

Surgical Approach to Obstetric Fistula Repair in Niamey, Niger: A Description of Surgical Technique

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Abstract

Objective: The objective of this project is to describe the diagnostic and surgical techniques utilized for the repair of complex obstetric vesico-vaginal fistula.

Cases: The two cases described include a recurrent pinpoint fistula at the bladder neck and a primary fistula with traumatic amputation of the proximal urethra.

Comment: Although most surgeons are unlikely to encounter the complexity of fistula caused by obstructed labor, principles used in the diagnosis and treatment of the complicated obstetric fistulas can guide surgeon approaching vesico-vaginal fistula repair of any etiology.

Keywords: Obstetric; Obstructed labor; Traumatic amputation of proximal urethra; Vesico-vaginal fistula

Introduction

Obstetric fistula, the consequence of tissue ischemia with subsequent pressure necrosis, occurs when a woman with obstructed labor has inadequate access to obstetric services. It is a devastating maternal complication. The Global Burden of Disease Survey of 1990 conservatively estimated 654,000 women living with obstetric fistula worldwide with 262,000 of these cases living in Sub-Saharan Africa [1]. More recently, Wall estimated that at least 3.5 million women suffer with fistula with 130,000 new cases developing each year [2]. Growing attention to the obstetric fistula, paired with an inadequate number of facilities that specialize in fistula repair, has led to surgeons from industrialized nations travelling to assist in the repair of these fistulas. Volunteer surgeons working in developing nations perform an estimated 7,000 surgeries annually [3].

The International Organization for Women and Development (IOWD) fistula program at the National Hospital of Niamey, Niger assembles surgical teams to work with an established Nigerien team for the repair of obstetric fistula. The objective of this article is to describe diagnostic procedures and surgical techniques utilized for the repair of various types of obstetric fistula.

Diagnostic and Surgical Techniques

This descriptive case-series of surgical technique received Internal Review Board approval from Women and Infants' Hospital of Rhode Island (IRB project #09-0023). All women evaluated by the IOWD team undergo a preoperative examination to determine classification and location of the fistula. The fistulas were classified using the Waaldijk classification of vesico-vaginal fistula [4] (Table 1). The examination consisted of a sterile speculum examination of the vagina, estimation of urethral length utilizing Foley catheter insertion, and estimation of bladder capacity using a graduated uterine sound in the bladder [5]. This technique, described by Waaldijk, utilized a graduated uterine sound to measure the distance between the urethral meatus and the bladder dome by subtracting the urethral length (centimeter distance from external urethral meatus to the inflated Foley balloon). The size of the residual bladder was then categorized as small (< 4cm), medium (4-6 cm), or large (> 6 cm). Although this was a relatively crude estimation of bladder capacity, more familiar methods of bladder

filling to measure capacity were not feasible due to continuous leakage from the fistula.

All women received preoperative intravenous antibiotics prophylaxis, primarily a 1st generation cephalosporin. The anesthesia for the surgeries is a spinal blockade. After administration of 500cc of isotonic intravenous (IV) solution, spinal anesthesia is obtained, using either tetracaine 1% (8 to 12 mg) ± epinephrine with fentanyl (12.5 micrograms) or bupivacaine 0.5% (10 to 14mg) with fentanyl (12.5 micrograms). Both these combinations resulted in profound, long duration block that assured comfort and immobility throughout the surgery as well as the immediate post-operative period. For improved communication, each patient had a native language speaker present for interpretation during the entire surgical procedure. Ketorolac 15 to 30 mg IV was administered at the end of the procedure.

At the conclusion of each surgical procedure, a transurethral Foley catheter is inserted and blue dye was instilled into the bladder in a retrograde fashion. The repairs are checked to ensure they are water tight. Vaginal packing soaked with betadine are placed and removed post-operative day #1. Ureteral stents are placed when the fistula involves the trigone or was within 1 cm of the ureteral orifices. These ureteral stents are removed on post-operative day#2. The transurethral Foley catheter drainage are usually discontinued on post-operative day #14.

Case #1: Recurrent pinpoint fistula at the bladder neck

A healthy woman in her mid-twenties presented with a four-year

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Type	
I	Fistula not involving the closing mechanism*
II	Fistula involving the closing mechanism
A	Without (sub)total involvement of the urethra
a	Without circumferential defect
b	With circumferential defect
B	With (sub)total involvement of the urethra
a	Without circumferential defect
b	With circumferential defect
III	Miscellaneous, e.g. ureterovaginal or other exceptional fistulas

*Closing mechanism includes the urethra and the bladder neck. The closing mechanism is measured as 5 cm from the external urethral meatus

Table 1: Waaldijk Classification of Vesicovaginal Fistulas4.

history of continuous urine leakage starting immediately after her second delivery. She had labored for 2 days and delivered a still born fetus vaginally. Previous IOWD teams had attempted surgical repair of her fistula on two previous missions. Her original fistula was classified as a large circumferential defect involving complete detachment of both the anterior and posterior bladder from the urethra with a large portion of the proximal urethra missing. This defect has been termed traumatic amputation of proximal urethra (TAPU) and is a Type IIBb fistula [6]. Her initial surgery resulted in the development a pinhole fistula that was noted at the bladder neck. On examination, urethral length was measured at 3cm and total vaginal length was 8 cm with moderate vaginal scar tissue anteriorly. The fistula involved the closing mechanism of the bladder neck, but did not extend to the urethra. We considered the closing, or continence, mechanism to be involved when the fistula was located within 5cm of the external urethral meatus as define by Waaldijk [4].

Intraoperatively, cystourethroscopy was performed with a 30 degree scope to survey both the bladder and the urethra. No defect was identified within the bladder either anteriorly or circumferentially. The lacrimal duct probe was gently placed through the pinpoint fistula opening vaginally and the opening of a simple fistula tract was noted 2.5cm distal to the ureteral orifices.

Although the visible opening of the vaginal fistula tract was small, an extensive dissection was performed to optimize the repair. Surgical repair commenced with a large “U” shaped incision from the lateral vaginal side wall, around the pinpoint fistula opening and out to the other vaginal side wall. A second up-side-down “U” incision was placed with the apex of the U overlapping the previous incision and incorporating the fistula opening. (Figure 1) These incisions are made to facilitate bilateral entry into the space of Retzius and allows for imbrication with a tension-free closure Thorek scissors were then used to undermine and dissect vaginal tissue away from bladder mucosa with counter-traction provided by tissue forceps with teeth. Allis clamps were not used for retraction as they tend to tear the fragile scar tissue surrounding the fistula. At least 2cm of tissue was mobilized in all directions to allow for a tension free closure.

After mobilization, the bladder mucosa was closed transversely with figure-of-eight sutures of 2-0 Polyglactin-910. These interrupted sutures were first placed at the most lateral corners of the fistula. This sequence ensures that the apices of the fistula are incorporated in the repair in order to avoid recurrences that result from missing the lateral corners of large fistulas [7]. Sutures were not placed through the bladder mucosa, but rather were placed to invert the bladder mucosa edges into the bladder lumen. Vaginal mucosa was then closed with horizontal mattress sutures of 2-0 Polyglactin-910. Again, wide bites were taken in the vaginal mucosa to ensure the sutures would hold. A 16 French Foley catheter was placed transurethrally with the whistle tip

stents threaded through the catheter. Two and a half months after the procedure, she was reported to be a dry successful fistula closure.

Case #2: Primary fistula with Traumatic Amputation of Proximal Urethra (TAPU)

A woman in her early forties presented with continuous leakage of urine for 6 years beginning after her fifth vaginal delivery. She had labored for 5days, ultimately delivering a still born fetus via forcep-assisted vaginal delivery. She had no prior attempt at fistula repair.

Her preoperative pelvic examination demonstrated a circumferential 5cm fistula defect including traumatic amputation of the proximal urethra (TAPU) (Figure 2). This fistula was a Type IIBb, involving both the continence mechanism and complete detachment of the urethra from the anterior and posterior bladder mucosa. On vaginal examination, the examiner could easily palpate the patient’s superior pubic rami bilaterally through the fistula defect. Only the distal 0.5cm of the external urethral meatus was identified while the remaining urethra was absent. Intraoperatively, the ureters were identified by gently retracting the exposed bladder mucosa downward through the vagina with the back of long forceps. Whistle tip stents were placed vaginally through the fistula tract and brought out through the remnant of the urethral meatus to avoid obstruction of the operative field.

The approach for surgical repair was similar to the technique



Figure 1: Surgical approach to a pinhole recurrent fistula that at the bladder neck. An extensive dissection was performed to optimize the repair and to facilitate bilateral entry into the space of Retzius. Drawing by Sarah Erekson and Susan Kelleher.

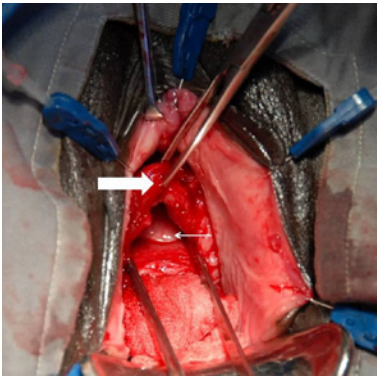


Figure 2: Traumatic amputation of proximal urethra (TAPU). The anterior bladder mucosa has been mobilized off the superior pubic rami and is held gently in an Allis clamp (block arrow). The large fistula was a Type IIBb, involving both the continence mechanism and complete detachment of the urethra from the anterior and posterior bladder mucosa, is demonstrated by tissue forceps (thin arrow). Picture by Sharon Knight, MD.

described by Elkins et al. [8]. The edges of the fistula tract were identified and the bladder mucosa was separated from the vaginal tissue by undermining with Thorek scissors. Lateral and anterior dissection into the retropubic space was necessary to release the scarred fistula edges away from the superior pubic rami. The anterior bladder mucosa was then mobilized to the level of the peritoneal reflection at the bladder dome. This mobilized anterior flap of bladder mucosa was then re-attached to the anterior urethral meatus with interrupted sutures of 4-O Polyglactin-910. At this point in order to maintain orientation, a 16 French Foley catheter was then placed through the urethral meatus and the whistle tip stents were threaded through this catheter. Two separate incisions were then made in the anterior bladder mucosa. (Figure 3A) These bilateral incisions were made in order to tubularize the mobilized anterior bladder to create a neo-urethra (Figure 3B) by bringing the incised anterior bladder mucosa around the Foley catheter and suturing the posterior aspect of the two lateral incisions with interrupted sutures of 2-O Polyglactin-910. The closure of the neo-urethra was in a vertical direction parallel to the axis of the vagina. Bilateral tacking sutures of 2-O Polyglactin-910, also called Hudson-Hendrickse stitches, were then placed to anchor the neo-urethra to the pubic periosteum [9]. The posterior bladder mucosa was then closed to the base of the neo-urethra in a transverse fashion. The closed suture lines were the shape of an inverted letter "T" (Figure 3C). The vaginal mucosa was then closed in a transverse fashion with interrupted sutures of 2-O Polyglactin-910. Her last exam, two month after repair, demonstrated a successful fistula closure. She has stress urinary incontinence.

Discussion

These surgical principles discussed in these cases are applicable to the repair of vesico-vaginal fistula of any etiology. First, our team proceeded in systematically evaluating and treating all treating all women. During the pre-operative examination, we identified the exact fistula location and its proximity to the ureteral orifices and the continence mechanism. Knowledge of the exact location of the fistula allows the surgeon to anticipate needed equipment such as ureteral stents. Thorough exam also allows the surgeon to determine if an anterior detachment of the bladder from the urethra is present. Failure to recognize and/or repair a defect in the anterior bladder mucosa can lead to continuous urine leakage across a healing suture line. This urine may eventually follow the path of least resistance causing a recurrent

pinpoint fistula. Second, we acknowledged that many fistula tracts are not simple or solitary. A small vaginal opening may be due to a much larger defect in the overlying bladder mucosa. Cystourethroscopy is helpful in the identification of anterior defects in the bladder mucosa or a complex fistula tract. Third, even when the vaginal fistula opening is small, we found a wide lateral dissection to be essential. This dissection allows for the imbrication of tissue to ensure a tension-free closure. Finally, bladder and vaginal tissue after obstructed labor is often scarred and devascularized. We avoid the use Allis clamps whenever possible to avoid further traumatizing these fragile tissues. Although most surgeons are unlikely to encounter the complexity of fistula caused by obstructed labor seen in underserved populations, principles used in the diagnosis and treatment of the complex obstetric fistulas can aid any surgeon approaching any vesico-vaginal fistula repair.

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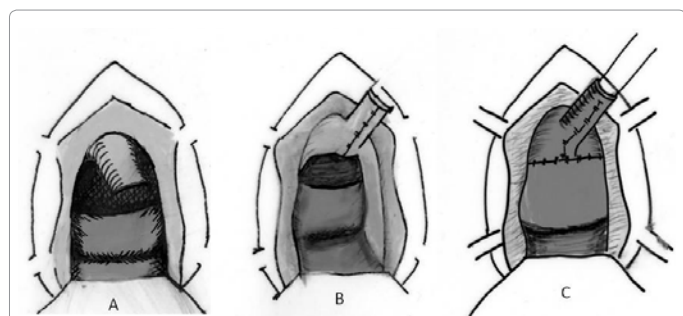


Figure 3: A. After the anterior bladder has been mobilized two separate incisions are made in the anterior bladder mucosa. B. After bilaterally incisions are made in the anterior bladder mucosa, the distal mucosa is tubularized around a Foley catheter in order to create a neo-urethra. C. After creation of the neo-urethra through tubularization of the proximal anterior bladder mucosa, the posterior bladder mucosa was then closed to the base of the neo-urethra in a transverse fashion. The closed suture lines were the shape of an inverted letter "T". Drawing by Sarah Erekson and Susan Kelleher.