Female urogenital fistulas

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Abstract
Urogenital fistulas represent a significant maternal morbidity from obstetric and urogynecologic causes. Although uncommon, they suggest a source of significant personal and social morbidity. Precise diagnostic evaluation is the cornerstone of successful treatment along with skillful surgeons. In most cases they can be managed transvaginally, however more complexed cases require transperitoneal procedures either open or minimally invasive. In the present study we review optimal diagnosis and treatment methods of most frequent urogenital fistulas.

Introduction
The term “fistula” indicates an abnormal communication between two epithelial surfaces [1]. Regarding urogenital fistulas in the female, there are different types of ‘urogenital fistulas’: Vesicovaginal, urethrovaginal, ureterovaginal, and vesicouterine fistulas. An estimated 2-3 million women worldwide currently have an untreated fistula, approximately 30,000-130,000 new cases occur annually, and more than 95% of these cases occur in developing countries [2]. Urological fistula in the industrialized countries usually result from non-obstetric causes and are relatively infrequent [3], whereas urological fistula in developing countries are usually urogynaecologic and most commonly result from prolonged or obstructed labour. Vesicovaginal fistulas suggest the 73.6% of the fistulas, 10% are urethrovaginal and 6% are ureterovaginal.

Obstetric fistula results from obstructed labor, in which the soft tissues in the maternal pelvis become entrapped between the fetal head and the bony pelvis [4], leading to ischemic necrosis of the walls between the vagina and the surrounding structures [5]. As the injury heals, a fistula forms between the bladder and the vagina leading to socially debilitating incontinence [6]. In industrialized nations, the incidence of fistula formation is unknown, but estimated to be at a rate of 0.13-2% [7]. Fistulas often result from unrecognized genitourinary injury during pelvic surgery. The estimated rate

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Citation
of injury to the genitourinary tract during gynecologic surgery ranges between 0.3 and 4.3% [8]. Risk factors identified for urinary tract injury include: Previous pelvic surgery, history of irradiation, cesarean section, endometriosis, diabetes mellitus, BMI greater than 30, concurrent infection, vasculopathy, tobacco abuse, abdominal hysterectomy, prolapse, and laparoscopic-assisted hysterectomy [6,9].

We herein review optimal diagnosis and treatment of this challenging surgical entity.

Patient presentation and diagnosis

In case of a genitourinary fistula, women classically present with continuous urinary incontinence from the vagina. Chronic loss of urine leads to associated skin dermatitis, recurrent cystitis, vaginal infections and pain [6]. Meticulous physical exam may identify the fistulous stoma; however, it is imperative to distinguish transurethral from extravesical incontinence. If the source of urinary incontinence cannot be determined, bladder instillation with blue dye can aid in diagnosis, along with a vaginal packing, frequently referred to as the “tampon test”. If the vaginal packing is stained after dye instillation, this increases suspicion for a fistula; however, if only the distal aspect of the gauze is blue, this may be more indicative of urethral incontinence. The overall sensitivity and specificity for this test are unknown, and an unstained gauze does not exclude fistula presence [1]. Oral pyridium, which stains orange, can be used in conjunction to identify and differentiate a uretero-vaginal fistula [6]. Cystourethroscopy is a reliable method for identifying fistulas and is useful for visualizing the location of the communication in relation to the ureters and for identifying intravesical pathology, while it allows ureteric stent placement if a ureteric injury is diagnosed [10,11]. It can be helpful in complex cases, where the tract is oblique and the vesical injury is cribiform. Imaging is not necessary for diagnosis, but may aid in surgical planning. Cystography and voiding cystourethrography are the first-line techniques for vesico-vaginal, vesicouterine and urethrovaginal fistulas. Although both examinations usually confirm the existence of fistulas, in most cases they fail to reveal the exact site and number of fistulous tracts. Additional diagnostic tools that have been utilized include helical computed tomography (CT) which is the imaging modality of choice but requires use of intravenous contrast, magnetic resonance imaging (MRI) with raising frequency and ultrasound, with limited diagnostic accuracy [3,12].

Vesicovaginal fistulas

A vesicovaginal fistula (VVF) is an abnormal opening between the urinary bladder and vagina. Injury to the bladder, either during a vaginal or transabdominal hysterectomy, may result in the development of a VVF [13]. The incidence of VVF after hysterectomy is estimated to be approximately 0.1-0.2% [14]. Apart from prolonged labour, VVF may also result from therapeutic irradiation of pelvic malignancies [13]. Generally, a VVF occurs 1-6 weeks after gynaecologic or obstetric surgery, although recurrent fistulas can develop within the first 3 months after primary repair [2]. VVF patients usually present with constant urine leakage from vagina. The length of time before formal closure of the fistula is controversial. Furthermore, 15-20% of smaller than 1 cm fistulas could be managed successfully only with continuous bladder drainage [15]. Traditionally, a wait time of 3-6 months before repair is recommended, enabling a decrease in reactionary inflammatory tissue and a better opportunity for success. However, many physicians advocate waiting the minimal amount of time required for the development of good-quality tissue, which may be less than 3 months depending on the circumstances [16]. Surgical approaches to VVFs are vaginal or abdominal. It has been reported that the “cure” rate was 88.1% for a single operation, 81.9% for a reoperation and 68.9% for a second reoperation [3]. Notably, the rate of success decreased with the number of previous surgeries, suggesting that the best opportunity to achieve successful fistula repair is with the first attempt. Transvaginal approach is characterized by decreased morbidity, shorter hospital stay and the ability to avoid entering the abdomen [16] and is the preferred method in distal VVFs. Latzko’s method has rather the best cure rates [17] and less postoperative pain [18], while in cases of failed initial attempts, history of radiotherapy or relatively larger VVFs, a very attractive option is Martius flap procedure [19]. Although the morbidity of open abdominal repair is significant compared with that of the transvaginal approach, abdominal surgery is usually preferred in patients with a large (>3 cm) fistula or fistulas, in cases or supratrigonal fistula or when the trigone is affected, when there...
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is concomitant ureteric injury or in patients with multiple complicated or recurrent VVFs after transvaginal repair [1]. Open transperitoneal approach can be either performed transvesically (O’Conor approach) offering a wider spectrum of surgical manipulations but at the same time increases morbidity, with high success rates reaching 85-100% [20], or extravasically [21]. Transperitoneal approach allows for tissue interposition via abdominal route including omentum, peritoneum, rectus abdomens or gracilis muscle. The omentum and peritoneum are the mainstay for vascularized tissue flaps and the easiest to utilize in transabdominal repairs, although there are several studies questioning their importance in better tissue healing [22]. With the ongoing adoption of minimally invasive techniques, surgeons are increasingly performing reconstructive procedures laparoscopically or robotically, but such procedure although very promising are still involving relatively smaller cohort of patients with shorter follow up periods. The first laparoscopic procedure has been performed in early 1990’s, while the first robotic-assisted in 2005 and are characterized by decreased morbidity, blood loss, operating time and hospital stay [23]. In a recent meta-analysis, minimally invasive transperitoneal procedures reached absolute successful rates of 80-100% [23].

Urethrovaginal Fistulas
In developed countries, urethrovaginal fistulas (UVF) usually result after previous vaginal surgeries. Knowing the location and number of the fistulas are extremely important. Given the proximity of the urethral sphincter in women, patients with UVF within the proximal and/or middle urethra are prone to development or worsening of stress urinary incontinence after repair (52.1%). It is advocated by some surgeons the simultaneous correction of stress incontinence during UVF repair, while others typically prefer to wait until UVF repair is complete and if stress incontinence remains is then corrected [24].

Vesicouterine fistulas
Vesicouterine fistulas (VUF) are uncommon abnormal communication between the urinary bladder and the uterus or cervix, comprising 2-9% of all genitourinary fistulas [25]. They generally result from cesarean section, but can be caused by obstructed labor, operative delivery, tumor invasion, endometriosis, intrauterine contraceptive devices, uterine artery embolization and brachytherapy as well. Although rare, these fistulae are seen in developing and developed nations. Patients classically present with ‘Youssef’s triad’ of watery vaginal discharge, cyclic hematuria and amenorrhea [25,26]. Treatment is mainly by surgical repair through an open or a laparoscopic approach [6]. However, some small fistulae may heal spontaneously; hormonal treatment is a historical option in some cases and may be indicated before the operation in some large fistulae [6,25].

Ureterovaginal fistulas
Ureterovaginal fistulas (UVF) most commonly occur as a complication of pelvic surgery and are associated with an incidence of ureteral damage between 2 and 11% [1]. The incidence of UVF due to obstetric causes, such as obstructed labour, Caesarean section and forceps application, differs between developed (5%) and developing (68-80%) countries [1]. Patients are usually present with urine leaking. VVF’s and UVFs coexist in approximately 12% of patients [27]. Evaluation and diagnosis are performed by physical examination, cystoscopy, CT and pyelography/excretory urography. Several techniques for the management of UVF have been, while the optimal time for intervention is controversial, with median time reaching 3 months [27]. The initial management of ureterovaginal fistulas is often conservative but typically fails [1]. Success rates of up to 55% for solely ureteral stent insertion even for complex injuries or fistula have been reported [28]. The rate of fistula resolution with stents alone was as high as 71% [29]. Longer defects require open intervention such as tension-free end-to-end anastomosis, re-implantation, psoas hitch and Boari flap procedures naming the most frequent depending on the length of ureteric injury [28,29].

Rare entities
A vesico-salpingo fistula (VSF) is an abnormal epithelial-lined communication between the urinary bladder and the fallopian tube. It suggests a very rare type of urogenital fistula, with very few published cases in the literature [30]. The patients present with sterility, lower abdominal pain, dysuria, fever, recurrent urinary tract infections and vaginal urine leakage
misdiagnosed as persistent urine leakage. They are managed either transperitoneally or robotic-assisted laparoscopically [30].

Epilogue
Genitourinary fistulas in developed countries are uncommon, but can be a source of significant physical and social morbidity. In contrast, in the developing world, genitourinary fistulas are rather usual suggesting a source of suffering and debility. Successful fistula management requires accurate diagnosis and ultimately skilled surgical care for effective treatment. Most genitourinary fistulas that do not involve the ureter can be managed successfully with a transvaginal approach. However, even with successful closure, particularly with obstetrical fistula, continence and vaginal function can often be compromised.

Conflicts of interest
The author declared no conflict of interest.

References


