

Chapter 6

Obstetric Fistula

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INTRODUCTION

Obstetric fistula is a serious and debilitating complication of childbirth affecting millions of women in the developing world. A gynecologic fistula refers to an abnormal communication between the urinary tract or the gastrointestinal tract and the genital tract, produced by obstetric causes, usually prolonged and obstructed labor.

The earliest example of obstetric fistula was found in 2050 BC in Egypt, where an Eleventh Dynasty mummy, Henhenit, appears to have had a vesico-vaginal fistula (VVF). The relationship between obstructed labor and fistula development was recognized and described by the Persian physician, Avicenna, in 1037 AD (Zacharin 2000). Before the twentieth century, both urinary and rectal fistulas were a common result of deliveries throughout the world.

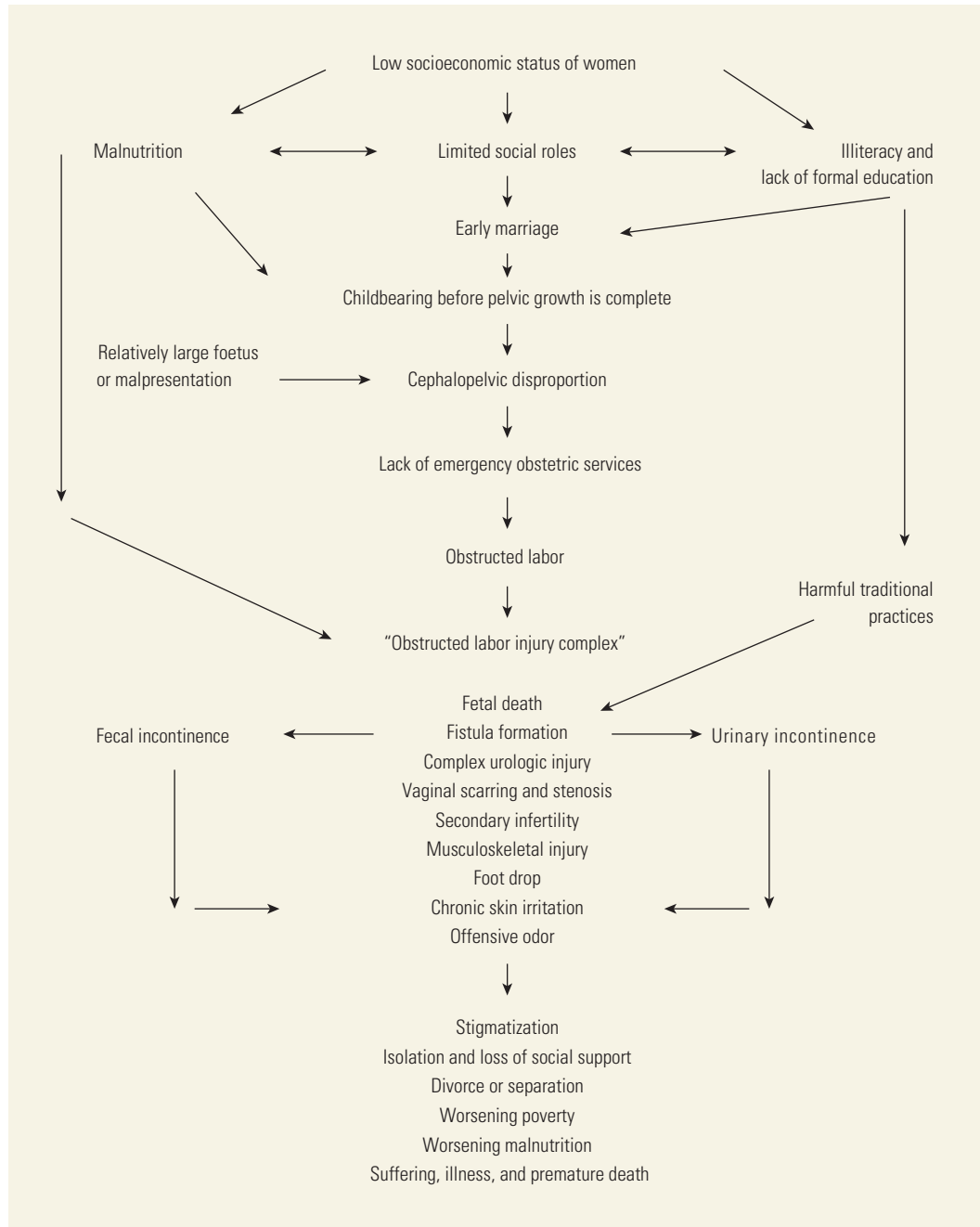
The unfortunate women who endure such obstructed labors and resulting incontinence are often young, undernourished, uneducated, and married early (Wall and others 2004). They are usually from rural, poor areas, often with an early first pregnancy. However, a Tanzanian survey by the Women's Dignity Project and Engender Health (2006) has shown that fewer than half of the fistulas in that country resulted from a first birth, suggesting that many fistulas occur in subsequent pregnancies as well. The woman labors at home, without the benefit of a trained birth

attendant and far from medical care capable of providing surgical intervention. In the absence of adequate communication or transportation services, labor continues for several days; if delivery does not follow, the baby dies and the mother often endures the long-term complications of an obstetric fistula (IMPAC 2006). Figure 6.1 describes the clinical implications of obstetric fistula.

The advent of anesthesia and safe, effective surgical procedures for cesarean sections have made the occurrence of obstetric fistula a rare event in the developed world; when they do occur, they are typically due to a congenital anomaly, surgical complication, malignancy, or radiation damage.

However, in the low- and middle-income regions of Asia and Sub-Saharan Africa, the overwhelming cause of fistulas between the bladder and the vagina (vesico-vaginal fistula, VVF) and between the rectum and vagina (recto-vaginal fistula, RVF) is prolonged and obstructed labor. This is also the situation, although less well documented, in Latin America and the Caribbean. In prolonged labor, which frequently results in delivery of a stillborn, the bladder and/or rectal tissue is compressed between the pelvic bones and the fetal head, cutting off blood flow and causing ischemic pressure necrosis (Husain and others 2005). In the hours or days following such a prolonged labor, the fistula forms and leakage of urine, stool, or both appears.

Figure 6.1 Worldwide Fistula Fund’s Obstetric Fistula Pathway



Source: "The Obstetric Fistula Pathway: Origins and Consequences" (Wall and others 2005), copyright Worldwide Fistula Fund. Used by permission.

Additional Complications

Additional major complications can include reproductive organ damage, such as uterine rupture, amenorrhea, and uterine scarring resulting in secondary infertility; dermatological conditions, resulting in excoriations and infections; neurological damage, resulting in weakness in the leg and foot drop (Arrowsmith,

Hamlin, and Wall 1996); and renal damage, resulting in decreased kidney function. Women also report genital soreness; painful intercourse; constipation; and unpleasant odor, despite frequent washing and pad changes (Turan, Johnson, and Polan 2007).

As devastating as the physical outcomes of obstructed labor are, the emotional and social implications are

equally tragic. A stillborn child is the most frequent result of such a delivery, and the woman may be abandoned by her husband and family to live as a social outcast without the ability to earn a living (Wall and others 2002). In many cultures, the woman either blames herself or is blamed by the community for the fistula, which is seen as a mark of punishment for some wrongdoing (Johnson and others 2010). She endures social isolation, economic deprivation, and depression (Turan, Johnson, and Polan 2007; Weston and others 2011).

Surgical Initiatives

Numerous surgical initiatives during the past 40 years have attempted to repair this obstetric damage and to rehabilitate these women. Among the first such initiatives was the establishment of the Addis Ababa Fistula Hospital in 1974 by Reginald and Catherine Hamlin. This hospital has cared for thousands of women and trained many surgeons in the techniques of fistula repair. Multiple surgical teams throughout Southeast Asia and Sub-Saharan Africa have reported successful closure of more than 80 percent of fistulas (Wall and others 2005).

However, successful closure of anatomic defects does not necessarily result in the absence of incontinence, which is an equally important criterion for a successful surgical outcome. The United Nations Population Fund (UNFPA) launched its Campaign to End Fistula in 2003. Awareness of the issues highlighted by this campaign, along with discussion of strategies to prevent and treat obstetric fistula, have resulted in increased interest in and knowledge of obstetric fistula, as well as the training of more fistula surgeons and additional reporting of the results of fistula surgeries (Husain and others 2005).

Chapter Goals

This chapter describes the present state of fistula surgery and the burden of death and disability, including the social and economic effects on women and their families. Although there is scant literature on both the cost of fistula surgeries and the quantitative impact on women's earnings in low- and middle-income countries (LMICs), we present what information is known. We describe current surgical procedures, as well as the skills and types of trained health workers necessary to perform these procedures. Clinical follow-up is complicated because most women return to their rural homes, making it difficult to contact them to assess long-term surgical outcomes. However, using the imperfect follow-up data available, we attempt to draw conclusions on the surgical outcomes and cost-effectiveness of the multiple surgical procedures used to repair obstetric fistula.

Finally, we offer comments on future directions and educational and surgical innovations to both prevent and treat the occurrence of obstructed labor and the resulting fistula.

BURDEN OF DISEASE DUE TO OBSTETRIC FISTULA

Beyond the actual physical and anatomic burdens of unrelenting urinary and fecal incontinence, the burden of disease encompasses many other physical and psychological consequences. Obstructed labor is a leading cause of maternal mortality and morbidity in LMICs. In these countries in the Middle East and North Africa, East Asia and Pacific, South Asia, and Sub-Saharan Africa, it is estimated that fistulas occur in one to three of every 1,000 deliveries (Wall 1998). An estimated 50,000 to 100,000 women worldwide develop obstetric fistula annually, 60,000 to 90,000 annually in Sub-Saharan Africa alone; more than 2 million women in Asia and Sub-Saharan Africa are living with an untreated obstetric fistula and the resulting urinary and/or rectal incontinence (UNFPA 2003).

Although obstetric fistulas in themselves rarely lead to immediate death, patients suffering with this disease have been referred to as the walking dead (Ahmed and others 2007). The women can also sustain long-term renal damage and eventually succumb to renal failure. In the words of expert fistula surgeon Dr. Kees Waaldijk of Katsina, Nigeria, "The poor woman survives the labor, and then the real problems begin" (personal communication). The physical disabilities include bladder and urethral damage, renal failure, and gynecologic and neurologic complications. The ischemic injury can lead to the damage and sloughing of bladder, urethral, rectal, and vaginal tissue, as well as tissue loss to the pelvic musculature and reproductive organs.

Reproductive Organ Damage

Vaginal, bladder, and rectal damage result from compression of the maternal tissue by the fetus during repeated uterine contractions that restrict blood flow, resulting in ischemia and tissue death. Vaginal strictures were noted in 17 percent of patients in one study (Raassen, Verdaasdonk, and Vierhout 2008), and a small Nigerian study reported vaginal scarring in up to 68 percent (Adetiloye and Dare 2000). Only 26.4 percent of women admitted for fistula repair surgery in this study were married, and these were the only women who reported regular sexual intercourse. Few studies to date have looked at sexual functioning in women who have

such tissue damage or those who have had attempts such as vaginoplasty to repair the damage.

The widespread damage to the pelvis can lead to cervical and uterine scarring from both ischemia and subsequent infection, resulting in postpartum amenorrhea. Amenorrhea may also be caused by hypothalamic-pituitary dysfunction secondary to intra- or postpartum hemorrhage (Sheehan's syndrome). A study from Ethiopia reported amenorrhea in 63.1 percent of women with obstetric fistula (Arrowsmith, Hamlin, and Wall 1996). One high-volume expert surgeon in Nigeria reports amenorrhea rates of 12 percent to 15 percent if the fistula duration exceeds one year (Waldijk 2008).

Although no long-term studies have examined the fecundity and birth rates of women with unrepaired fistulas, several papers have examined the reproductive performance in women who have had obstetric fistula surgery. No conclusive reproductive rates have been reported after repair; however, it is known from experiences at multiple sites that patients with repaired fistulas can conceive and subsequently deliver healthy infants, although the rates are presumed to be markedly diminished because of pelvic adhesions. The long-term social impact of infertility for young women in a poor country, where fistulas are endemic, includes the negative economic effect of not having offspring in societies in which government welfare programs are nonexistent and security in old age is directly linked to having children (Wall and others 2002).

Dermatological Conditions

Skin excoriations and ulcerations due to urinary ammonia deposition on the skin are a common complication of fistula. The chronic moisture and acidity of urine can cause the formation of uric acid crystals, and the skin may become infected. A review of 639 patients in East Africa found that almost 50 percent had evidence of excoriations of the labia and medial aspects of the thigh (Raassen, Verdaasdonk, and Vierhout 2008). Other studies report lower rates (20 percent) for similar skin damage (Gharoro and Agholor 2009). This skin condition is painful, and the constant contact with urine allows little relief from the discomfort. The ideal regimen for skin care remains to be determined; however, several salves and creams, including steroids and estrogens, have been proposed.

Neurological Disabilities

The extensive ischemic damage that leads to an obstetric fistula can also result in nerve damage. Foot drop may

be caused by compression injury or ischemic damage to the peroneal nerve, leading to the inability to dorsiflex the foot. The involvement of the L5 root is often noted, and severe pelvic ischemia can lead to postdelivery paraplegia that will recover (Hancock 2009a). Affected women tend to drag one or both legs, needing a stick or walls for support. Originally called "obstetric palsy," this lower extremity nerve damage has been associated with labor for hundreds of years. A prospective study of 947 Nigerian women with obstetric fistula found that approximately 27 percent had signs of peroneal nerve weakness, and approximately 38 percent had a history of relevant symptoms such as foot drop (Waldijk and Elkins 1994).

In an East African study, unilateral or bilateral peroneal nerve damage was observed in 43.7 percent of first-time obstetrical fistula patients. On a scale of 0 (paralyzed) to 5 (normal strength), 7.1 percent had a score of ≤ 2 in one or both legs. When comparing routes of delivery, there was no statistically significant difference in peroneal paralysis frequency between women who eventually delivered vaginally (43.9 percent) and those who were delivered by cesarean section (43.5 percent) (Raassen, Verdaasdonk, and Vierhout 2008). Waldijk and Elkins (1994) report that most women regain function after two years. Despite this, 13 percent remain with some residual nerve damage.

Renal Damage

The proximity of the ureters to the area where most obstetric fistulas occur puts them at risk of damage from obstructed labor. A radiology study in Nigeria looked at the incidence of renal and ureteric injury in 216 Nigerian women with obstetric fistula. Intravenous urographic studies found 48.6 percent of the patients evaluated had evidence of renal damage; 34 percent had evidence of unilateral or bilateral hydronephrosis with significant ureteral dilation. The most extreme damage was found in 4.6 percent of patients who had nonfunctioning bilateral kidneys (Lagundoye and others 1976). Long-term follow-up was not performed on these women.

Stillbirths

In cases in which the woman survives the obstruction, most of the pregnancies result in the birth of a stillborn fetus. After the traumatic ordeal of prolonged labor with associated pain and fear, this tragic outcome enhances the despair. In one study, 85 percent of women incurred fetal loss from deliveries resulting in fistula

(Raassen, Verdaasdonk, and Vierhout 2008). In another series of 899 fistula cases, fetal mortality was 92 percent; of the 75 infants who were live-born, an additional 14 died within the neonatal period (Wall and others 2004).

Mental and Emotional Issues

Obstetric fistula patients have been called the most dispossessed, outcast, powerless group of women in the world. For women in many cultures in which fistula is prevalent, the obstetrical problems that result in VVF are not only considered physiological events, they can also profoundly affect personal relationships with families and entire communities. Goh and others (2005) questioned women with obstetric fistula from Bangladesh and Ethiopia using a psychiatric disorders screening tool. They found that 97 percent of women screened positive for potential mental health dysfunctions. They estimated between 23 percent and 39 percent of women with fistula had major depression.

This finding is in contrast to controls surveyed during the same study in Bangladesh and Ethiopia, where only 32 percent screened positive with the same questionnaire, equating to a major depression prevalence of 8 percent to 13 percent (Goh and others 2005). A study of 70 women with fistula from Kenya reported depression in 72.9 percent, with 25.7 percent meeting the criteria for severe depression. Risk factors for depression appeared to be age older than 20 years, unemployment, lack of social support after fistula development, and living with fistula for more than three months (Weston and others 2011). Even though studies have suggested that some women commit suicide, no data have been published about the risk of murder or “honor killing.” There is, however, anecdotal evidence of increased domestic violence.

One study found high levels of mental distress in women living with fistula resulting from long-time social isolation. The greatest distress and frustration appears to come from the inability to establish and maintain healthy social relationships. This same study reported that 14 percent of women attempted suicide while living with fistula (Nielsen and others 2009). Nearly all women suffered from isolation, shame, and stigma. Avoidance of public places due to the risk of being insulted or simply ignored was common. Patients have had community members hold their noses publicly and humiliate them with words of abuse.

In a survey of Eritrean fistula patients, self-imposed isolation during meal times and religious ceremonies was almost universal. A small cohort revealed that

the smell of urine was the reason many felt unable to participate in routine activities that were a cornerstone of their social lives. The women would not go to church or be able to pray because of feeling “unclean” (ongoing survey of the quality of life of fistula patients, Eritrean MOH, personal communication, 2012).

From the social standpoint, the most traumatic aspects of VVF result from incontinence, distorted self-image, and childlessness. These factors can lead to divorce, depression, and exclusion from families and society. A review of 899 women with obstetrical fistula in central Nigeria found that approximately 50 percent of patients had been divorced as the result of fistula-related problems (Wall and others 2004). In a study from Bangladesh, 61.4 percent of women reported embarrassment in their social lives, 39.4 percent reported feeling constantly ill, and 33.3 percent reported difficulty in maintaining sexual relations. In addition, 67.4 percent reported the inability to perform their prayers, and 62 percent reported unhappiness in their married lives (Islam and Begum 1992).

Economic Burden

The obstetric fistula is an affliction of reproductive-age women who are primiparous in 31 percent to 66.7 percent of documented studies. The economic burden includes the patients’ loss of the ability to work and perhaps the loss of a society’s future workforce due to high rates of stillbirth and subsequent infertility (Tebeu and others 2012; Waaldijk 2008). In Nigeria, a study reported that women with fistula were 50 percent more economically impoverished by job loss. In many instances, such as in a study of women in Tanzania, they were farmers and were unable to perform hard manual labor after sustaining a fistula (Pope, Bangser, and Requejo 2011). All of the women had some form of occupation when the fistula developed; 92 percent were farmers, 5 percent were domestic workers, and one (3 percent) was a potter. While living with a fistula, 22 percent stopped working and remained at home. Following surgery, 75 percent of these women returned to their former occupations (Nielsen and others 2009). Long hours of field labor may be difficult with injuries such as foot drop or pelvic trauma, and many women wait years before seeking help.

Research in Addis Ababa found that women affected by fistula and rejected by their husbands often had to depend on relatives for their food; some of the women were reduced to begging and lived on donations (Kelly 1995). A large number of women reported not having

the means to afford soaps and clothes to stay clean and remain a productive part of working society. Most of the injured women were not able to continue employment and lost their ability to be contributing members of the household (Women's Dignity Project and Engender Health 2006). Families affected by fistula experience significant economic burdens that can be a factor in reducing families to poverty levels.

SURGICAL REPAIR AS EFFECTIVE TREATMENT

The surgical closure of an obstetric fistula is the most effective way to treat this condition. Evidence indicates that life improves dramatically for the majority of women after successful fistula repair. Women are able to return to their normal lives; interact freely with their families, friends, and communities; and play active roles in economic pursuits (Women's Dignity Project and Engender Health 2006).

A cross-sectional, prospective study sought to assess the quality of life of women with surgical repair of their VVF. Of the 150 women studied, only 20 percent felt satisfied with their general state of health and quality of life before the repair; this figure increased to 90 percent following successful repair. In the physical health domain, the mean quality of life score was significantly improved; this improvement was also seen in the mental health domain. In the social health domain, the mean score was 20.2 ± 2.7 before and 69.7 ± 2.3 after successful repair ($p < 0.001$). The conclusions suggest that successful repair of VVF is associated with significant improvement in the multidimensional quality of life among affected women (Umoiyoho and others 2011).

An Eritrea-based study of patients' postoperative experiences notes that patients described improvements in their conditions, but many continued to have problems with incontinence and sexual health (Turan, Johnson, and Polan 2007). The majority of women in another study were able to resume their household and farming responsibilities postrepair (Pope, Bangser, and Requejo 2011). By one year postrepair, 68 percent of the women who perceived themselves healed or mostly healed reported feeling "themselves again." Looking toward the future, most hoped that they could continue working in the fields, engage in small trade, bring their children to school, and "maybe build a home." Most treated women (99 percent) did not link their physical condition to economic problems. As one woman explained, "Life is tough, but that does not affect anything economically."

However, 60 percent of the women reported that being able to work again, principally in the fields doing

agricultural labor, was the most important factor in their reintegration process. Those who experienced difficulties resuming their expected social roles after treatment mentioned that they were afraid that they would develop another fistula from physical exertion or sexual activity and/or experience a lot of pain and weakness while working (Pope, Bangser, and Requejo 2011).

Browning, Fentahun, and Goh (2007) report on the impact of surgical treatment on mental health. Closure of the fistula markedly improved mental health scores, despite the lack of any formal psychological or psychiatric input. Surgery improved quality of life and facilitated social reintegration to a level comparable to that experienced before fistula development for both women who were continent and those with residual incontinence. It was not surprising that no change was seen in those women still suffering from fistula (Nielson and others 2009).

COST-EFFECTIVENESS OF SURGERY

The cost-effectiveness of obstetric fistula repair is understudied, leading to a paucity of literature on this issue. Current research indicates that "[A]t the world's current capacity to repair fistula, it would take at least 400 years to clear the backlog of patients, provided that there are no more new cases" and that less than 1 percent of surgical needs for this disease is met (Browning and Patel 2004, 321). Prevention of the fistula is the ultimate goal. The mental, physical, and economic burden to women with obstetric fistula has been well documented. However, for those currently living with, and those who will develop, a fistula, the demonstrable benefit in economic terms must be studied further.

Estimated Costs

The UNFPA estimates that the average cost of fistula surgery is approximately US\$400 (UNFPA 2012). According to the Fistula Foundation, costs vary depending on the sociopolitical situation in countries where wars, conflict, and political instability have significantly increased the cost of fistula repair; the estimated average cost of fistula surgery was US\$1,000 (Church and Grant 2012). A Kenyan paper reports that the heavily subsidized cost of fistula repair is about 30,000 Kenya shillings (US\$375) at the main referral center in Kenyatta National Hospital in Nairobi; the cost in a private hospital can be at least five times that amount. However, in Kenya, only 7.5 percent of women have access to treatment, and the majority cannot afford to travel to the fistula center.¹

Disability-Adjusted Life Years

Research in Ethiopia finds that the average age of women at the time of fistula appearance is 22 years, and surgical treatment is initiated eight years later (Muleta 2009). The Fistula Foundation's Shaun Church and Kate Grant report that the life expectancy of women in Ethiopia is 58.8 years.² Therefore, it can be estimated that fistula surgery savings could be 28.8 disability-adjusted life years (DALYs). Using Ethiopia as an example and estimating the cost of fistula surgery to be US\$1,163, dividing that cost by the estimated 28.8 DALYs results in a conservative savings of about US\$40 per DALY averted with surgery. This suggests fistula surgery is a highly cost-effective intervention.

Prevention Strategies and Costs

The prevention of fistula requires significant social and economic attention. Investing in medical facilities that are able to provide adequate prenatal care as well as healthy deliveries needs to be a priority. Prenatal care, with early identification of at-risk pregnancies coupled with early referral to delivery centers capable of operative delivery, is essential for prevention. The cost of prenatal care varies by country, as well as by government-provided insurance plan, but all costs for these preventive strategies are significantly lower than the cost of later treatment.

Access to medical care in most of the countries where obstetric fistula is endemic is extremely limited. The economic cost of obtaining medical care at hospitals is beyond the budget of all but the wealthiest families. The costs of travel and accommodations for patients and family members are extremely high. Studies involving obstetrical costs in Benin, Ghana, and Pakistan concluded that vaginal delivery and cesarean sections in medical facilities were beyond the limits of what 75 percent of residents could afford (Lewis and de Bernis 2006).

Cesarean sections need to be more widely available as an option for the treatment of obstructed labor. A study in Kenya found that the cost of one cesarean section is about 3,000 Kenya shillings, or US\$35 to US\$40, in government hospitals; in rural Tanzania, the average cost is US\$135.40 (Kowalewski, Mujinja, and Jahn 2002; Wanzala 2011). The patient population also needs to be educated about the natural progress of labor and to have the ability to be transported to the hospital when obstructed labor occurs.

One key factor in LMICs is the lack of transportation to medical facilities; women in prolonged labor often do not have adequate resources to reach medical facilities.

Once women develop fistulas, transportation to a medical facility is extremely difficult because of the cost of transportation and also because of the inadequate hygiene and leaking that women with fistulas exhibit. A 2001 UNFPA survey of fistula patients in Tanzania reports that some women travel as far as 500 kilometers to reach the nearest fistula center (UNFPA 2001). The survey notes that of 32 fistula centers, only 3 provide free surgery.

Education of the medical profession has been a challenge in LMICs, limiting access to doctors who are able to provide successful fistula repair. Sub-Saharan Africa, which accounts for about 24 percent of the global disease burden, has only 3 percent of the global health workforce (Anyangwe and Mtonga 2007). Insufficient numbers of medical schools, inadequate salaries, and poor working conditions account for this situation. There are an estimated 0.25 trained surgeons per 100,000 persons in East Africa, compared with 5.60 per 100,000 in the United States.

“Brain drain” exacerbates the shortage of trained medical personnel. Uganda's government spends an estimated US\$21,000 and South Africa spends about US\$59,000 to subsidize each medical doctor's training (Mills and others 2011). Sub-Saharan African countries spent about US\$2 billion dollars to train doctors who later migrated to more stable, richer countries. Mills and others (2011) estimate that the United Kingdom benefited by about US\$2.7 billion and the United States by about US\$846 million from the immigration of Africa-trained physicians. Based on the impact of this loss of medical expertise, those countries that benefit the most from this drain of intellectual and surgical resources might consider investing in the source countries and strengthening their training systems.

PRESURGICAL PROCEDURES IN OBSTETRIC FISTULA REPAIR

Women with bladder fistulas can sometimes be treated conservatively if the injury is recent and the hole is small. Continuous bladder drainage with Foley catheters for four to six weeks has been reported to result in the spontaneous closure of small fistulas with fresh edges in 15 percent to 20 percent of cases (Waalwijk 1994). However, the majority of VVFs require surgical treatment.

General principles in obstetric fistula surgery include patient evaluation and preoperative care, maximum exposure of the repair site, adequate tissue mobilization, gentle tissue management, closure of the defect without tension, and meticulous postoperative care.

PATIENT SELECTION AND PREOPERATIVE CARE

A standard classification of obstetric fistula has not been agreed upon. However, urethral involvement, extent of scar, defect size, bladder capacity, and history of prior repair attempts are generally acknowledged as predictors of posttreatment continence (Nardos, Browning, and Chen 2009). The first attempt at fistula repair is likely to be the most successful; therefore, the woman should be provided the best available care and skill during the first surgery (Angioli and others 2003).

The timing of surgery after injury is controversial, but it should be delayed until the quality of the tissue needed for repair improves. This can take up to three months, although some surgeons advocate immediate repair and claim comparable results (Waldijk 1994). Early repair might minimize the social neglect of the affected women; however, the evidence for this approach is limited. Physiotherapy and psychological counseling should begin preoperatively and should continue postoperatively. Malnutrition and anemia, ammonia dermatitis, and genital infections should be treated before surgery.

SURGICAL REPAIR

Repair Procedure

The surgical approach can be vaginal, abdominal, or combined, based on the location of the fistula and the preference and experience of the surgeon. The vaginal route seems to be associated with less blood loss and pain (Chigbu and others 2006). However, the evidence on the difference in operative complications and speed of recovery is limited. In some cases, the damage to the urethra and bladder is so severe that conventional repair methods are not successful. In specialized centers, these patients are sometimes offered urinary diversion in which the ureters are implanted in the lower bowel (Morgan and others 2009).

Maximizing the exposure of the defect is necessary to identify the location and size of the fistula, the extent of the tissue loss, the involved organs and tissues, and the amount of scar tissue in the vagina. The patient should be positioned in exaggerated lithotomy with a Trendelenburg tilt and the buttocks protruding on an adjustable operating table, if available. The use of bright and well-focused light over the field of surgery is essential.

An incision is made over the vaginal mucosa all around the fistula about 3 millimeters away from the junction of the bladder (rectum in RVF) and

vaginal skin (epithelium). Lateral extension of the incision, at the 3:00 and 9:00 o'clock positions, is made bilaterally. These incisions over the vaginal mucosa should be just deep enough to cut only the vaginal mucosa. The bladder (rectum in RVF) should be mobilized adequately to avoid tension on the closure of the defect.

Bladder or rectal muscle should be approximated, avoiding the bladder or rectal mucosa. The closure of bladder fistulas can be in either a single or a double layer based on individual preference. Closure of rectal fistula is preferable in two layers, to avoid rectal mucosal interposition between the sutures. In patients who had had a diverting colostomy and repair of an RVF, a dye test must be done to confirm success of repair before planning for colostomy closure.

Postoperative Care

The main concern in VVF patients in the postoperative period is the maintenance of free and continuous bladder drainage. High fluid intake is widely advised; women should be encouraged to drink four to five liters a day (Hancock 2009b) and the color of the urine should be watched as the indicator of the adequacy of hydration. A blocked catheter signals an emergency. Transurethral drainage catheters are generally kept for an average of 14 days (up to 21 days following new urethral reconstruction) and should be removed without clamping. Some suggest that postoperative catheterization for 10 days may be sufficient for less complicated cases of VVF repair (Nardos, Browning, and Member 2008). Women are advised not to resume sexual contact for three months to give adequate time for the tissues to heal.

The most challenging situation in obstetric fistula management is post-VVF-repair incontinence. Although failure of fistula repair must be ruled out, incontinence is often due to stress incontinence or combined stress and urge incontinence (Murray and others 2002). Urodynamic studies of bladder and urethral function can be helpful, but the equipment is most often unavailable in settings where fistulas are frequently encountered.

POSTOPERATIVE TRAINING AND REINTEGRATION

For women who have lived with fistula for many years, reintegration into society involves redefinition of self and transition from being identified as filthy, dependent, and unworthy to being seen as clean, feminine, and active

in family and community life. Thus, reintegration into family and community life is a major adjustment and goal after surgery. This need for reintegration requires that surgical programs dedicated to fistula repair consider and implement counseling for social integration and training in life skills to help these women return to gainful employment after repair.

Most women live an agrarian lifestyle, and returning to farming is important to them. One paper identifies the most important factor helping them feel normal again is the ability to return to farming after surgical repair (Pope, Bangser, and Requejo 2011). However, most women felt that they needed more time after surgery to fully recover their strength; the authors recommend having an alternate non-labor-intensive form of income for the first year after repair before most women return to their routine work. The full reintegration of a patient postrepair should also include her sexual and reproductive health needs (Mselle and others 2012). Preoperative and postoperative counseling for 47 Eritrean fistula patients was shown to increase their self-esteem (Johnson and others 2010).

After postsurgery counseling, women were significantly more likely to practice positive health behaviors, to use family planning, and to improve their nutritional intake. Following counseling, 91 percent of women expressed intentions to talk with family members and 77 percent intended to talk to other community members about fistula and fistula prevention, compared with 26 percent and 34 percent, respectively, before counseling. Counseling seems to have a marked impact on women's ability to resume their roles in their communities.

One Nigerian study calculated the cost of surgical treatment and rehabilitation to be US\$2,300 per patient for a 10-month stay, and an additional US\$340 for 12-month follow-up and reintegration (Mohammed 2007). To validate the long-term impact and sustainability of these programs, studies need to be performed in the community settings where patients settle after repair and after rehabilitation.

HEALTH SYSTEM CONSIDERATIONS

Obstetric fistula, a problem seen primarily in women from resource-poor countries, results from financial, cultural, political, and logistical obstacles. Although international efforts, such as the UNFPA's Campaign to End Fistula, have made some improvements in the number of fistulas treated, overall only a very small fraction of cases are ever repaired. The number of fistula treatment centers is especially low in countries that have the highest levels of maternal mortality

and fistulas. More than 50 percent of the reporting fistula treatment centers in the world provide surgery in fewer than 50 cases a year; only five centers report doing more than 500 a year (United Nations General Assembly 2012).

Models of Treatment

According to the World Health Organization (WHO), several models of treatment are currently in practice, but no convincing evidence is available with respect to which approach is superior. Many are supported by non-governmental organizations and charitable donations; others are integrated into the country's reproductive health programs and are supported by the government, often with help from international organizations like the UNFPA.

The most famous standalone fistula center program is at Addis Ababa Fistula Hospital. The Women and Health Alliance International has integrated fistula repair centers into three university hospitals in Ethiopia, Somalia, and the Republic of the Sudan that are similar to centers in Eritrea (box 6.1), Niger, and Nigeria. Some centers are integrated into gynecology or urology departments in academic centers; others are satellite units that refer complicated cases to regional independent or national fistula centers.

Finally, there are "fistula camps" that are managed by national and international teams. International training centers are being selected and developed to serve as training sites for future fistula surgeons, using a *Global Competency-Based Fistula Surgery Training Manual* developed by the International Federation of Gynecology and Obstetrics (FIGO), the International Society of Obstetric Fistula Surgeons (ISOFS), and other international partners. The UNFPA funded development of the manual.

The WHO recommends that each country set up an obstetric fistula strategy committee as part of a national maternal-newborn health program. This program should include a needs assessment that is both facility and community based. It is important that the community understand the context in which fistulas develop so that cultural and logistical issues (for example, transportation) can be addressed. The program should include strategies for preventing fistula; for providing facilities for fistula repair and rehabilitation; and for training surgeons, nurses, and other health care personnel. The program should also include provisions for oversight and advocacy to ensure that the program continues to be funded and that the results are acceptable (Lewis and de Bernis 2006). Setting up this kind of model, however, is difficult in

Box 6.1

Case Study: Eritrean Women's Project 2000–13

Eritrea, a country of 5 million people, is located along the coast of the Red Sea and is bordered by Djibouti, Ethiopia, and the Republic of Sudan.

Eritrea's population is 20 percent urban and 80 percent rural; 55 percent of the people are farmers, and 30 percent are pastoralists who move across borders with their animals. There are nine main ethnic groups and religions, including Islam, Eastern Orthodoxy, and Catholicism.

The original goals of the Eritrean Women's Project, founded by Mary Lake Polan, MD, included repair of fistulas, training of Eritrean surgeons, implementation of interventions to educate women about the causes and treatment of fistulas, and establishment of the Fistulae Treatment Center for comprehensive care, education, and rehabilitation of women with fistulas.

Program Milestones:

- 2001–13: A small group of surgeons traveled to Eritrea two to three times a year for two weeks each time, scheduled by the Ministry of Health and UNFPA, to operate on women with fistulas. The trips were funded by the United Nations Population Fund (UNFPA) and private donations.
- 2005: The first class of medical students enrolled in Orotta School of Medicine in Asmara and was subsequently taught by the visiting surgeons.
- 2006: The project organized the perioperative counseling program.
- 2007: The community-based study of reproductive outcomes sponsored by the project showed that inclusion of the entire community in a fistula education program improved prenatal care.
- 2008: The Eritrean government established the National Fistula Center at Mendefera Referral Hospital.
- Two Eritrean fistula surgeons have been trained at the National Fistula Center since its opening in 2008 as part of the project.
- 2012: The first five residents in obstetrics and gynecology were trained in Eritrea.
- 2013: The 40-bed Fistula Waiting Home at Mendefera Referral Hospital opened.

Supportive Government Actions

The government of Eritrea and the Ministry of Health supported and amplified the project's goals for improving reproductive health by instituting a national campaign to promote the use of condoms, raising the legal age of marriage to 18, and prohibiting female genital mutilation. Most important, the Ministry of Health set a goal of ending fistula in Eritrea by 2013.

Outcomes

- More than 600 surgical procedures over 12 years were performed by the U.S. surgeons, with a continence rate of approximately 70 percent.
- More than 303 urinary and 49 recto-vaginal fistulas were repaired.
- More than 1,000 surgical procedures were performed by Eritrean and U.S. surgeons.
- Approximately 8 percent of patients required urinary diversion procedures because of irreparable fistulas; follow-up of one to nine years resulted in live births for five diversion patients and no perioperative mortality.
- Six articles on fistula issues were published in peer-reviewed journals.
- Three Eritrean residents' abstracts were accepted to attend the 2012 meeting of the International Federation of Gynecology and Obstetrics (FIGO) in Rome.
- Trained Eritrean surgeons now perform 80 percent of fistula repairs and treat more than 100 cases a year.
- The National Fistula Center now has dedicated and trained nursing staff.
- The 40-bed Fistula Waiting Home serving preoperative and postoperative patients and women with high-risk pregnancies in their third trimester was constructed on the grounds of the Mendefera Referral Hospital, with donations from Friends of UNFPA, and opened in April 2013.

box continues next page

Box 6.1 (continued)

Building a Sustainable Fistula Program:

Lessons Learned

The considerable progress achieved in a relatively short time is the result of the widespread support and commitment of key organizations and partnerships, including the trained surgeons who treat patients and teach medical students and residents in obstetrics and gynecology, as well as the visiting physicians, nurses, physical therapists, and students from the United States who have donated their time and skills. The strong relationship with the Minister of

Health and staff members was an essential element, as was the support of the UNFPA and the Eritrean staff. The financial assistance of private donations to Friends of UNFPA in the United States supported the travel expenses of physicians, fellows, residents, and medical students. Moreover, the in-kind corporate donations of ultrasound equipment, sutures, retractors, catheters, and antibiotics allowed the surgeons to more effectively care for women with fistula.

Source: Data collected by Drs. Ambereen Sleemi and Mark Morgan.

many resource-poor countries, particularly in those with internal or external conflicts.

Health Workforce Requirements

The main obstacle in fistula care is the lack of trained medical personnel in surgery. The fistula surgeon must have basic surgical skills in abdominal, pelvic, and vaginal surgery. Training for this type of complex surgery is highly specialized and, until recently, was organized differently in different institutions. Recently, however, FIGO, ISOFS, and other partners developed a consensus-derived document that focuses on competency-based training in fistula surgery to three levels: standard, advanced, and expert (FIGO and Partners 2011).

Local gynecologists, urologists, general surgeons, and other professionals with basic surgical skills can be trained in fistula repair. Having a maximum number of trained local staff increases the number of locally managed fistula operations. A preferable strategy is to integrate fistula care and training into the services provided by local governmental institutions so that an adequate number of gynecology, urology, surgery, and other students with basic surgical skills are systematically trained to manage fistula cases. This approach is a sustainable way to dramatically increase the number of operations available in regions with the heaviest burden of fistula, and it offers a greater number of women the opportunity to return to normal and dignified lives. Good prenatal care, adequate transportation of patients in labor, and delivery facilities able to intervene with cesarean section for operative delivery would reduce the incidence of fistulas and, thereby, the specific need for fistula surgeons and specialized surgical care.

Good nursing care for patients with fistula is essential to the surgical outcome. Nurses often receive special training onsite; the training includes presurgery and postsurgery care, psychological support, and counseling and communication skills.

FUTURE DIRECTIONS

Centers providing obstetric fistula treatment are few, and patients must often undertake long and difficult journeys to access care. Many of these services operate outside the government health sector as part of campaigns involving surgeons who come for short visits.

A complete fistula treatment center includes surgical services (operating theaters, postoperative wards, and anesthetic services), investigation services (laboratory, radiology, and blood bank), and physiotherapy and social-reintegration services. The largest financial challenge of most fistula centers is the cost of consumables and salaries, renewal of equipment, and maintenance of the infrastructure. The less-than-optimal training and supervision of health workers and the very low wages for fistula surgeons have resulted in the uneven distribution of specialized health care providers. The long-term sustainability of such services depends on the strong commitment of health professionals, health management teams, governments, and local authorities (Donnay and Ramsey 2006).

Training facilities should be developed in districts with large numbers of untreated patients. The size of the health facility is determined by the magnitude of the problem in the area. Being part of a larger health institution provides access to and use of essential facilities, such as pharmacies, laboratories, laundries, sterilization

services, and kitchens. Being part of a hospital offers other advantages as well, such as access to other aspects of health care, including prenatal health care services and emergency obstetric services.

A global consensus exists on the need for improved access to quality and sustainable fistula care and training services, as well as postoperative social-reintegration services. This goal can be attained by integrating fistula treatment and training into existing government health services (PMNCH 2006). Fistula centers do not need to be sophisticated, however, if they provide human resources with basic skills, facilities, and equipment to provide fistula-management services.

The UNFPA released a fistula map in 2013 to track fistula services internationally (<http://www.globalfistulamap.org>). It is hoped that these efforts will have a significant effect on the worldwide burden of obstetric fistula by combining prevention with treatment and rehabilitation services. Intensive advocacy for increased resource allocation to strengthen health systems to ensure prevention and treatment of obstetric fistula is equally important.

NOTES

The World Bank classifies countries according to four income groupings. Income is measured using gross national income (GNI) per capita, in U.S. dollars, converted from local currency using the *World Bank Atlas* method. Classifications as of July 2014 are as follows:

- Low-income countries (LICs) = US\$1,045 or less in 2013
- Middle-income countries (MICs) are subdivided:
 - Lower-middle-income = US\$1,046 to US\$4,125
 - Upper-middle-income (UMICs) = US\$4,126 to US\$12,745
- High-income countries (HICs) = US\$12,746 or more

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