal or colonic reservoir using 15 – 20 cm of ileum.



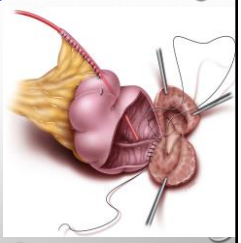
ILEOCECAL VALVE (Indiana Pouch)
CONTINENCE MECHANISM

- Short segment of terminal ileum is tailored or imbricated.
- ***Continence depends on the augmented imbricated ileocecal valve using interrupted sutures.***
- Continence is up to 95%.
- The main disadvantage is the potential nutritional and gastrointestinal functional hazards.

Ileocecal Bladder Augmentation

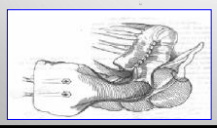
In patients with low bladder capacity a simultaneous ileocecal bladder augmentation was performed.

- A 10 cm portion of the cecum was isolated along with the 2 distal ileal loops, each 10 cm in length, when the submucosally embedded in situ appendix was used.
- For creation of an ileal intussusception valve, an additional 8-10-cm segment of ileum was necessary to create the outlet.
- The technique described for the **Mainz-I Pouch-** procedure was used



PENN POUCH
CONTINENCE MECHANISM

- Is the use of in situ appendix in continent reservoir which by necessity will include the right colon.
- *Continence depends on natural ceco-appendicular valve which is enforced by imbricated cecal sutures around the appendix.*



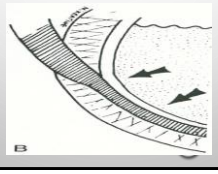

FLAP VALVE (MITROFANOFF PRINCIPLE)
CONTINENCE MECHANISM

- Since its description in 1980, the Mitrofanoff principle using the appendix has been a main stay in the armamentarium of reconstructive surgeons.
- Its principle involves the use of a small caliber tube implanted into a compliant bladder or reservoir with a non refluxing anastomosis to provide convenient and effective method to empty the bladder.

Flap Valve Techniques

Mechanism of continence

Pressure is transmitted to the implanted conduit



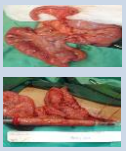
Flap Valve Techniques

- ***Different channels can be used*** including:
  - Ureter, Appendix.
  - Tubularized ileum or sigmoid colon (Monti)
  - Tailored Blabber Flap.
- ***Different tunnels can be also used:***
  - Submucosal tunnel bladder or colon.
  - Extramural serosa-lined ileal tunnel.
- 2-3 cm tunnel to create a continent stoma ???

Flap Valve Techniques - Channels

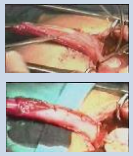
Different channels can be used including:

Ureter, Appendix



Tubularized ileum or sigmoid colon (Monti)

Tailored Blabber Flap

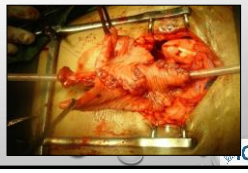


Flap Valve Techniques - Tunnels

Different tunnels can be also used:

Submucosal tunnel (bladder or colon)

Extramural ileal tunnel



Continent Diversion Technique

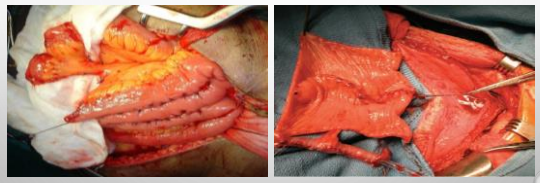
- Continent cutaneous Diversion is a technique that needs attention to all small details ***(small things make perfection but perfection is not a small thing).***
- It's a technique vulnerable to complications and the consequences could be very serious.
- It needs a steep learning curve and has to be done by urologists who are familiar with bowel reconstructive surgery.

Surgical Tips

- Low pressure pouch.
- Adequate tunnel (2-3 cm-suggested length).
- Fixation of the Monti channel and the nearby bladder to the posterior surface of the anterior abdominal wall.
- Wide skin anastomosis to create adequate stoma.

Monti Technique

Reservoir used is augmented or substituted bladder using a reconfigured ileum.



Monti Technique

isolation of ileal segment

use either:

- The ***single tube Monti (classic)*** technique
- The ***double tube Monti (full Monti)*** technique if a longer channel is needed.

The classic Yang Monti technique (Single tube) - Gives 7-8 cm

Double tube Monti technique - Gives 14-16 cm

Monti Technique

Detubularization of ileal segment

Single tube Monti technique

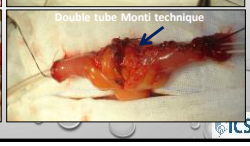
Double tube Monti technique

Monti Technique

Tailoring of the tubularized ileum on cath.

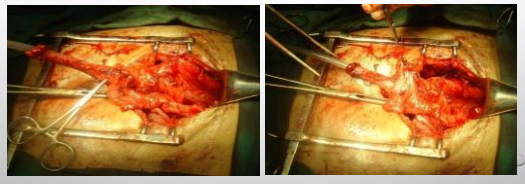
Single tube Monti technique

Double tube Monti technique



Monti Technique

implantion of ileal conduit to reservoir through extramural ileal tunnel
(Ghoneim-Abo-Elaenin Technique)



Monti Technique

implantion of ileal conduit to reservoir through extramural ileal tunnel
(Ghoneim-Abo-Elaenin Technique)

Monti Technique

Fixation of channel to abdominal wall

Monti Technique

Creation of wide stoma

Monti Technique

Post-operative catheterization of stoma

Complications of Continent Urinary Diversion

- Channel complications: kinked and strictured channel.
- ***Stomal complications:*** *the most common.*
- Metabolic complications: uncommon.
- Pouch complications: pouch rupture is the most serious.

Stomal Complications of Continent Urinary Diversion

The most frequent stomal complications are:

- Stomal stenosis.
- Stomal incontinence.

To date, stoma-related complications have proved to be those most commonly reported and requiring subsequent assessment and revision.

Causes of Stomal Incontinence

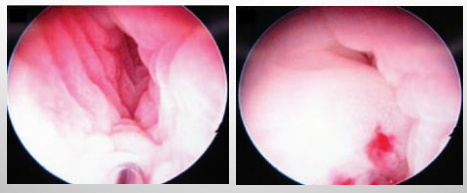
The cause of leakage is due to:

- *high pressure reservoir, (less likely).*
- *inadequate continence mechanism, due to:*
  - Inadequate tunnel length.
  - Inadequate channel fixation.
  - Valve resorption due to overdistension of pouch.
  - Internal fistulation due to false passage resulting from difficult catheterization.

Management Of Stomal Incontinence

- Bulking agent (Macroplastique) injection
- Revision of tunnel.
- Increasing number of the catheterizations, fixing a permanent catheter or application of stoma bag.

ENDOSCOPIC INJECTION FOR STOMAL INCONTINENCE (12 patients)



Before injection

After injection

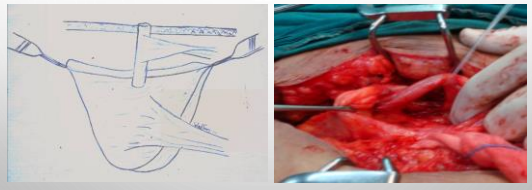
Results of endoscopic management of stomal incontinence after Monti

Study	Success rate
Our Results	Initial 5 days, almost 100%. After then, 0%.
Roth et al., 2008,	At 15 months 86%
Prieto et al,2006	At 3-36 months, 79%
Koivusalo et al., 2006	At 3-53 months, 89%
Halachmi et al., 2004	At 3-13 months, 80%
Guys et al., 2002	at 8-18 months, 67%

Tunnel revision

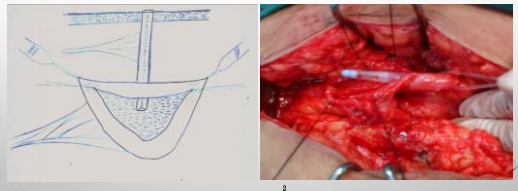
- ❑Tailoring of the tubularized ileum to 16-18 Fr. Catheter.
- ❑Adequate tunnel length is 1:5.
- ❑Double channel fixation by lateral and roof anchoring stitches.

Technique for Tunnel Revision



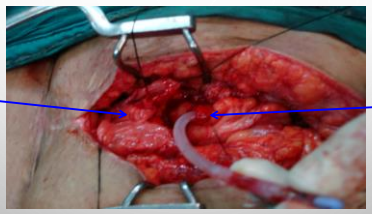
Tunnel resorbed completely (lost trufts)

Technique for Tunnel Revision



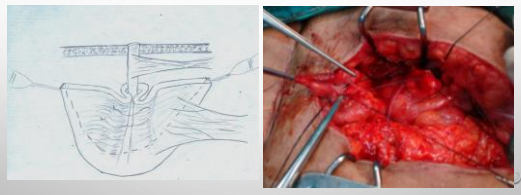
Opening the Pouch

Technique for Tunnel Revision



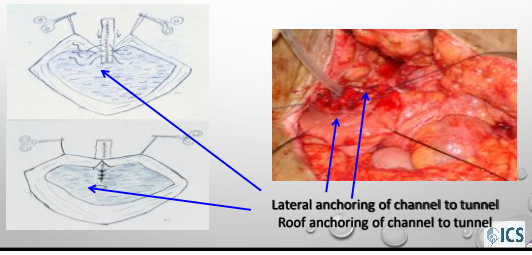
Separation of channel from pouch

Technique for Tunnel Revision



formation of tunnel in posterior wall of pouch

Technique for Tunnel Revision



Lateral anchoring of channel to tunnel
Roof anchoring of channel to tunnel

Surgical Tips for Revision of Stoma

- Adequate tunnel length is 1:5.
- Tailoring of the tubularized ileum to 16-18 Fr.
- Double channel fixation inside the tunnel using silk sutures and during tunnel closure.
- Postoperative bladder drainage for 3-4 weeks.
- frequent catherization of the bladder every 3 hrs. for 3 months with fixation of catheter by night for continous drainage.

CONCLUSION

- Urinary Diversion is a medical necessity but continent Diversion is meant to improve patient's satisfaction and quality of life.
- Continent cutaneous Diversion is a technique that needs attention to all small details (small things make perfection but perfection is not small thing).
- It's a technique vulnerable to complications and the consequences could be very serious