

The Etiology, Risk Factors, Management, and Prevention of Urogenital Fistula : A Review

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Abstract

Urogenital fistula is an abnormal communication between the urinary tract and the genital tract. The occurrence of urogenital fistula varies based on whether the cause is related to obstetrics or gynecology causes, with obstetric trauma prevalent in developing nations and iatrogenic injury during pelvic surgery common in developed countries. Urogenital fistula is linked to various risk factors, a few of them are prolonged and obstructed labor, early marriage, older age, patient's education, and lack of antenatal care. These factors can be avoided with preventive measures improving access to obstetric care and provide health trainings for healthcare worker. A collaboration of medical, educational, and infrastructure measures is essential to effectively address and prevent the incidence of urogenital fistula. This article presents a comprehensive review of urogenital fistula, including its etiology, risk factors, management, and prevention based on prior studies.

Keywords: urogenital fistula; genitourinary fistula, etiology, prevention

1. Introduction

Urogenital fistula is defined as an abnormal opening between the urinary tract (urethra, urinary bladder, and ureter) and the genital tract (vagina, cervix, and uterus) (Geavlete et al., 2016). Urogenital fistula can cause continuous leakage of urine through the vagina (Medlen and Barbier, 2022). This condition greatly affects the quality of life of women with urogenital fistula (Changole et al., 2017). Other long-term complications of urogenital fistula include recurrent fistula, vaginal stenosis, sexual dysfunction, reproductive dysfunction, infertility, mental health disruption, and social isolation (Goh and Krause, 2016).

The incidence of urogenital fistula is also still high in developing countries. WHO states that there are 50.000 – 100.000 women worldwide affected by fistula each year. WHO also predicts that there are more than 2 million young women living with untreated obstetric fistula in Asia and sub-Saharan Africa (WHO, 2018).

Urogenital fistula can occur due to obstetric and gynecology causes. In developing countries, urogenital fistula occurs after obstetric trauma. On the other hand, iatrogenic injury during pelvic surgery is the most common cause of urogenital fistula in developed countries (Hoffman et al., 2016).

Urogenital fistula is associated with multiple risk factors, including but not limited to prolonged and obstructed labor, early marriage, advanced age, education level, and insufficient antenatal care. Preventive measures can be implemented to reduce these factors. Accordingly, a comprehensive study is important to identify and explore deeper about the etiology, risk factors, management, and prevention of urogenital fistula.

2. Etiology

In developing countries, over 70% of urogenital fistula occurs after obstetric trauma, especially from prolonged or obstructed labor, or complicated cesarean section (Hoffman et al., 2016). A study conducted at H. Adam Malik General Hospital and Dr. Pirngadi Medan Regional Hospital found that the most common etiology of urogenital fistula is due to obstetric factors, particularly prolonged labor (Pranata, 2008). Another study about urogenital fistula in a tertiary referral hospital in Saudi Arabia shows that urogenital fistula is mostly caused by repeated cesarean section surgery (Osman et al., 2018).

In another study conducted in Lahore, Pakistan in 2009 – 2010, it was found that obstetric trauma was the most frequent cause of urogenital fistula, with 37.7% cases of obstructed labor and 32.8% of cases of urogenital fistula were reported to occur after caesarean section surgery (Saaqib et al., 2010).

Meanwhile, in developed countries, most urogenital fistula occurs after iatrogenic injuries during pelvic surgery (Hoffman et al., 2016). Out of 41 women that were identified in a urogenital fistula study in the UK, 56% of the vesicovaginal fistula occurred subsequent to hysterectomy and 56% of the urethrovaginal fistula emerged after the placement of a suburethral tape or sling (Ockrim et al., 2009). Vesicovaginal fistulas in the United States stems primarily from benign gynecologic surgery (80%), followed by obstetrics events (10%), surgical interventions for malignancies involving the cervix, uterus, or ovary (5%), and pelvic radiotherapy (5%) (Karram, 2007).

Recently, there is a developing perspective suggesting that a rising percentage of urogenital fistula in developing countries stem from iatrogenic causes rather than being a obstetric fistula from ischemic mechanism (Hilton, 2016). A study by Djusad et al (2016) about obstetric and gynecologic fistulas at Cipto Mangunkusumo Hospital Jakarta in 2011 – 2016 also shows a recent trend of fistulas caused by iatrogenic injuries compared to fistulas due to obstetric causes. This trend could be caused by the improved monitoring of childbirth in developing countries.

Another study conducted in Islamabad, Pakistan also showed a rising trend in iatrogenic fistula. 58.5% of the urogenital fistula which is found in that study experienced iatrogenic fistulas, whereas 41.5% developed ischemic fistulas due to obstructed labor. The primary cause of iatrogenic fistulas was hysterectomy (52.5%), followed by cesarean hysterectomy (26.4%), and cesarean delivery (19.9%) (Tasnim et al., 2020).

Other conditions that could cause urogenital fistula, such as :

- **Radiation therapy**
Radiation therapy is a significant component in malignancies management, with over two-thirds of oncology patients receiving this treatment as part of their specific care. However, the emergence of radiogenic urogenital fistulas are a potential serious complication of radiotherapy (Kocot and Reidmiller, 2017). Radiation therapy can cause endarteritis, which may result in tissue necrosis and the subsequent potential of fistulas (Hoffman et al., 2016).
- **Tumors**
Pelvic tumors, whether benign or malignant, is linked to necrosis of the tissue and could lead to the formation of urogenital fistula (Hoffman et al., 2016). Urogenital fistulas are linked to malignant causes result from either direct infiltration by the tumor or complications arising post-surgery, chemotherapy, and radiation (Mandava et al., 2020).
- **Pelvic trauma**
Trauma obtained during sexual activity or sexual assault could lead to the formation of urogenital fistula and is believed to precede approximately 4 percent of these defects (Hoffman et al., 2016). A study found that one of the cases of the urogenital fistula founded occurred after a motor vehicle accident involving a pelvic fracture at the sacroiliac joint (Osman et al., 2018). Urogenital fistulas can also be caused by the bladder repair with an indication of bladder rupture due to traffic accident (Mukti et al., 2018).
- **Foreign bodies and material**
Even though this setting is rare, isolated vesicovaginal fistula are often associated with a retained intrauterine device, neglected pessary, and atypical insertions primarily linked to sexual activity or

underlying psychiatric disorders (Rapp et al., 2020). Other objects could include vesical calculi, transurethrally injected collagen and complications resulting from the placement of synthetic mesh during previous surgery procedure (Hoffman et al., 2016).

- Inflammatory conditions

Conditions such as lymphogranuloma venereum, urinary tract tuberculosis, pelvic inflammation, syphilis, inflammatory bowel disease, and autoimmune disease (Hoffman et al., 2016).

3. Risk Factors

The primary risk factor for the occurrence of obstetric fistula is a prolonged and obstructed labor (Yaay et al., 2022). Other major risk factors for obstetric fistula that are frequently reported include the place of birth of the baby and the presence of a skilled birth attendant, duration of labor and use of a partograph, lack of prenatal care, and lack of family planning (Tebeu et al., 2012). Additional risk factors includes a baby weighing 3.5 kg or more, the patient with a short stature or patient with a height of 150 cm or less (Barageine et al., 2014).

Another important risk factor is the patient's education and a lack of understanding of the negative impact of the sufferer's psychological condition. A study conducted at H. Adam Malik Hospital and Dr. Pirngadi Medan found that 48.3% of the fistula cases found had a high school education and the remainder had primary and junior high school education (Pranata, 2008).

Marriage at a young age is also identified as one of the risk factors of urogenital fistula. At a study conducted in Semarang, Indonesia, shows the average of the urogenital fistula patient's marital age is 14 years old. Many women who marry early often conceive shortly after marriage, leading to pregnancies that occurs before the reproductive organs attain full development and maturity. Consequently, one of the outcomes is pelvic disproportion (Mukti et al., 2018).

Older age is also an essential risk factor for urogenital fistula. Urogenital fistulas can occur in the reproductive age since during this period, pregnancy and childbirth rated tend to be high. But on the other hand, women over 35 years old are still capable of reproduction, but pregnancies and childbirths during this age have a higher risk and can cause urogenital fistula as one of its complication (Pranata, 2008; Mukti et al., 2018). The incidence of hysterectomy, one of the non-obstetric factor of urogenital fistula, is also known to increase with age, reaching their peak in the age of 40 to 50 years (Zimmermann et al., 2023).

4. Management

a. Conservative therapy

Urogenital fistulas can sometimes close spontaneously during continuous bladder drainage using an indwelling urinary catheter. Approximately 12% of women treated by continuous catheterization alone have fistulas that heal spontaneously. Urinary tract fistulas can also close spontaneously after 2 – 8 weeks of transurethral catheter placement, especially if the size of the fistula is small (2 to 3 mm in diameter) (Hoffman et al., 2016).

b. Surgical repair

Primary surgical repair of urogenital fistula is associated with a high cure rate of approximately 75 to 100%. This is supported by adequate vascularization of the surrounding tissue, short duration of the fistula tract, no prior radiation therapy, careful surgical technique, and experienced surgeons that performed the surgery (Hoffman et al., 2016). A study regarding the management of urogenital fistulas also showed that the majority of urogenital fistulas healed after primary surgery (Osman et al., 2018).

The selection of surgical repair method relies on the surgeon's expertise, the nature and site of the fistula, and the individual preferences of the patient. There are several types of approaches in the surgical repair of urogenital fistula. The primary and current trend favors a transvaginal approach, even for deep and large fistulas, as it has been linked to lower morbidity rates compared to transabdominal approaches (Ghoneim and Kamal, 2014).

Abdominal approach might be required if the fistula is situated high in the vagina and/or is linked to stenosis and fibrosis (Wong et al., 2012). Transvesical approach is less commonly chosen because it is associated with reportedly elevated morbidity rates. This method is recommended for fistulas that are localized and cases where the ureteric orifices are cannulated (Ghoneim and Kamal, 2014).

Other choices of approaches of the surgery are laparoscopy and robotic-assisted repair. Laparoscopic repair is associated with lower levels of blood loss, postoperative pain, hospital stay, and infection, as well as a faster recovery compared to abdominal surgery (Wong et al., 2012). Robotic-assisted surgery had been reported with great outcomes but this approach would still need additional evaluation (Ghoneim and Kamal, 2014).

c. **Regenerative therapy**

Regenerative therapy is a new research field that focuses on repairing, replacing, or regenerating cells, tissues, or organs to restore functional disorders. In the management of vesicovaginal fistula cases, regenerative medicine can be a solution in postoperative care. This type of therapy still requires further development and standardization (Kurniawati and Rahmawati, 2021).

5. Prevention

The prevention of obstetric and urogenital fistulas demands a multifaceted approach tailored to the specific challenges faced in both developed and less developed nations. Adequate care during childbirth, including early identification of abnormal labor patterns and timely interventions, holds the potential to prevent obstetric fistulas and reduce maternal mortality rates. In less developed nations, emphasis should be placed on improving obstetric care through education, addressing cultural practices, providing affordable transportation, and supporting local hospitals with free or low-cost obstetric care (Ngoma, 2010; Wong et al., 2012).

In contrast, in developed countries, where urogenital fistulas often result from surgical procedures, early detection and efficient repair of urinary tract injuries during surgery are critical (Wong et al., 2012). The use of advanced surgical techniques and routine cystoscopy can enhance detection rates and minimize the development of fistulas. Special attention should be given to iatrogenic fistulas, where surgeons must exercise extra caution during surgery, and preventive measures may be challenging in specific cases, such as those following radiotherapy (Ghoneim and Warda, 2014).

Furthermore, preventing urogenital fistulas in developing countries involves improving access to obstetric care and implementing bladder drainage or Foley catheters during long labor (Wong et al., 2012). Health training for healthcare workers, education in communities, and government support in providing necessary facilities and equipment play pivotal roles in this comprehensive preventive strategy (Ngoma, 2010). Ultimately, a combination of medical, educational, and infrastructural measures is essential to effectively address and reduce the incidence of obstetric and urogenital fistulas on a global scale.

6. Conclusion

Urogenital fistula prevalence and causes vary globally. Developing countries often see obstetric factors, especially prolonged labor, as predominant causes, while a recent trend indicates a rise in iatrogenic cases due to improved childbirth monitoring. Risk factors include obstructed labor, lack of prenatal care, early marriage, and certain surgical procedures. Management involves conservative therapy, surgical repair, and emerging regenerative therapy. Prevention strategies differ, with developed countries focusing on advanced surgical techniques, and developing nations emphasizing improved obstetric care and community education. A comprehensive, context-specific approach is vital for effectively addressing and reducing urogenital fistulas globally.

Acknowledgements

The author would like to express her gratitude to the supervising lecturers and colleagues that have guided the writer in the writing process of this article.

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