Source manuscript for e-learning module

Vesico-vaginal fistula in the developing world

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Learning objectives

By the end of this module the reader should be able to:

- recall the aetiology and classification of obstetric fistulas
- describe the surgical techniques used to repair big and complex fistulas and the possible need for urethral reconstruction
- recognise the possible complications associated with obstetric fistulas and with the surgical repairs.

Introduction

Vesico-vaginal fistula (VVF) is a subtype of female urogenital fistula. VVF is an abnormal fistulous tract extending between the bladder and the vagina. It allows continuous involuntary discharge of urine into the vaginal vault.

Although the incidence of urogenital fistulae has become rare in the industrialised world, they still commonly occur in developing countries. Obstetric fistulas are widely prevalent in the developing world; the true incidence of obstetric fistulas is unknown, as many patients with this condition suffer in silence and isolation.

Obstetric fistulas destroy the lives of many young women in developing countries. Some estimates place the prevalence as high as two million women worldwide. In some rural areas of Africa, the fistula rate may approach 5–10 per 1000 deliveries, which is close to the maternal mortality rate in Africa [1, 2].

Obstetric fistula is a wholly preventable condition, provided that appropriate medical and obstetric facilities including emergency caesarean section are available.

It is not easy to establish a review on obstetric fistulas because there are no evidence-based guidelines or well-designed randomised controlled trials. Most of the published articles were simple observational studies.

Aetiology of obstetric fistula

In the developing world, the aetiology of VVF is mainly due to prolonged or obstructed labour and causes include: marriage and conception at a young age often before full pelvic growth has been achieved, few attendances by qualified health care professionals or having access to medical facilities during childbirth and chronic malnutrition that limits pelvic dimensions, increasing the risk of cephalopelvic disproportion and malpresentation.

Furthermore, religious or traditional practices may mean that women and girls have undergone forms of female circumcision and the practice of harmful traditional medical practices, such as Gishiri incisions (anterior vaginal wall incisions). The insertion of caustic substances into the vagina with the intent to treat a gynaecological condition or to help the vagina to return to its nulliparous state usually ends with tissue injury, scaring and fibrous narrowing of the vagina.

The prolonged impaction of the fetal presenting part in the pelvis causes widespread tissue oedema, hypoxia, necrosis, and sloughing resulting from prolonged compression of the soft tissues of the vagina, bladder base, and urethra between the fetal head and the posterior surface of the symphysis pubis.

Complex neuropathic bladder dysfunction and urethral sphincteric incompetency often result, even if the fistula can be repaired successfully [3].

In developed countries, VVF are attributed predominantly to inadvertent bladder injury during pelvic surgery and abdominal hysterectomy represents the single most common cause of fistula [4]. Such injuries include: unrecognised intraoperative laceration of the bladder, bladder wall injury from electrocautery or mechanical crushing and dissection of the bladder into an incorrect plane, causing avascular necrosis.

Other types of pelvic surgery that may result in VVF include: suburethral sling procedures, surgical repair of urethral diverticulum, electrocautery of bladder papilloma and surgery for pelvic carcinomas. Rare cases of VVF may occur following irradiation therapy of the pelvis.

There are different presentations of obstetric fistula

These include: vesicovaginal fistula, urethrovaginal fistula, rectovaginal fistula, ureterovaginal fistula, vesicouterine fistula, sometimes more than one type of fistula may occur at the same time, where damage is severe.

Symptoms

There is usually leakage of urine and/or faecal matter as a result of the obstetric fistula which means that the woman is constantly wet and/or soiled with an unpleasant odour. This condition can lead to other complications, such as genital ulceration and sores, urinary tract or local skin infections, kidney disease, pain, limping gate in cases of neurogenic injury, scarring of the vaginal tissue which makes sexual intercourse impossible or painful, and probably secondary infertility will exist.

Social and psychological impact of obstetric fistula

Obstetric fistula can have immense social and psychological consequences for the affected women. Since the woman is constantly wet and soiled with a strong, unpleasant smell, she may be socially isolated, stigmatised and badly discriminated. She may be excluded from religious practices in the community and rejected by both her family and the community.

The dyspareunia due to vaginal damage and scarring as well as the unpleasantness of sexual relations due to the leakage and strong smell often results in divorce and abandonment of these women and their husbands will leave them alone in extreme poverty without any means of subsistence [5, 6].

Assessment of fistula

Identifying the number, size and location of the fistula/s is crucial for a successful repair that aims at a fully dry patient postoperatively. Clinically, it will be important to assess the number, size and location of the fistulas, the amount of fibrosis present, and any involvement of the ureters and or the urethra.

The methylene blue test is crucial in the assessment of vaginal fistulas. The dye can help the surgeon to locate the fistula and, more importantly, discover other fistulas that might be hidden so all the existing fistulas are well detected. It is also important to apply the methylene blue test during and after the repair to make sure that the sutures are watertight and there is no more leakage.

Classification of fistula

There is currently no single accepted system for classifying fistulas and a wide variety of different systems have been proposed. Classification of fistulas is important only if the classification can predict the outcome of the repair, particularly in terms of fistula repair and possibility of persistent incontinence after successful fistula closure [7]. In recent fistula classifications, the size of the fistula and involvement of the urethral closing mechanism have been taken into account [8]. Some systems attempt to classify fistulas according to the anticipated degree of difficulty of the repair, while others classify them according to the type of surgical intervention that will be needed [7]. Systems based on the anatomical appearance of the fistula do not necessarily predict the difficulty of repair, nor the postoperative prognosis. Goh *et al.* recently reviewed the existing classification systems [8]. The Waaldijk and the Goh classifications are the most frequently used fistula classifications currently [9]. The most important points to be considered in fistula repair are: fistula location, fistula size and dimensions, number of fistulas, extent of vaginal scarring, surgical approach and technique used.

The simple fistula

Only about 20% of obstetric fistulas can be defined as simple. Simple fistulas are less than 3cm in diameter, with no or only mild scarring and do not involve the urethra. The first prerequisite for successful fistula repair is meticulous attention to detail. In practiced hands, skilled fistula surgeons routinely achieve a closure rate of over 90% for simple fistulas at the time of first operation [10, 11].

The complex fistula

A complex obstetric fistula can be described as being larger than 3–4cm, involving the urethra, and associated with reduced vaginal capacity from significant scarring and/or a reduced bladder volume. Sometimes the defect may be urethrovaginal, but more commonly both the urethra and bladder are involved and therefore the fistula is called a urethrovesicovaginal fistula [12].

Treatment

Reconstructive surgery can mend the injury, and success rates are as high as 90 per cent for uncomplicated cases. Two weeks or more of postoperative care is needed to ensure a successful outcome.

Fistulas can be closed successfully in 72–92% of cases [13]. The definition of success, however, is often different when the perspectives of the patient and the surgeon are compared. “Success” to a fistula patient means complete restoration of urinary continence and control, whereas many surgeons define “success” as simply closing the fistula [13].

Treatment complexity and success depend on multiple factors including: fistula type, size, degree of scarring, involvement of urethra, ureter and bladder, surgeon capacity and postoperative care and compliance.

The early fistula

Little is known about the conservative treatment of vesicovaginal fistula. In most cases the diagnosis of a developing fistula is not made in the early days after a difficult delivery or emergency caesarean section. Waaldijk published his personal experience with the conservative approach to fresh obstetric fistula [14]. He reported that of 2031 patients who received immediate catheter treatment, 1579 (78%) were cured completely; however, this group was not entirely having VVF, but also included patients with "overflow incontinence" and total incontinence grade III; if catheter treatment failed, they were operated immediately once the fistula was clean.

Most fistulas reported cured by catheter drainage alone are small, usually less than 1cm in diameter. It was not possible to establish a relationship between fistula size and outcome, although a 5mm diameter has been set as an arbitrary cut-off limit [15]. Duration of drainage varies between 10 days and six weeks, but has not been studied properly. No data are available on which type of catheter drainage yields the best results. Fresh fistulas are more likely to close than those of longstanding duration. Although a real cut-off time has never been established, healing by catheter after six weeks to three months postpartum can no longer be expected since then there is an established fistula where the bladder mucosa has united with the vagina mucosa [16].

Surgical exposure

Fistula surgery requires some form of anesthesia. For the vast majority of fistulas, an extended lithotomy position (with the buttocks pulled well over the edge of the operating table – a steep head-down position) provides enhanced exposure. Vaginal surgery for small fistulas can be attempted under local anaesthesia [17]. Larger or more complex fistulas can be treated under spinal anaesthesia, which is to be preferred over epidural or general anaesthesia in low-resource settings [18].

After positioning the patient on the table, the surgeon must obtain adequate exposure of the operative field. For simple cases without scarring, the use of a weighted Auvard speculum should be sufficient. When required, lateral vaginal wall releasing incisions are usually done laterally (at 5 and/or 7 o'clock) which could be extended as far as necessary to gain adequate exposure. After the fistula closure and the closure of the vaginal wall, the episiotomy or episiotomies (if needed) are closed [19, 20].

Surgical approach

Experienced fistula surgeons may be able to repair most defects vaginally. Operating by the abdominal route increases surgical trauma, as well as the cost and time of the operation, but is still often performed for some high fistulas where vaginal access is problematic. If ureteral reimplantation is needed or if other concomitant procedures are necessary (e.g. colostomy) the abdominal approach may be preferred.

A laparoscopic approach has been less commonly used to repair the vaginal fistulas in developing countries although it was used with high success rates in high-resource settings [21, 22].

Types of incisions

Several types of surgical incisions have been described.

Simple circumcision of the fistula and Latzko's partial colpocleisis procedure

Latzko described his fistula procedure in 1942 [18, 23]. The incision circumcises the fistula tract and a plane between the vaginal wall and bladder wall is developed. The fistula is then closed by approximating the denuded bladder wall in one or two layers over the fistula tract. The fistula tract is not excised and the vaginal epithelium is closed separately. There is no significant difference between trimming or not trimming the edges of the fistula after dissection [24].

J-shaped incision

The J-shaped incision circumcises the fistula tract and then extends the incision bilaterally in the shape of a "J", with the fistula sitting in the curvature of the "J". The J-shape can be directed anterior or posterior. By developing the vesicovaginal plane, two vaginal flaps are created. The shorter flap is excised to allow the larger flap to cover the fistula repair site, while avoiding superposition of both suture lines. This type of incision is also suitable for smaller fistulas without too much vaginal scarring [19].

Flap-splitting technique or Hamlin's technique

The following is a general description of the flap-splitting technique of fistula repair, as practiced by the Hamlins in Ethiopia, and used in the repair of nearly 10 000 fistulas. Collins already developed this technique in 1861 [25]. The majority of fistula surgeons around the world currently employ this technique. In the original technique, wide mobilisation was recommended, while nowadays many fistula surgeons limit their dissection to what is needed to allow a tension-free closure of the fistula [26].

The mobilisation should be adequate to be able to bring the margins of the bladder defect together under no tension.

Surgical closure

Experienced fistula surgeons routinely achieve a closure rate of over 80% for simple fistulas at the time of first operation. Multiple papers reporting large case series are in support of these figures [27, 28].

In their large series of 2484 obstetric fistula patients, Hilton and Ward reported successful fistula closure in 82.8% of patients at the first attempt [1]. Successful closure was achieved in only 65% of those patients who required two or more operations.

A consensus about the basic principles of fistula repair was reached at the Fistula Surgeons Experts Meeting at the WHO in Geneva, 2004. These principles can be summarised as follows:

1. The best chance for successful fistula closure is at the first operation and closure rates tend to diminish with each subsequent attempt at operative repair.
2. The ureters should be identified and protected to ensure they are not cut or ligated during the fistula repair.
3. The fistula should be mobilised from the surrounding tissues at the time of repair.
4. The fistula should be closed without tension at the site of repair.
5. The repair must be watertight. To ensure this, a dye test is performed intra-operatively and, if there is still leakage, the repair is sutured again [19].

The aim of treatment for obstetric fistula is to achieve complete continence by day and night, a bladder capacity of more than 250mL, no stress urinary incontinence, normal coitus without dyspareunia, no traumatic amenorrhea and the ability to bear children if the patient wants.

Role of Martius flaps and fibrin glue

There is debate about the value of using a Martius bulbocavernosus flap or other flaps as an interposition tissue in fistula repair. One retrospective paper compared the surgical outcomes of surgical repairs involving similar fistulas repaired with and without the use of the Martius flap and demonstrated a higher successful closure rate when such a flap was employed [29, 30]. Another more recent retrospective analysis evaluated 400 patients in whom comparable fistulas were repaired with and without the use of a flap. The analysis showed no differences between the two groups in closure rates or postoperative incontinence rates [31]. Many experienced fistula surgeons now only use grafts under rare circumstances, such as when the urethra has to be reconstructed, when the tissues are particularly poor, or if there have been multiple previous attempts at repair. One prospective randomised controlled trial compared the use of a Martius flap “as an interpositioning flap” to the use of a self-made fibrin glue [32]. There was no statistical difference in outcome, but the authors stated that the use of fibrin glue allowed the fistula repair to be quicker and simpler.

Anti-incontinence procedures

The outcome of fistula repair surgeries is usually challenging. One of the most unpredictable outcomes is postoperative continence, especially in patients who have had extensive fibrosis and damage of urethral tissues. So even if the defect itself has been closed successfully the rates of postoperative urethral incontinence can range from 6–50% [33, 34]. Another cause could be the residual bladder volume after repeated surgeries and the possibility of having a contracted or low compliant bladder. The type of postoperative incontinence is difficult to study. Stress urinary incontinence, urgency incontinence and overactive bladder (OAB), or mixed incontinence or total incontinence may be present. The differential diagnosis is difficult since urodynamics are not often available in developing countries [35]. Persistent urinary incontinence after successful repair of VVF is mostly due to intrinsic sphincter deficiency (ISD) but can be secondary to overactive bladder [20]. In patients in whom all the risk factors mentioned above are present, the postoperative incontinence rate may approach 100% [36]. This is probably because circumferential urethral injuries involve extensive tissue loss leading to urethral detachment from the bladder. A scarred non-functional urethra is left behind, leading to incontinence.

Complications

The complications of obstetric fistula formation and the complications of fistula repair are many and these include:

Recurrence of fistula

This could be fistula reformation, a residual fistula that was missed during the repair or a de novo fistula that occurred due to faulty dissection, especially if the tissues are extensively scarred.

Infections

Wound infection, urinary tract infections, pyelonephritis and even urosepsis may occur postoperatively.

Voiding dysfunction

In the form of overactive bladder, incomplete micturition or persistent dysuria.

Ureteric obstruction

Probably due to ligation at the level of the lower ureteric segment usually with dissection in dense fibrosis. Injury to pelvic ureter is one of the most serious operative complications of gynaecological surgery.

Bladder outlet obstruction

In the form of meatal stenosis, urethral stricture or bladder neck obstruction.

Bladder contracture

May be the result of repair of giant fistulas or due to repeated repairs of recurrent fistulas.

Vaginal stenosis

Due to overcorrection or massive fibrosis due to loss of tissue secondary to pressure necrosis or recurrent fistulas surgeries.

Sexual dysfunction

In the form of vaginismus or dyspareunia and obviously contracted vagina.

Neurological complications

In the form of foot drop or neurogenic bladder dysfunction. Foot drop is one of the tragic injuries associated with obstructed fistula, which was known as "**obstetric palsy**" [37]. Women with this condition are unable to dorsiflex the foot and therefore walk with a serious limp, dragging their injured foot [38]. Complex neuropathic bladder dysfunction and urethral sphincter incompetency often result, even if the fistula can be repaired successfully.

Psychological trauma

Due to social isolation and maybe divorce [6].

Rehabilitation and reintegration into the community

Some women may have been living with fistula for many years, isolated from their community and living in abject poverty. Following fistula repair, they may need a great deal of help in rehabilitating and reintegrating into the community. Acceptance by the community once again will allow the women to participate in social and religious life [39]. They may be able to marry again and have children, thereby restoring their social status. Rehabilitation projects can help the patient get back her life, restore her self-confidence and provide her with the means and skills to earn money to support herself and her family [40-42].

Conclusions

Successful repair of obstetric fistulas can lead to a dramatic change in the woman's quality of life. Fistula repair is best carried out by experienced fistula surgeons and at a dedicated fistula centre. Surgical repair should ideally be successful at the first attempt since the best surgical results are usually obtained with the first repair. Second and third attempts are associated with lower success rate and higher risk of complications. Since follow-up healthcare is essential for lasting results, it is important to have dedicated, skilled surgeons permanently stationed at the location, backed up by trained nurses and physiotherapists. Current problems regarding treatment include: too few locally based, skilled surgeons, particularly those trained to treat complicated cases, too few medical centres and hospitals and a lack of medical supplies, equipment and the maintenance of this equipment. A lack of follow-up may result in a failure to treat continuing incontinence, to detect complications and to rehabilitate the patient.

Key learning points

- Diagnosis and evaluation of female patients complaining of different types of genital fistulas.
- Surgical repair planning for vesicovaginal fistulas according to the aetiology, classification systems, times of previous attempts of repairs and the need of interpositioning flaps.
- Dealing with complications, whether due to obstructed labour or due to the surgical procedures.
- Follow-up of patients and evaluation of any residual leakage or voiding dysfunction.

Disclosures

Authors

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