CLINICAL OBSTETRICS AND GYNECOLOGY
Volume 00, Number 00, 000–000

Contemporary Issues in Obstetric Fistula

L. LEWIS WALL, MD, DPHIL,*† ITENGRE OUEDRAOGO, MD,‡ and FEKADE AYENACHEW, MD§

**Department of Anthropology, College of Arts and Sciences; †Department of Obstetrics and Gynecology, School of Medicine, Washington University in St. Louis, St. Louis, Missouri; ‡Association Renaissance Arena, Ouagadougou, Burkina Faso; Danja Fistula Center, Danja, Niger; and §International Fistula Alliance, Terrewode Women's Community Hospital, Soroti, Uganda*

Abstract: We discuss a variety of contemporary issues relating to obstetric fistula. These include definitions of these injuries, the etiologic mechanisms by which fistulas occur, the role of specialist fistula centers in diagnosis and management, the classification of fistulas, and the assessment of surgical outcomes. We also review the growing need for complex reconstructive surgical procedures, follow-up challenges, and the transition to a fistula-free world in which other pathologies (such as pelvic organ prolapse) will be of increasing importance. Finally, we discuss the need to develop responsive systems of maternal health care that treat women with competence, compassion, respect, and fairness.
Key words: obstetric fistula, vesicovaginal fistula, obstructed labor, women's rights

Definitions

A fistula is an abnormal passage between 2 epithelialized body cavities that normally are not connected with 1 another. Fistulas are named with reference to the structures that have thus become connected: for example, a vesicovaginal fistula is an abnormal opening between the bladder and the vagina.

Fistulas arise in different ways. A small number of fistulas are congenital, arising from defects that occur during embryogenesis.[1] More commonly, however, fistulas are caused by trauma.[2,3]

The most common fistulas occurring in females are genitourinary fistulas (vesicovaginal fistula, urethrovaginal fistula, ureterovaginal fistula, etc.) and genitoenteric fistulas (especially rectovaginal fistula). The term "obstetric fistula" refers to a genitourinary or genitoenteric fistula that develops as the result of complications of the pregnant state (pregnancy, labor, delivery, and the puerperium) or from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above, just as a direct maternal death is the death of a pregnant or recently pregnant woman from such causes. It is incorrect to use the terms "obstetric fistula" and "genitourinary fistula" interchangeably. The

Correspondence: L. Lewis Wall, MD, DPhil, Department of Anthropology, Washington University in St. Louis, MO. E-mail: walll@wustl.edu

The authors declare that they have nothing to disclose.

term "obstetric fistula" should be used only for fistulas that result from known direct causes of maternal mortality and morbidity. In high-resource industrialized countries, most fistulas are now caused by misadventure during pelvic surgery (complications of hysterectomy or urinary stone surgery), by cancer, or by radiation therapy. In low-resource countries (especially those with high rates of maternal mortality), most fistulas arise as the result of delivery trauma.[2,3]

Fistula Etiology

When the general public hears about obstetric fistula, the common belief is that these injuries must arise as the result of "tears" occurring during labor and delivery, since most people know that some degree of tissue-tearing (usually superficial) is common during normal childbirth. However, except in rare instances such as difficult forceps deliveries, acute laceration of the vesicovaginal septum is almost never a cause of obstetric vesicovaginal fistula. Some rectovaginal fistulas result from nonhealing lacerations of the anal sphincter and/or perineum, but rectovaginal fistulas account for only a small percentage of the overall obstetric fistulas found worldwide.

Most obstetric fistulas are the result of a crush injury occurring during labor. This fact is of fundamental importance in understanding the comorbidities that are often found in association with obstetric fistulas. The fact that these lesions originate in a crush injury also explains why obstetric fistulas are frequently difficult to repair. In an acute laceration, the tissues are torn and are separated from 1 another, but they themselves are otherwise normal. In a crush injury, on the other hand, the fistula forms not from tissues being pulled apart, but rather from necrosis of tissues that have lost their blood supply at the site where the fistula forms.

Labor is obstructed when the fetus cannot advance through the birth canal despite vigorous uterine contractions. The presenting part (usually the fetal head) becomes lodged in the bony pelvis, where it compresses the soft tissues of the vesicovaginal septum against the maternal pelvic bones (Fig. 1). The continuing uterine contractions increase the compression of the maternal soft tissues that are trapped between these 2 bony plates. Eventually this pressure shuts off the blood flow to these tissues completely. If the obstruction is not relieved by prompt delivery (such as emergency cesarean section), a crush injury as described above results, and the compressed tissues die and slough away, leaving a fistula of varying size. The location and extent of the fistula that forms depends on the location in the

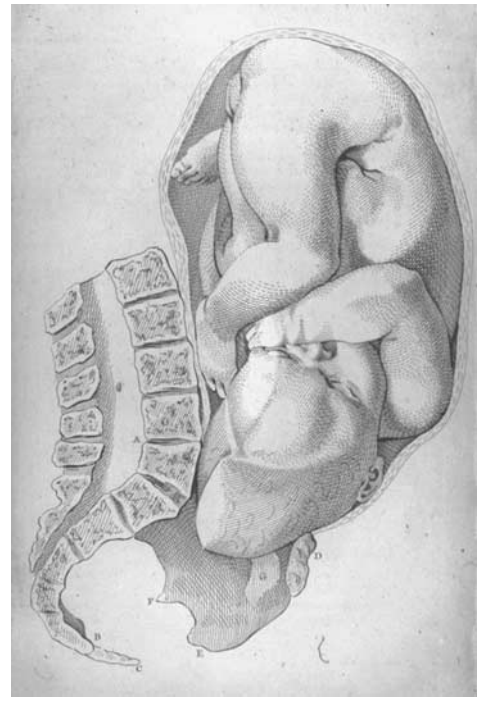

FIGURE 1. Obstructed labor due to absolute cephalopelvic disproportion. From Smellie, (public domain).[4]

pelvis where obstruction has occurred, the volume of tissues compressed, and related factors.[2,3]

The tissues that surround the newly formed fistula from obstructed labor are not themselves normal. Often these tissues have also been compressed, have lost some of their blood supply, and have been injured during obstructed labor. Even though these tissues have not died, they are not healthy. There is often heavy scarring, almost always confounded by serious infections and poor tissue perfusion, with distortion and retraction of the surrounding structures. The size and scope of the area affected is quite variable, but may be enormous, affecting other pelvic organ systems. In such cases, numerous, severe comorbidities may accompany the obstetric fistula. The constellation of these comorbidities has been called "the obstructed labor injury complex" (Table 1).[5] The presence of any of these comorbidities dramatically affects the care of the woman with an obstetric fistula. These women often present for care in a condition of marked general poor health requiring a long convalescence (both before and after surgical repair) and the poor and often distorted condition of the local tissues makes the outcome of their treatment extremely unpredictable.

The other major cause of obstetric fistulas comes from surgical complications, usually during emergency cesarean section, often performed because of obstructed labor. In many of these cases tissue damage will already have occurred before the performance of the cesarean section; but in other cases, the operation itself may independently cause an injury that leads to a fistula, particularly if the injury occurs in tissues that have already been partially compromised.[6]

Iatrogenic Fistulas

As countries with limited resources try to expand the reach of their maternal health care systems, they have increasingly adopted a philosophy of task-shifting, in which surgical procedures in rural and remote areas are provided by a cadre of "surgical technicians" (called by different names in different countries). Generally, these are individuals with less than a medical degree who have been trained to provide emergency surgical procedures in rural health care facilities. In some cases, such technicians provide excellent care, provided they are adequately supervised, but this issue has not been studied extensively in many countries.[7]

What may happen in such settings is that the surgeon with the least training and experience attempts—under the most difficult circumstances and without optimal support—to do the most difficult cesarean sections: the surgical delivery of a patient who has been in labor for 2 or 3 days, is dehydrated and exhausted, with ongoing pelvic sepsis, and a fetal head that is wedged deeply and tightly into the pelvis, with local tissues that may well be already undergoing necrosis at the time of operation. Under such circumstances, it is not at all surprising that the number of ureteral injuries and other surgical mishaps increase. Experience from Ethiopia strongly suggests that the number of iatrogenic fistulas (such as ureterovaginal fistulas from surgical injury) have begun increasing as surgical technicians with less than full training have been deployed to rural areas.[8] This, in turn, means that gynecologic surgeons in low-income and middle-income countries must develop better skill-sets for dealing with these complications. Doing this will require specialized, focused training to deal with these specific surgical problems.

This phenomenon is sometimes known as the emergence of a "disease of medical progress"; that is, the injury is the result of the introduction of new, often life-saving, technologies that make an important contribution to medical care, but which bring with them at the same time their

TABLE 1. The "Obstructed Labor Injury Complex"

Acute obstetric injury
Hemorrhage, especially postpartum hemorrhage from uterine atony
Intrauterine infection and/or systemic sepsis
Deep venous thrombosis
Massive vulvar edema
Pathologic uterine retraction ring (Bandl ring)
Uterine rupture
Urologic injury
Genitourinary fistulas (vesicovaginal fistula and complex combinations of injuries)
Urethral damage, including complete urethral loss
Inversion of the bladder through a large fistula, with ulceration of the urothelium
Bladder stones
Urinary stress incontinence
Acute and chronic ureteral injury (hydroureteronephrosis)
Acute and chronic urinary tract infection (chronic pyelonephritis)
Kidney failure
Gynecologic injury
Cessation of menstruation (amenorrhea)
Vagina scarring and narrowing, leading to loss of sexual capability (gynatresia)
Cervical damage, including complete cervical loss
Pelvic inflammatory disease
Infertility and childlessness
Gastrointestinal injury
Rectovaginal fistula and perineal laceration
Scarring and narrowing of the rectum
Anal sphincter injury and anal incontinence
Musculoskeletal injury
Injury and inflammation of the pubic bone
Diffuse pelvic floor trauma
Neurological injury
Foot-drop and limb contractures from disuse
Neuropathic bladder dysfunction
Dermatological injury
Ulceration due to chronic maceration of the skin by urine and feces
Fetal/neonatal injury
Over 90% stillbirth rate with a high death rate among living newborns
Neonatal asphyxiation, infection and traumatic birth injuries
Psychosocial injury
Social isolation
Domestic violence
Separation and divorce
Worsening poverty
Malnutrition
Posttraumatic stress disorder
Depression, sometimes leading to suicide

Modified from Arrowsmith et al.[5] Adaptations are themselves works protected by copyright. So in order to publish this adaptation, authorization must be obtained both from the owner of the copyright in the original work and from the owner of copyright in the translation or adaptation.

own set of complications.[9] Fistulas arising as a complication of hysterectomy, for example, did not occur before hysterectomy was available as a surgical treatment for uterine disease.[10] In the case of cesarean section, one would expect that the overall-number of obstetric fistulas from prolonged obstructed labor will fall as access to cesarean section becomes more widely available. At the same time, the number of fistulas due to surgical injuries will also likely rise, even though

the absolute number of fistulas will be dramatically less overall as the number of obstetric fistulas from prolonged obstructed labor decreases in line with the increasing access to cesarean section.[11]

The Role of Specialist Fistula Centers

These 2 etiological factors—complicated fistulas from prolonged obstructed labor and the injuries resulting from surgical misadventure—argue strongly for the creation and support of dedicated specialist fistula units in countries where obstetric fistulas are common. Although a skilled surgeon operating at a district hospital could successfully repair many fistulas, the data are clear that the best opportunity for successful closure of an obstetric fistula is at the first operation.[12] Success tends to decline with each ensuing failed operation.

As Table 1 clearly indicates, the "hole in the bladder" is not the whole problem when it comes to obstructed labor and obstetric fistulas. There is abundant evidence that women who develop an obstetric fistula in a resource-poor country come from impoverished social groups. Once they develop the fistula, their social situation often deteriorates, making them progressively more vulnerable to exclusion and exploitation.[2,3] Domestic violence, marital discord, separation and divorce are all quite common among women with vesicovaginal fistulas. They often require special social programs to help them recover and reintegrate successfully into society. These programs are more likely to be effective when run as part of specialist fistula centers where a comprehensive view of the needs of fistula patients are embraced.[13]

Complex Reconstructive Surgical Procedures

The magnitude of the injuries that a woman may sustain in the course of prolonged obstructed labor is often staggering (Fig. 2). In the worst cases, virtually the entire anterior pelvis, bladder, and vagina may be obliterated (Fig. 3), and there may be almost nothing left with which to attempt to reconstruct a functioning bladder and/or vagina. When faced with a pelvic cloaca of this kind, the only viable reconstructive option may be to attempt to create an artificial bladder out of reconfigured intestine, with transplantation of the ureters. The new urinary reservoir is then emptied periodically by self-catheterization (Mainz II pouch, etc.).[14] Diversion using an ileal conduit has proven less successful in cases of obstetric fistula. Cases of severe gynatresia where the vagina has been

FIGURE 2. Total loss of the urethra following prolonged obstructed labor. Used with permission. Copyright [Itengre Ouedraogo], [Ouagadougou, Burkina Faso]. All permission requests for this image should be made to the copyright holder. full color online

FIGURE 3. Combined vesicovaginal and rectovaginal fistula complicated by dense vaginal scarring and tissue retraction. Used with permission. Copyright [Itengre Ouedraogo], [Ouagadougou, Burkina Faso]. All permission requests for this image should be made to the copyright holder. full color online

obliterated by dense scarring following sloughing of the vaginal lumen, require complex vaginoplasty operations or the even the creation of a neovagina using intestinal segments for reconstruction.[15]

Operations like these require experienced, highly specialized surgeons, well-trained teams of nurses and operating room technicians, smoothly integrated logistical support, and excellent follow-up to diagnose and treat potential long-term problems associated with these operations. These operations should only be performed at specialist centers where the necessary support and technical capacity can be mobilized.

Fistula Classification and Postoperative Follow-up

The diverse presentations that can occur from vesicovaginal fistulas caused by obstructed labor mean that individual cases will vary extensively in their complexity. To evaluate surgical outcomes accurately, a system of uniform classification and evaluation must be accepted and utilized by clinicians and researchers. This is the only way that therapeutic interventions can be accurately compared. To date, this process remains incomplete. There are 2 widely used classification systems: 1 proposed by Waaldijk[16] and another 1 proposed by Judith Goh (Table 2).[17] The latter system has been independently validated among multiple observers.[18,19] A prospective study of 202 patients classified using both systems found the Goh classification was better able to predict successful closure than the Waaldijk system.[20] Further such studies involving multiple different centers with differing teams of surgeons should be encouraged. Attempts have also been made to create risk-factor scoring systems to aid prognosis. These show some promise. The important prognostic factors appear to include fistula size, degree of scarring, involvement of the bladder neck/urethra, whether the fistula is circumferential, number of previous attempted repairs, and bladder capacity.[12,18,21,22] As yet, no risk-factor scoring system has attained a general consensus among operating surgeons.

An additional complicating factor is the absence of a well-developed methodology for characterizing the potential confounding influences of other components of the

TABLE 2. Goh Genitourinary Fistula Classification

The new classification divides genitourinary fistulae into 4 main types, depending on the distance of the distal edge of the fistula from the external urinary meatus. These 4 types are further subclassified by the size of the fistula, extent of associated scarring, vaginal length or special considerations

Type 1: Distal edge of fistula > 3.5 cm from external urinary meatus

Type 2: Distal edge of fistula 2.5 to 3.5 cm from external urinary meatus

Type 3: Distal edge of fistula 1.5 to <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, eg, postradiation, ureteric involvement, circumferential fistula, previous repair

As an example, with this proposed classification in a Type 2bi fistula the ureteric orifice can be close to the fistula edge and it is recommended that ureteric orifices be identified before or during surgery, while the woman with a Type 3aii fistula is probably at a higher risk of postoperative urinary incontinence and requires follow-up.

Reproduced with permission from Goh.[17]

"obstructed labor injury complex" on the outcome of fistula repair. These nonfistula factors, which are clearly related to the underlying pathophysiology that produces the injury, may have a bearing on successful outcome—certainly they have a major bearing on whether or not patients with such co-morbidities have an improved quality of life after therapy.[13]

There is still no uniformly accepted definition of surgical "success" in fistula repair. Due to the fact that most fistula patients come from remote rural areas with poor transportation and communication networks, "success" of the fistula repair is still often determined at the time of discharge from the hospital, typically about 2 weeks after surgery. This is clearly inadequate; long-term follow-up studies are required.

In the past it was generally assumed that successful closure of a vesicovaginal fistula was a surgical "success," but it has since become apparent that a significant number of women who undergo successful repair of a fistula continue to have transurethral urinary incontinence from a variety of other causes. This discrepancy between successful fistula closure and the attainment of urinary continence has been called the "continence gap."[23] At a minimum, descriptions of surgical outcome in vesicovaginal fistula repair should include the categories "Closed and Dry," "Failed Repair—Fistula Not Closed," and "Closed, but Wet."[12] Further research is needed to determine the best methods for evaluation and treatment for women who have persistent incontinence after successful fistula closure, particularly with reference to the role that should be played by urodynamic studies and urinary tract imaging.[24]

Building Responsive Maternal Health Care Systems to Eliminate Obstetric Fistula

There is nothing particularly complicated about preventing an obstetric fistula from prolonged obstructed labor. All labors should be monitored by skilled birth attendants, and, at the first indication that the progress of labor has stopped, the patient should be referred to a higher level of care for evaluation and delivery. Nobody expressed this better than the great American fistula surgeon Thomas Addis Emmet who, writing nearly 150 years ago, said "Since the loss of tissue is not in proportion to the length of the labor … and since we cannot judge of the degree of impaction, there is but one safe course to adopt, and that is

speedy delivery. … We must accept the teaching that vesicovaginal fistula could not occur from a slough if delivery was always brought about as soon as the head ceased to recede after the cessation of an expulsive effort of the uterus."[25] Emmet clearly identified the key issue as one of delay in providing appropriate emergency obstetric care once labor becomes obstructed.

Delay has long been understood as a major factor in maternal mortality and morbidity. The "3 delays" model popularized by Thaddeus and Maine includes 3 sequential points at which delay can occur in the presence of an obstetrical emergency such as prolonged obstructed labor: (1) delay in deciding to seek care; (2) delay in arriving at an appropriate health care facility; and (3) delay in receiving needed care at the facility.[3,26] The most difficult delay to overcome is the initial delay by the laboring woman and her family in deciding to seek care.[3,27] There is still a cultural bias in many parts of the world towards home delivery, which exponentially increases the chances of delay if labor becomes obstructed. Reluctance of women to embrace facility-based deliveries stems in large part from perceptions of low-quality care at local institutions and high rates of patient abuse by nurses and midwives. Laboring women, quite understandably, do not wish to be subjected to such maltreatment. Overcoming these problems will require health systems to dedicate themselves to providing competent care to laboring women, delivered with compassion, respect, and fairness.[3] Medical professional and nursing organizations should be leaders in this regard.

Transportation is also problematic in resource-poor parts of the world. Functioning infrastructure is a primary government responsibility, and local populations should be adamant about demanding quality improvements in this area.

Low-quality health care services are a disgrace. In the kinds of low-resource settings where obstetric fistulas are most common, the quality of health care is inadequate at best, and often is disgraceful. This is particularly true in situations where, despite deep dissatisfaction, the public perceives itself to be powerless or unable to demand change. Quality improvement in patient care should be led by dedicated, empowered hospital administrators, physicians, nurses, and midwives who have a primary ethical responsibility to care for patients to the best of their abilities.

With respect to women who have an obstetric fistula, Ruder et al[28] have recently discussed the "fourth delay"—the long period of time that many women who have sustained an obstetric fistula must wait before they can receive appropriate psychosocial and medical care. This is another compelling reason to promote the development of specialist fistula centers in parts of the world where there are large numbers of these cases.

Training for the Transition to a Fistula-free World

As rates of institutional delivery and access to cesarean section increase in low-income and middle-income countries, the number of obstetric fistulas from obstructed labor will decrease. This is already being seen in countries like Ethiopia, which was long noted for its high rate of obstetric fistulas.[6,8] As the overall numbers of fistulas decrease, their place on the spectrum of women's health needs will be taken by other pathologic conditions, most notably pelvic organ prolapse. Recent studies from low-income and middle-income countries have shown that there are now far more cases of severe, symptomatic prolapse than fistulas.[8,29] There is a pressing need to improve postgraduate medical education in these countries to prepare gynecologists to meet these new challenges. In particular, a major push needs to be made to improve

training in reconstructive pelvic surgery. Existing specialist fistula centers should expand their capacities in urogynecology. When new centers are created, they should strive to encompass the full-spectrum of training and treatment for pelvic floor disorders from the outset so as to provide birth-injured women in these countries with the highest possible level of care.[30]

The Human Rights Dimension of Obstetric Fistula

Above all, the world must develop a shared understanding that childbirth injuries are violations of human rights, of women's rights.[3] Childbirth injuries affect women exclusively—they are the ones who give birth. These injuries occur largely because women are denied access to basic, life-saving medical services that should be within the capacity of every country in the world. No woman should lose her life or sustain a crippling life-altering injury just because she gives birth. Not to provide these services to all women is a form of structural, sex-based violence that arises from the political decisions of ruling elites who choose to divert resources to other, less important but personally preferable purposes. This is only likely to change when local populations—especially in low-income and middle-income countries—demand justice from their political leaders, and hold them accountable for the poor performance they have shown almost everywhere to date in confronting these solvable problems.

References

1. Escoriza JCM, Marques AMP, Fernandez JAL, et al. Congenital vesicovaginal fistula with or without menouria. *Eur J Obstet Gynecol Reprod Biol*. 2014;175:38–48.
2. Wall LL. Obstetric vesicovaginal fistula as an international public health problem. *Lancet*. 2006;368: 1201–1209.
3. Wall LL. *Tears for My Sisters: The Tragedy of Obstetric Fistula*. Baltimore: Johns Hopkins University Press; 2018.
4. Smellie W. A sett of anatomical tables. London; 1752 (public domain).
5. Arrowsmith S, Hamlin EC, Wall LL. "Obstructed labor injury complex:" obstetric fistula formation and the multifaceted morbidity of maternal birth trauma in the developing world. *Obstet Gynecol Surv*. 1996;51:568–574.
6. Onsrud M, Sjoveian S, Mukwege D. Cesarean delivery-related fistulae in the Democratic Republic of Congo. *Int J Gynecol Obstet*. 2011;114: 10–14.
7. Wilson A, Lissauer D, Thangaratinam S, et al. A comparison of clinical officers with medical doctors on outcomes of caesarean section in the developing world: Meta-analysis of controlled studies. *BMJ*. 2011;342:d2600.
8. Wright J, Ayenachew F, Ballard KD. The changing face of obstetric fistula surgery in Ethiopia. *Int J Womens Health*. 2016;8:243–248.
9. Moser RH. Diseases of medical progress. *N Engl J Med*. 1956;255:606–614.
10. Danso KA, Martey JO, Wall LL, et al. The epidemiology of genito-urinary fistulae in Kumasi, Ghana, 1977-1992. *Int Urogynecol J*. 1996;7: 117–120.
11. Raassen TJIP, Ngongo CJ, Mahendeka MM. Iatrogenic genitourinary fistula: and 18-year retrospective review. *Int Urogynecol J*. 2014;25: 1699–1706.
12. Ouedraogo I, Payne C, Nardos R, et al. Obstetric fistula in Niger: 6-month postoperative follow-up of 384 patients from the Danja Fistula Center. *Int Urogynecol J*. 2018;29:345–351.
13. Emasu A, Ruder B, Wall LL, et al. Reintegration needs of young women following genitourinary fistula surgery in Uganda. *Int Urogynecol J*. 2019;30:1101–1110.
14. Kirschner CV, Lengmang SJ, Zhou Y, et al. Urinary diversion for patients with inoperable obstetric vesicovaginal fistula: The Jos, Nigeria, experience. *Int Urogynecol J*. 2016;27:865–870.
15. Pope R, Hollier PC, Brown RH, et al. A retrospective review to identify criteria for incorporating the Singapor flap and gracilis muscle flap into obstetric fistula repair. *Int J Gynecol Obstet*. 2020; 148(suppl 1):37–41.
16. Waaldijk K. Surgical classification of obstetric fistula. *Int J Gynecol Obstet*. 1995;49:161–163.
17. Goh JTW. A new classification for female genital tract fistula. *Aus NZ J Obstet Gynaecol*. 2004;44: 502–504.
18. Goh JTW, Browning A, Berhan B, et al. Predicting the risk of failure of closure of obstetric fistula and residual urinary incontinence using a classification system. *Int Urogynecol J*. 2008;19:1659–1662.

19. Goh JTW, Krause HG, Browning A, et al. Classification of female genito-urinary tract fistula: inter- and intra-observer correlations. *J Obstet Gynaecol Res*. 2009;35:160–163.
21. Capes T, Stanford EJ, Romanzi L, et al. Comparison of two classification systems for vesicovaginal fistula. *Int Urogynecol J*. 2012;23: 1679–1685.
20. Mukwege D, Peters L, Amisi C, et al. Panzi score as a parsimonious indicator of urogenital fistula severity derived from Goh and Waaldijk classifications. *Int J Gynecol Obstet*. 2018;142: 187–193.
22. Nardos R, Browning A, Chen CCG. Risk factors that predict failure after vaginal repair of obstetric vesico-vaginal fistulas. *Am J Obstet Gynecol*. 2009;200:578.e1–578.e4.
24. Wall LL, Arrowsmith SD. The Continence Gap: a critical concept in obstetric fistula repair. *Int Urogynecol J*. 2007;18:843–844.
23. Nardos R, Phoutrides EK, Jacobson L, et al. Characteristics of persistent urinary incontinence after successful fistula closure in Ethiopian women. *Int Urogynecol J*. 2020;31:2277–2283.
25. Emmet TA. The necessity of early delivery, as demonstrated by the analysis of one hundred and sixty-one cases of vesico-vaginal delivery. *Trans Am Gynecol Soc*. 1878;3:114–134.
26. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med*. 1994;38: 1091–1110.
27. Wall LL. Overcoming Phase I delays: the critical component in obstetric fistula prevention programs in low-resource countries. *BMC Pregnancy Childbirth*. 2012;12:68.
28. Ruder B, Cheyney M, Emasu AE. Too long to wait: obstetric fistula and the sociopolitical dynamics of the fourth delay in Soroti, Uganda. *Qual Health Res*. 2018;28:721–732.
29. Ballard K, Ayenachew F, Wrfith J, et al. Prevalence of obstetric fistula and symptomatic pelvic organ prolapse in rural Ethiopia. *Int Urogynecol J*. 2016;27:1063–1067.
30. Nardos R, Ayenachew F, Roentgen R, et al. Capacity building in female pelvic medicine and reconstructive surgery: global health partnership beyond fistula care in Ethiopia. *Int Urogynecol J*. 2020;31:227–235.