Surgical repair and urethral reconstruction in fistula following gynecologic procedures:

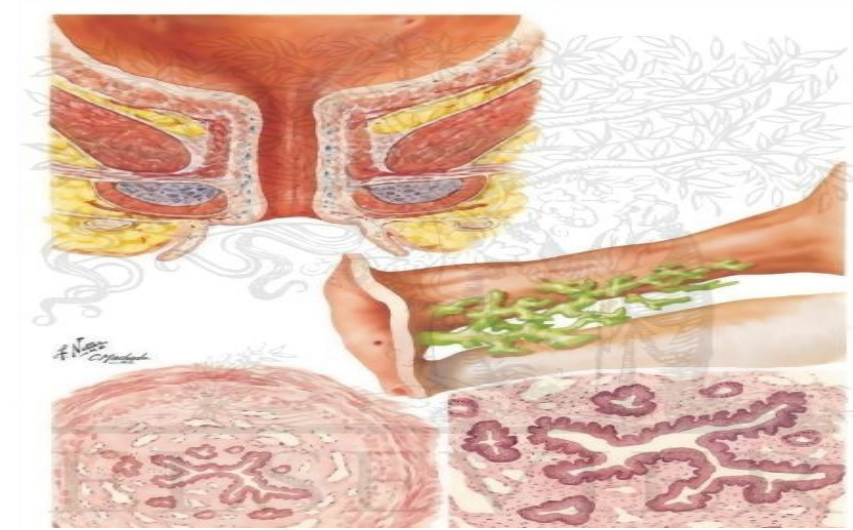
The hole is closed but it is not all!!!

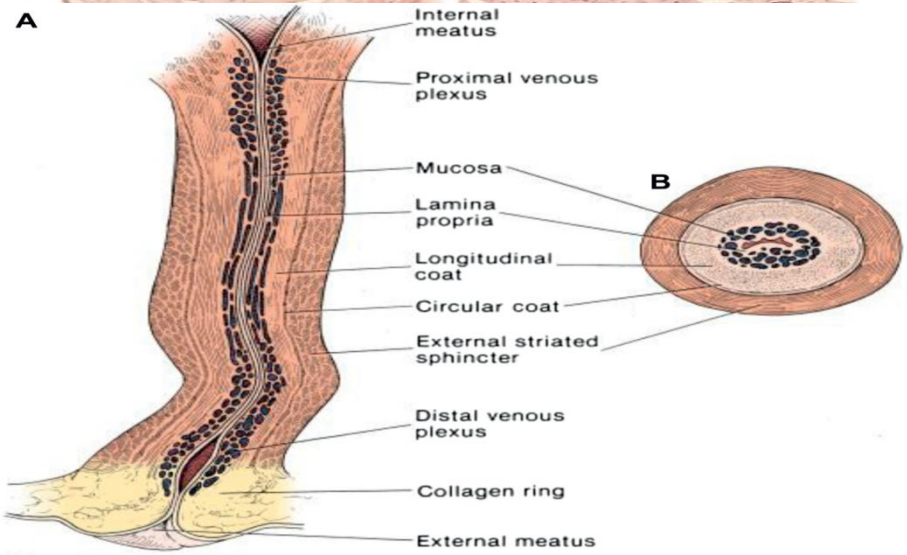
Bundang CHA Hospital, Department of Urology
Young Dong Yu

Female urethra

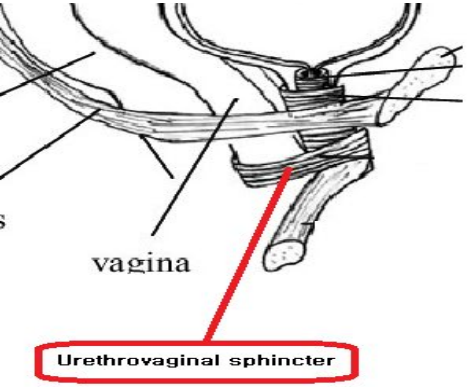
Anatomy

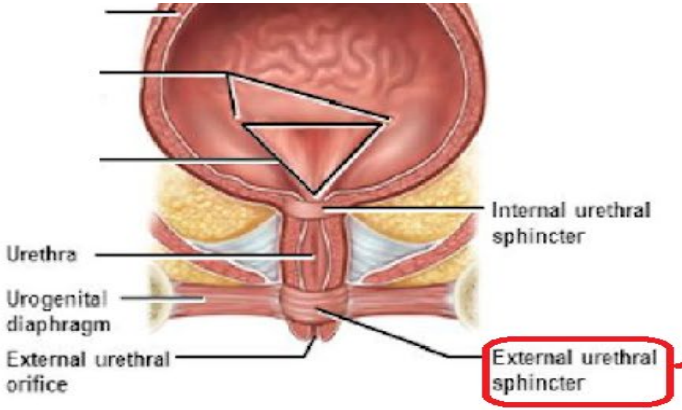
- **Thin fibromuscular tube, 2-5 cm in length**
- **Proximal 2/3 of the female urethra: lined by transitional cells, continuation from the urothelial lining of the bladder**
- **Distal urethra: urothelial lining transitions into stratified squamous epithelial cells**
- **Mucosa is redundant with multiple folds, which contribute to continence by acting as a seal**



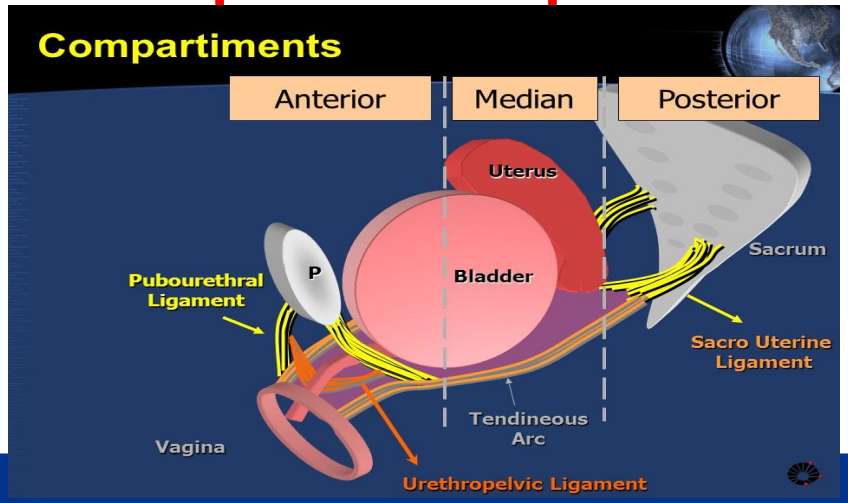


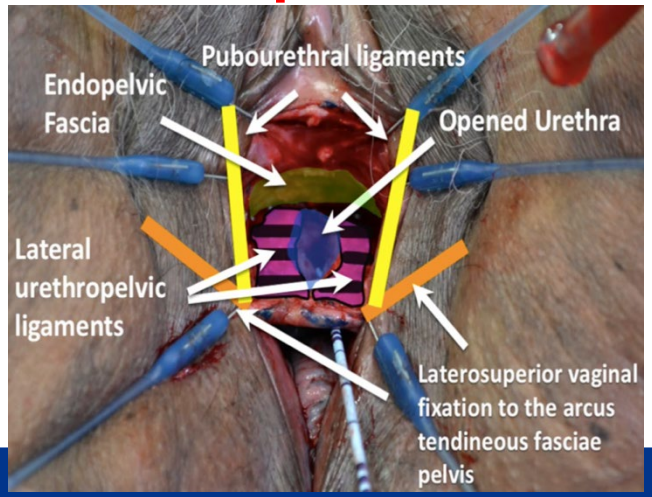
- **Lamina propria: soft tissue layer of longitudinally organized collagen and elastin fibers + venous plexus (venous plexus contributes to increase the resting pressure of the urethra)**
- **Musculature: inner circular smooth muscle layer, outer longitudinal striated muscle layer**
- **External sphincter: proximal third - completely encircles the urethra / middle - covers the ventral surface of the urethra in a horseshoe shape / distal - increasing in size and envelop the distal vagina (urethrovaginal sphincter)**





- **Two fascial attachments support the urethra:**
  - **Pubourethral and urethropelvic ligaments**
    - **Ligaments often serve as a point of anatomic division between the proximal and distal urethra**
  - **Urethropelvic ligaments: comprised of two layers of fascial condensation, endopelvic fascia and the pubocervical fascia, which provide lateral attachment to the arcus tendineus**
- **Mid-urethra is believed to be the center of continence where the striated sphincter complex maintains active and passive tone**





Etiology and epidemiology of genitourinary fistula (GTF)

- **Majority of GTF occur in developing countries where obstetric care is not readily available**
- **Iatrogenic causes accounts for about 1% of all GTF cases**
- **Worldwide incidence of GTF is about 3 million cases/year, whereas most cases occurring in the developing countries primarily in sub-Saharan Africa**
- **Neglected prolonged obstructed labor is the most common cause of genital tract fistulae worldwide**
- **In developed countries, GTF also commonly results from prior surgeries such as**
  - **Anterior colporrhaphy, urethral diverticulectomy, paraurethral cyst removal, anti-incontinence surgery, urethral trauma, pelvic surgery, prolonged catheterization, and radiation**

DOI: 10.1111/j.1471-0528.2012.03474.x
www.bjog.org

The risk of vesicovaginal and urethrovaginal fistula after hysterectomy performed in the English National Health Service—a retrospective cohort study examining patterns of care between 2000 and 2008

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Accepted 12 June 2012. Published Online 20 August 2012.

- **Risk of UVF: associated with type of hysterectomy (HT) and indication**
- **Among 343,771 women undergoing HT, rate of UVF was 1 in 788**
- **The rate varied by indication and procedure**
  - **Highest rate following abdominal radical HT for cervical cancer (1 in 87; 95% CI 61-128)**
  - **Lowest rate following vaginal HT for prolapse (1 in 3861; 95% CI 2550-6161)**
  - **After total abdominal HT for endometriosis, fibroids**
    - **Risk of UVF women aged over 50 yrs > women under 40 yrs (adjusted odds ratio 0.61; 95% CI 0.38-0.98)**

Genitourinary fistula classification: Goh criteria (2004)

Type 1: Distal edge of fistula > 3.5 cm from external urinary meatus
Type 2: Distal edge of fistula 2.5-3.5 cm from external urinary meatus
Type 3: Distal edge of fistula 1.5- < 2.5 cm from external urinary meatus
Type 4: Distal edge of fistula < 1.5 cm from external urinary meatus

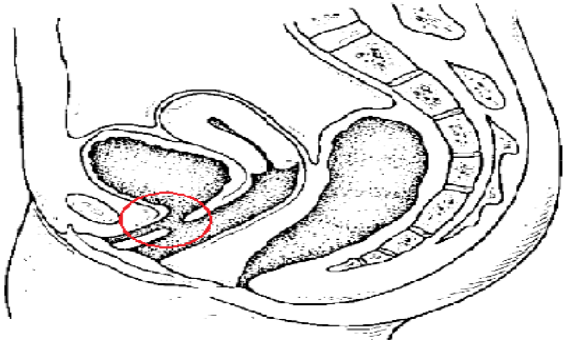
(a) Size < 1.5 cm, in the largest diameter
(b) Size 1.5–3 cm, in the largest diameter
(c) Size > 3 cm, in the largest diameter

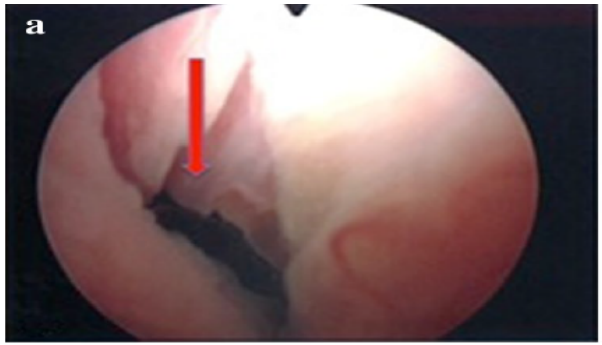
i. None or only mild fibrosis (around fistula and/or vagina) and/or vaginal length > 6 cm, normal capacity
ii. Moderate or severe fibrosis (around fistula and/or vagina) and/or reduced vaginal length and/or capacity
iii. Special consideration e.g. postradiation, ureteric involvement, circumferential fistula, previous repair

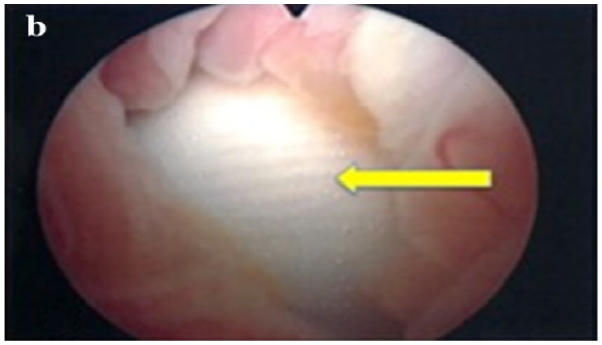
Clinical presentation and symptoms

- **Clinical presentations of UVFs: depend on the location and the size of the fistula**

Location of UVF	Clinical symptoms
Distal third of the urethra	• Patient may be continent and often **minimally symptomatic** • Patient may complain of urinary drainage per vagina during or after voiding
Middle or proximal urethra	• Intermittent positional wetness is often present • **Significant risk of concomitant sphincteric damage**





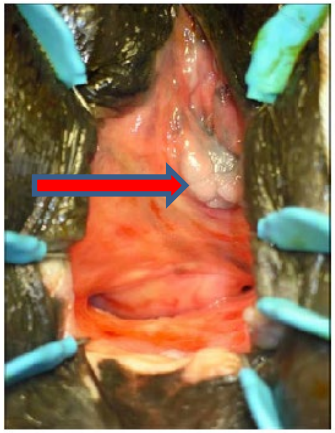


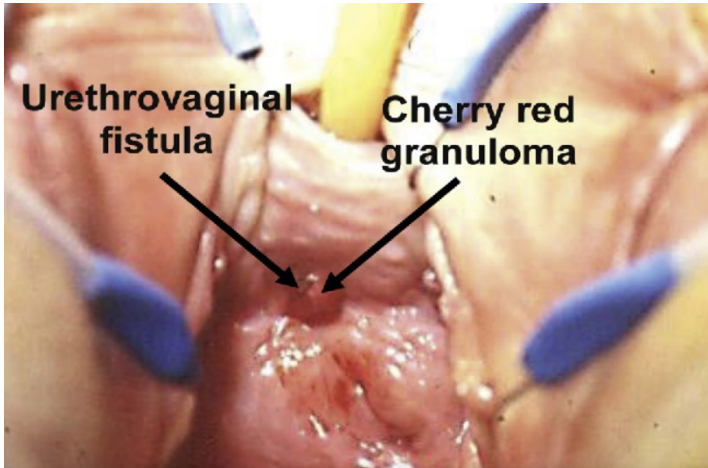
- **Other clinical symptoms:**
  - **Perineal skin irritation, recurrent urinary tract infections, vaginal fungal infections**
- **The time from initial lesion to the onset of clinical symptoms**
  - **Depends on the etiology of the UVF**
  - **Trauma from clamps or suture can result in a cycle of devascularization, tissue necrosis, and the formation of a fistula tract over time**

UVF type	Onset of symptoms
UVF associated with **pelvic surgery**	90% are symptomatic within 7-30d postoperatively
Anterior vaginal wall laceration (associated with **obstetric fistulas**)	75% presents within the first 24h after delivery
Radiation induced UVF	slowly progressive (several months)

Diagnosis and workup

- **Physical examination**
  - **Speculum examination: urine is seen within the vaginal cavity, which might be coming from UVF cuff, depending on the type of fistula present**
    - **Large, complex fistulae (from obstructed labor course): easily identified and palpated**
    - **UVF after hysterectomy: located along the cuff or just anterior to the scar**
    - **Smaller tracts: an appear as a dimple with surrounding inflammation or granulation tissue**



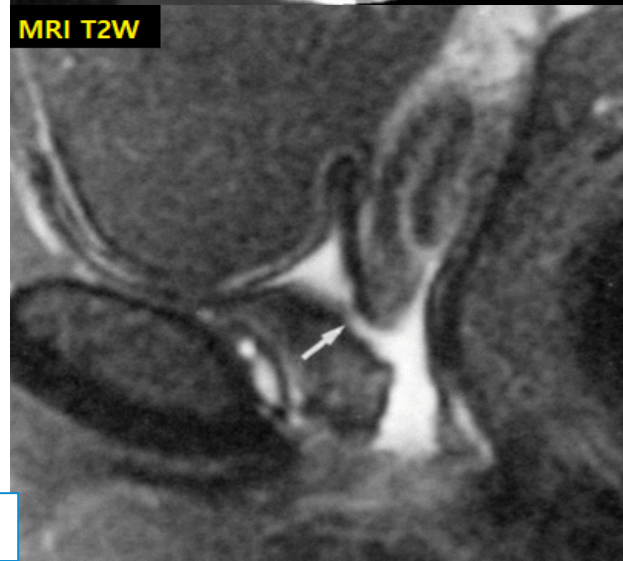


Diagnosis and workup

- **Tampon dye test**
  - **300 mL of saline and methylene blue or indigo carmine mixed solution filled in bladder**
  - **After 5 minutes, the bladder is drained, and the tampon removed**
  - **Blue staining at the mid or lower portion of the tampon is suggestive of VVF or proximal UVF fistula**

- **Cystourethroscopy**
  - **Assessment for sequelae of the fistula, such as foreign bodies and stones might be helpful to identify UVF location**
  - **Important to exclude involvement of the bladder neck and trigone**
  - **Even in the presence of a normal trigone, imaging studies to exclude occult upper tract abnormality is recommended**

- **Imaging studies**
  - **Often, more than 1 technique is required to fully characterize the tract**
  - **Cystourethrography are the first-line imaging studies for UVF**
  - **CT: excellent tool for detecting co-presence of upper urinary tract fistulae**
    - **Contrast material in the vagina, air around the urethra or within anterior vaginal wall are highly suggestive of UVF**
  - **MRI: ideal for localizing and characterizing fistulae (current modality of choice for diagnosing UVF)**



Tonolini et al. Insights into imaging. 2019;10:123

Treatment and management

- **Basic principle of UVF repair**
  - **UVFs identified within 72 hours of obstetric injury should be immediately repaired while the tissues are unscarred and pliable**
  - **Complete excision of the fistulous tract is necessary**
  - **Using tension-free suture layers with or without interposition of a labial fat pad**
    - **Complete urethral mobilization with dissection extending laterally to the pubic ramus bilaterally is necessary to allow for a tension-free closure**
  - **Non-interrupted sutures are recommended to avoid the urethral mucosa in 2 layers (non-overlapping suture lines) – *debatable?***
  - **Sburethral fascial sling with a vascular fat pad may be placed for proximal urethra fistula : ≥1.5cm large fistula need flap interposition between urethra and vagina**
  - **Avoid postop infection, maintain tight blood sugar control**

UVF after suburethral sling

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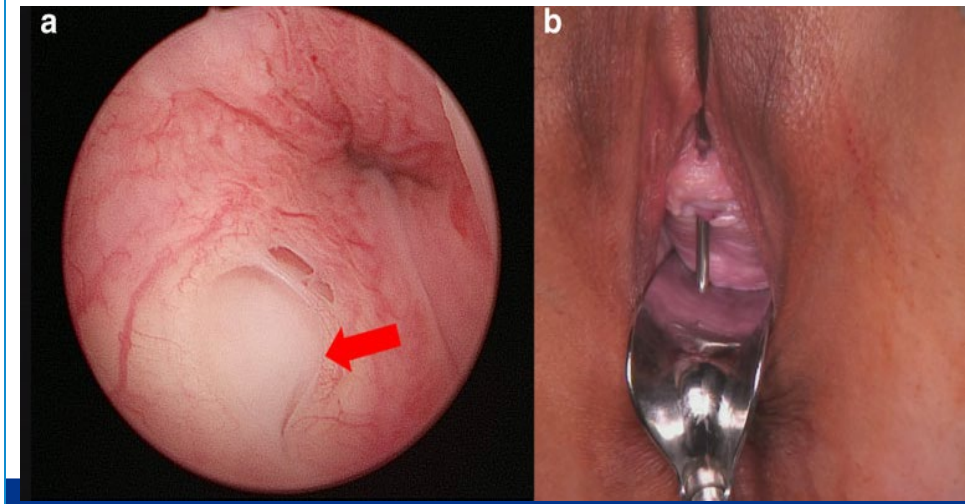
- **Fistula occurring shortly after sling placement**: due to urethral injury during the surgery itself or following urethral dilatation to treat postoperative voiding difficulties
- **Fistulae diagnosed years after the sling procedure**: sling penetration into the urethra over the years

[Case]

- 53yr female c uncontrolled DM
- Midurethral sling (TOT) 3yrs ago at local OBGY clinic
- Tape removal 2mo ago d/t mesh erosion
- UVF was accidently found during hysterectomy d/t massive abnormal uterine bleeding caused by adenomyosis



UVF after suburethral sling

Falconer et al. Int Urogynecol J 2001;12(Suppl 2):19-23

[Risk of tape erosion]

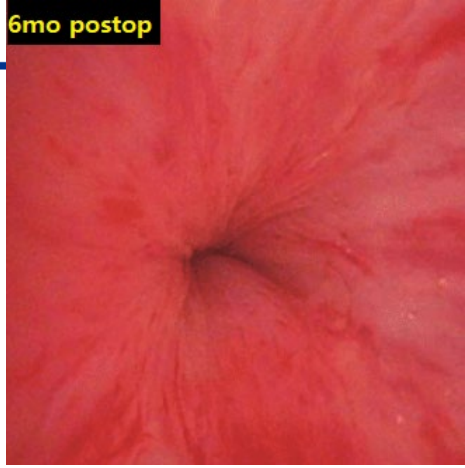
- **Monofilament > multifilament: in favor of monofilament tapes**
- **Surgical technique: >2cm incision, recurrent vaginal incision, previous vaginal surgery, large hematoma,**
- **Patient factor: older age, DM, smoking**

[Surgical methods]

- **Circumferential incision around the fistula → urethral and vaginal walls were mobilized and separated**
- **Avoided extensive excision of perifistular tissues → to prevent iatrogenic increase in fistula diameter**

- **Interrupted 4-0 vicryl transversal sutures → to minimize urethral narrowing**
- **Tension free second suture line within periurethral and perivaginal tissue → created a layer between urethra and vagina**
- **Foley catheter maintained for 2wks**

UVF after suburethral sling



- 16mo postop:
  - No was fistula observed in cystosocpy, VCUG, P/E, CT urography
  - VLPP 80cmH_2O → with trivial to minimal SUI
  - Patient did not want further evaluations or interventions regarding SUI

Miklos et al. J Reprod Med 2007;52(6):560-2

- 17 females received surgery for UVF resulted from previous sling op.
- 71% complained persistent SUI after UVF repair
- After fistulae closure, 42.8% underwent TVT sling op. for conservative treatment of persistent SUI → all of them showed ineffective
- Concomitant UVF closure and synthetic midurethral sling placement → may increase the risk of adverse events including UVF recurrence
  - Appropriate management of concomitant UVF and SUI is widely debated

Int Urogynecol J (2010) 21:889–891
DOI 10.1007/s00192-009-1067-7

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An uncommon case of urethrovaginal fistula resulting from tension-free vaginal tape

Juan Pablo Estevez · Michel Cosson · Malik Boukerrou

- 3 cases of UVF occurrence after TVT™ (Ethicon Gynecare) placement
- Removed the tape and closed the urethra defect with transversally placed uninterrupted absorbable monofilament suture - for tight mucosal suture

- Paraurethral tissues were interruptedly closed (absorbable monofilament sutures), creating an intermediate layer between urethra and vagina

- 11mo after successful fistula closure, the patient was continent

Int Urogynecol J (2016) 27:1925–1927
DOI 10.1007/s00192-016-3085-6

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Transvaginal repair of a urethrovaginal fistula using the Latzko technique with a bulbocavernosus (Martius) flap

Ariel Zilberlicht[1] · Yuval Lavy[2] · Ron Auslender[1] · Yoram Abramov[1]

- A 46-year-old woman underwent TVT and tape removal (2wks after TVT procedure) → experienced urine loss through vagina occurred 6mo after tape removal

[Surgical repair]

1. Semicircular incision was made into the vaginal mucosa → exposed fistula tract
2. 4 circular purse-string 2-0 absorbable sutures were placed around the fistula tract and tied down : no fistula tract excision
   - The bladder was filled with saline, and the sutures were noted to be water-tight

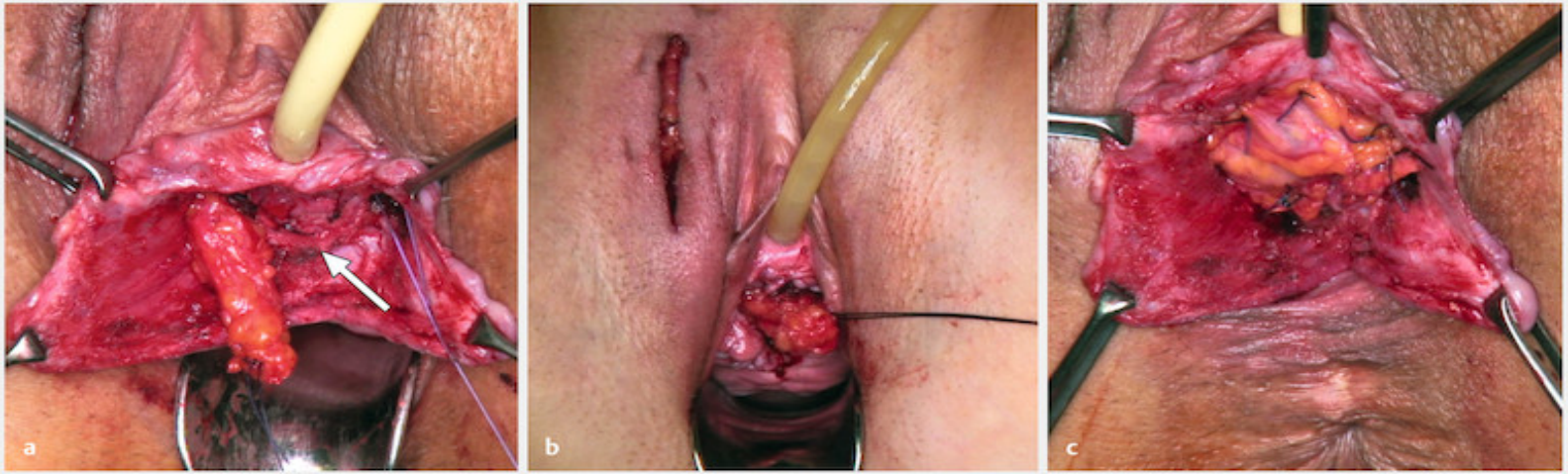
[Surgical repair]

4. A 4-cm incision was made in the skin of the right labium major

5. A tunnel was then created between the right labium and the vaginal incision → Martius flap was inserted into this tunnel and fixed to the endopelvic connective tissue to create interpositioning between the urethra and the vaginal mucosa

[Surgical outcome]

•2 mo later: well wound healing with free of urinary leakage



International Urogynecology Journal (2019) 30:839–841
https://doi.org/10.1007/s00192-019-03868-2

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Surgical management of recurrent urethrovaginal fistula with a skin island flap

Alois Martan[1] · Kamil Svabik[2] · Libor Zamecnik[3] · Jaromir Masata[2]

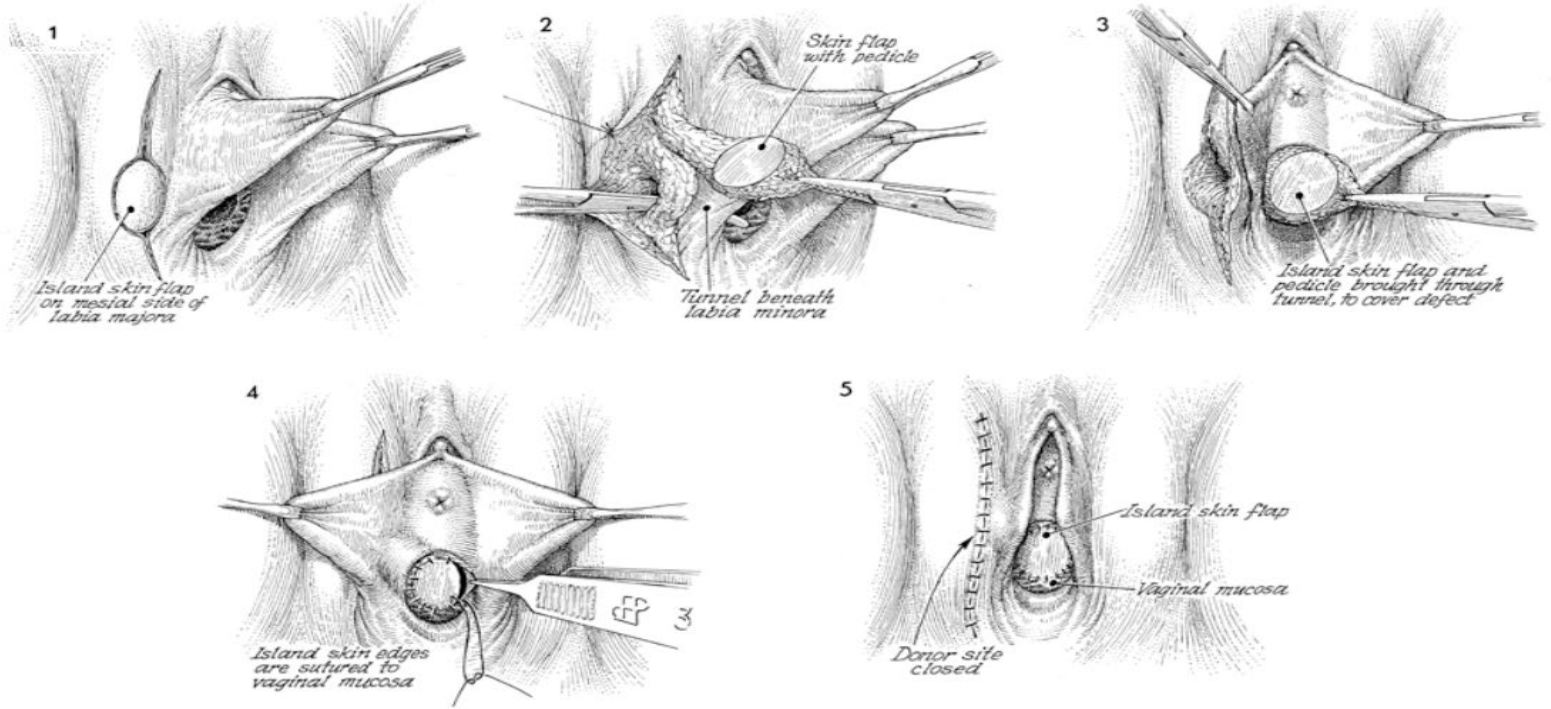
•69yr female, underwent TOT → 4mo later, received retropubic TVT d/t persistent SUI → tape removal at 9mo after TVT procedure → 10mm size UVF at mid urethra diagnosed (2mo after tape removal)

[Surgical correction – first repair]

1. **Laparoscopic abdominal removal of the rest of the retropubic tape, preparation of the omental flap**
2. **Fistula tract was resected, and a transversal suture line with a 2-0 Vicryl stitch was performed**
3. **Omental flap was placed between the suture of the urethra and the defect in the vaginal wall**
4. **Closure of the vaginal mucosa with Monocryl**

[Surgical correction – second repair]

1. **UVF was closed with 2-0 Vicryl running stitch and skin island flap was interposed**
2. **3mo later: excellent wound healing, SUI persistent**
3. **6mo later: bulking agent procedure was performed**



Int Urogynecol J (2011) 22:1333–1334
DOI 10.1007/s00192-011-1423-2

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A neglected shelf pessary resulting in a urethrovaginal fistula

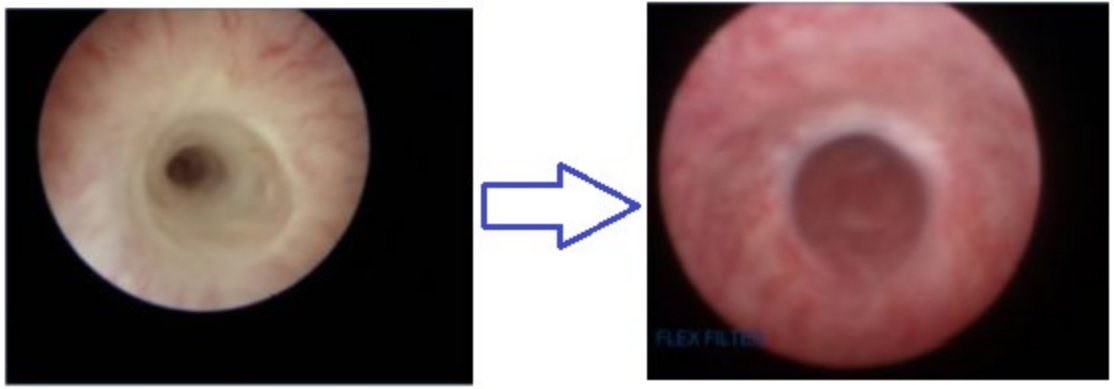
Kate F. Walker · Jaydip Dasgupta · Michael P. Cust

- **86 yr woman, history of recurrent UTI, foul-smelling vaginal discharge**
  - **At 72 years of age, she had a pessary fitted d/t grade III POP (uterine descent): last vaginal exam – 12 years ago**
  - **Pelvic exam: a calcified pessary was completely impacted into the anterior vaginal wall**
  - **Cystoscopy: unable to pass the cystoscope beyond the pessary into the bladder (proximal urethral fistula)**

→ Unable to remove pessary d/t comorbidity

Pessary induced urethral stricture

- History
  - 71 year old female with a pessary insertion 3yrs ago d/t uterine prolapse (grade III POP)
  - Recurrent UTI, last vaginal exam – 1yr ago
  - Complain weak stream with residual urine sense
- UFM: VV 157 – Qmax 5.1 – PVR 55
- P/E: pessary compressing ant. vaginal wall – mid urethra
- Cystoscopy: severe narrowing of mid urethra
- Serial urethral dilation with VIU



- Women with vaginal pessaries need to be checked every 3-6 months
- Hx. of pessary, recurrent UTI, LUTS - pessary induced urethral injury has to be evaluated

Nkwabong and Fomulu *Journal of Medical Case Reports* (2017) 11:292
DOI 10.1186/s13256-017-1457-2

Journal of
Medical Case Reports

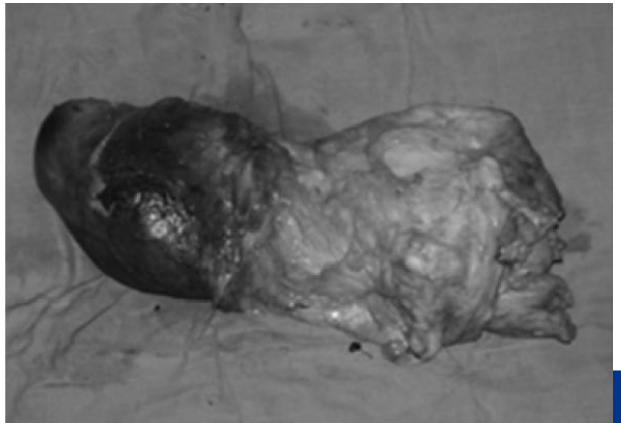
CASE REPORT Open Access

Urethrovaginal fistula following vaginal prolapse of a pedunculated uterine myoma: a case report

Elie Nkwabong[1*] and Joseph Nelson Fomulu[2]

- **25-year-old black African woman with intramural uterine fibroids**
- **Physical exam: foul-smelling 20x10cm mass in vagina with urinary retention**
  - **Dilated fibroid's pedicle was located in the posterior uterine wall at 3 cm from the external cervical os.**
  - **Transvaginal removal of uterine leiomyoma was performed**
- **5days after surgery Pt complained of fluid leakage from vagina**
- **3 mm diameter located 3 cm from the urethral meatus was diagnosed using the blue dye test**

- Fistula was successfully closed in two layers (urethral wall and vaginal wall) with polyglactin
- Foley catheter was kept for 14 days
- Pathology report confirmed ischemia of urethra and vaginal walls surrounding the fistula tract
- Compression of vagina and urethral wall by large uterine myoma → tissue ischemia → UVF formation
    - Huge vaginally prolapsed uterine fibroid should be managed urgently



UROLOGY 68: 1115–1118, 2006. © 2006 Elsevier Inc.

FASCIAL PATCH TECHNIQUE FOR REPAIR OF COMPLICATED URETHROVAGINAL FISTULA

JACOB GOLOMB, ILAN LEIBOVITCH, YORAM MOR, ANDREI NADU, AND JACOB RAMON

From the Department of Urology, Chaim Sheba Medical Center, Tel-Hashomer; and Department of Urology, Meir Medical Center, Kfar-Saba, affiliated with Tel Aviv University Sackler School of Medicine, Tel Aviv, Israel

- **38-year-old woman had TVT procedure for SUI 7 years ago**
- **Complained vaginal leakage: SUI was not demonstrated with cough or Valsalva maneuvers**
- **Cystoscopy: mucosal irregularity at the 7-o'clock position of the mid-urethra / VCUG: confirmed presence of a UVF**

[Initial management]

- **TVT mesh was noted to penetrate into the mid-urethral lumen at the 7-o'clock position**
- **The intravaginal section of the tape was excised, urethral defect was repaired with 3-0 interrupted polyglactin sutures in two nonoverlapping layers → Martius flap was developed and brought over to buttress the repair site → Foley cath. kept for 3 months**

[Follow-up management]

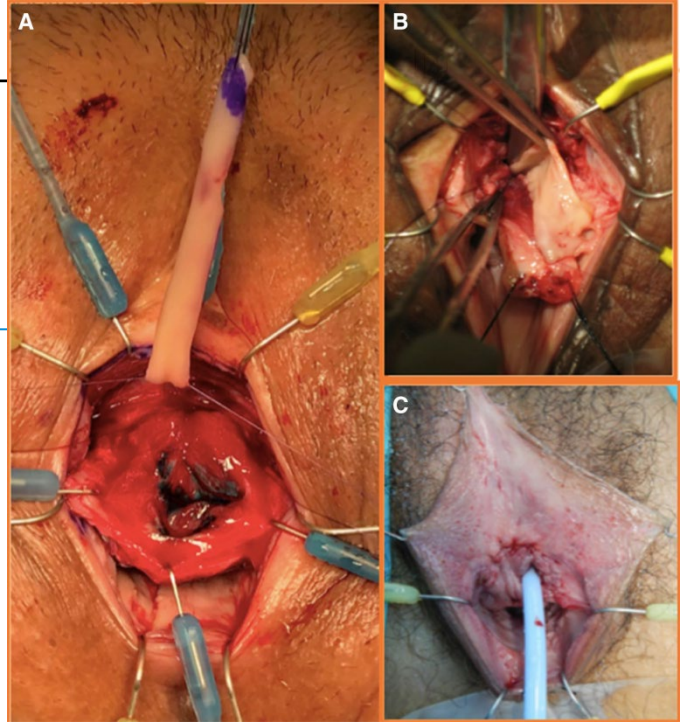
- Urine leakage per vagina from an opening on the left side of the mid-urethra was observed
- Martius flap was identified, dissected free from the urethra, and preserved
- A low transverse abdominal abdominal incision was made, 2x2cm patch of fascia was excised and sutured to the surrounding periurethral tissues with interrupted 3-0 polyglactin sutures
- 10x2cm strip of rectus was used to perform pubovaginal sling
- Martius flap was brought over the fascial patch as a third layer
- At 12mo-postop, the patient was continent

World Journal of Urology (2020) 38:3047–3054
https://doi.org/10.1007/s00345-019-02958-6

TOPIC PAPER

Female urethral reconstruction: dorsal buccal mucosa graft onlay

Reynaldo G. Gomez[1,2] · Fernando J. Segura[3,4] · Alvaro Saavedra[5,6,7] · Rodrigo A. Campos[1]



- **2 cases of UVF repair using buccal mucosa graft (5-7o'clock direction, ≤5mm szie)**
- **Periurethral dissection is taken**
- **Opened at the midline to access the bladder neck**
- **If the meatus is not involved, this incision begins 1 cm proximal to preserve the original meatus**
- **Important to maintain the dissection in the midline to preserve the latero-ventral anatomical structures**
- **5×2cm mucosal graft is harvested from the inner cheek placed with the mucosal side towards the urethral lumen – sutured with Monocryl 5-0**


Don't
forget!
Take
Home

- **The possibility of stress or urge incontinence, resulting from sphincteric damage, should also be considered**
- **Fistulas identified within the first 24-48 hours postoperatively can be safely repaired immediately; presence of complicating factors such as sepsis or other issues may preclude this approach**
- **Fistula tracts identified days to weeks after surgery require careful planning and selection**
- **94% (15 of 16) were cured with initial surgery (≤3months)**
  [Wang Y, Hadley R. The use of rotated vascularized pedicle flaps for complex transvaginal procedures. J Urol 1993;149:590–592]
- **A fistula that occurs in a previously radiated field requires periodic reassessment (before/after surgery)**
  - **Wide excision and tissue interposition need to be used**
  - **In some cases may be considered non-curable → may be scheduled for diversion**

- About 30% of patients benefit from simple primary anatomical repair
  - Fine absorbable suture materials, such as 3-0 or 4-0, are used for the majority of repairs
  - 14 or 16 Fr Foley catheter is left in place 10-30days

  [Biswas A, Bal R, Alauddin M. Genital fistula-our experience. J Indian Med Assoc 2007; 105:123–126]
- A suprapubic catheter is not routinely recommended (possibly for radiated tissues)
- Performing simultaneous correction of SUI is still under debate
- Autologous sling procedure is the most common operation advised for these patients
  - Additional graft should be used to cover the suture layer - the sling should be placed overlying the graft (Martius flap should placed over autologous sling)

- **15-20% of patients may develop obstructive voiding (urethral stricture) and lower urinary tract symptoms: surgeon should inform the patient**
  [Pushkar DY, Dyakov VV, Kosko JW, Kasyan GR. Management of urethrovaginal fistulae. Eur Urol 2006; 50:1000–1005]

- **Wide mobilization of the urethral wall in order to provide tension-free closure, preferably with two layers of absorbable sutures**
  - **Avoided extensive excision of perifistular tissues → to prevent iatrogenic increase in fistula diameter**

- **Non-interrupted sutures with fine monofilament absorbable may be used – tissue integrity, micro-circulation should be considered (non-overlapping suture lines)**

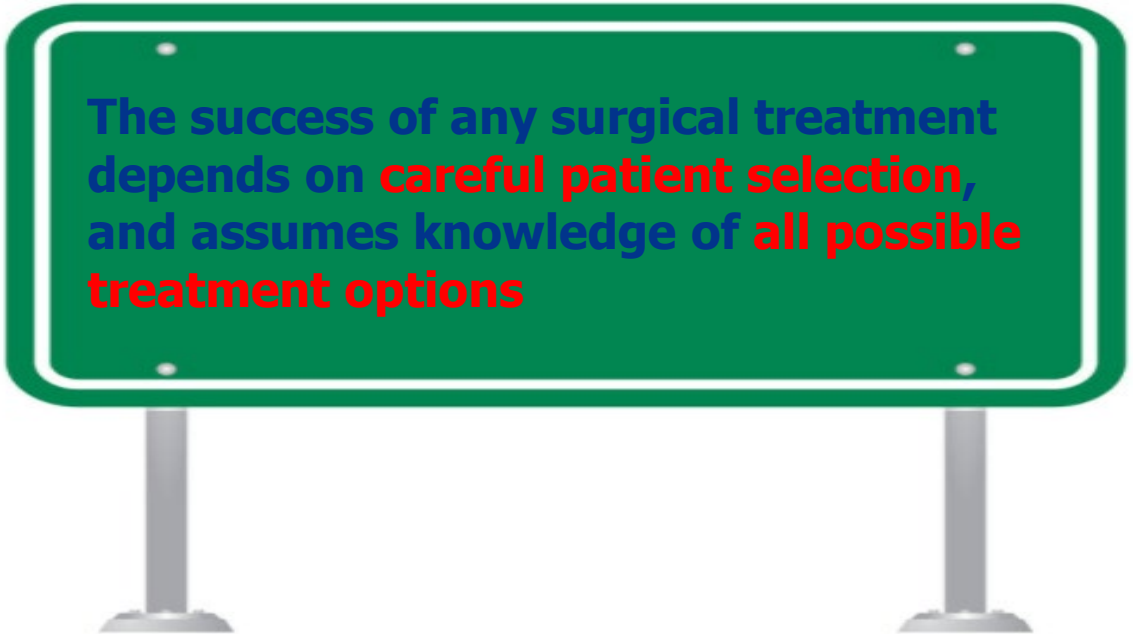
- **50% of patients after such a repair develop stress urinary incontinence symptoms requiring anti-incontinence procedures**
  - **If the full-thickness urethral wall has been used with no tissue tension for fistula closure, tension-free synthetic tape may be considered as an antistress procedure**

  [Pushkar DY, Dyakov VV, Kosko JW, Kasyan GR. Management of urethrovaginal fistulae. Eur Urol 2006; 50:1000–1005]

- **Interpositional tissue should be considered for large fistula (>1cm) or vaginal tissues are of questionable quality**
  - **Martius flap, skin island flap, buccal mucosa flap, vaginal wall flap…**


CHOICES


case
by
case


The success of any surgical treatment depends on careful patient selection, and assumes knowledge of all possible treatment options

Thank you for listening