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FACULTE DE MEDECINE ET DES SCIENCES BIOMEDICALES

REPUBLIC OF CAMEROON
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MINISTRY OF HIGHER EDUCATION
****
UNIVERSITY OF YAOUNDE I
****
FACULTY OF MEDICINES AND BIOMEDICAL SCIENCES

DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

THE PROGNOSIS OF OBSTETRICS AND NON – OBSTETRICS FISTULAS FROM 2014 TO 2024 IN TWO HOSPITALS IN YAOUNDE

Thesis written and presented

By

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In partial fulfillment of the requirements for the award of a specialization diploma (DES) in Obstetrics and Gynecology

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DEDICATION

This piece of work is dedicated to all women who suffer or will suffer from obstetrical and non-obstetrical fistulas.

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SL = Senior Lecturer

L = Lecturer

AL = Assistant Lecturer.

HoD=Head of Departement.

ABSTRACT

Introduction: Obstetric fistulas and non-obstetric fistulas are abnormal communications between the genital tract and the urinary tract or between the genital tract and the digestif tract usually the rectum, with obstetric fistulas being caused by complications of childbirth, while non-obstetric fistulas are caused by complications of gynecologic surgeries, radiotherapy, inflammatory bowel disease. Obstetric fistulas are more frequent than non-obstetric fistulas in sub-Saharan Africa, where access to quality obstetric care is still a challenge for women even to those living in urban areas. These women are stigmatized, socially and economically isolated and face complications related to untreated fistulas.

Objective: Evaluate the prognosis of obstetric and non-obstetric fistulas of patients who underwent surgical repair from 2014 to 2024 in two hospitals in Yaounde, the University Teaching Hospital Yaounde (UTHY) and the Centre Medico-Chirurgical Essos (CMC)

Methodology: The study was a hospital based cross sectional descriptive study with retrospective data collection. Data was analysed using Statistical Package for the Social Science (SPSS) version 20 and Microsoft excel 2016. Results were presented in terms of mean ±standard deviation, frequencies and percentages. We used a confidence interval of 95%, and values with $P < 0.05$ were considered statistically significant. Verbal consent was obtained through phone calls.

Results: We had a total of 248 participants included in the study. More than three -quarters 187 (75.4%) were obstetrical fistulas cases while 61(24.6%) were non- Obstetrical cases.

The mean age for patients with obstetrical fistula was 32.28years and 45.54 years for patients with non-obstetrical fistulas.

In our study population 47.6% of obstetrical fistulas were single on admission, 34.1% of were married, while in the non-obstetrical group 49.2% were married, 26.25 were single. More than half of the participants with obstetrical (53.8%) and non-obstetric (54.5%) fistulas had secondary education. Almost 40% of participants were unemployed. Participants with obstetric fistulas resided in urban areas in 67.9% of cases while non-obstetric fistula participants resided in urban areas 80%of cases. Patients with obstetric fistulas were majorly multiparous (44.4%) multiparous

Data on index pregnancy reveal that caesarean section was performed in of 31% of cases, caesarean hysterectomy was performed in 25% of cases. The new born in index pregnancy died during labour in 36.8% of cases.

Obstructed labour was the major cause of urogenital obstetric fistulas 58.5%. Perineal tear and episiotomy were responsible of 68.4% of genito-digestive obstetric fistulas fistulas.

In non-obstetrical urogenital fistula total abdominal hysterectomy was responsible for 88.5% of cases, while non -obstetric genito -digestive fistulas which constituted 14% of cases was due to abdominal hysterectomy, debulking and radiotherapy in equal proportions. We had success rate of 95.4% for obstetric fistulas and 93.3% for non-obstetric fistulas and a failure rate of 1.3% at 24 months post-surgery follow up.

Conclusion: Obstetric and non-obstetric fistulas is still a major problem in Cameroon, adversely affecting women in their most productive years. The, main cause of obstetric fistulas are obstructed labour, while non-obstetrical fistulas are mainly caused by total abdominal hysterectomy. The outcomes after surgical repair was a success rate of 95.0%, the failure rate was 1.3% while the closed but incontinent rate was 3.8%. There was a marked decline in time from fistulas to surgery from 42 months in 2014 to 7 months in 2024. This is a glimmer of hope for better days ahead in the fight against obstetric and non-obstetric fistulas.

Keywords : Obstetric fistulas, Non-Obstetric fistulas, prognosis .

RESUME

Introduction : Les fistules obstétrical et non-obstétrical sont des communications anormales entre le système urinaire et génital (fistule urogénital) et entre le système digestive et génitale (fistules génitaux-digestive. Les fistules obstétricales sont des fistules causées par les complications obstétricales tel que le travail obstructif, la déchirure périnéale tandis que les fistules non-obstétricales sont causées par des complications de la chirurgie gynécologique, la radiothérapie et les maladies inflammatoires. On a constaté une augmentation des cas des fistules non-obstétrique secondaire à la chirurgie gynécologique au fil des années. Ces femmes qui souffrent des fistules font faces à plusieurs défis ; les complications médicales de la fistule, l'isolement, la stigmatisation, la baisse de l'estime de soi, le manque des revenues. Nous avons mené cette étude pour connaître les états de lieux en ce qui concerne les fistules obstétriques et non-obstétriques

Objectif : Evaluer le prognostique des fistules obstétriques et non-obstétrique de 2014 à 2024 dans deux hôpitaux à Yaoundé.

Méthodologie : C'est une étude hospitalière, rétrospective, transversale. Les données ont été analysé avec le SPSS version 20 et Microsoft Excel 2016.Les résultats ont été présenter en moyenne, écart type, fréquences et pourcentages. Un intervalle de 95% d'intervalle de confiance, la valeur P<0.05etaient statistiquement significative. Un consentement verbal avait été obtenue par téléphone.

Résultats : Nous avons retenu 248 dossiers pour notre étude. Plus de trois quart187 (75.4%) des participants étaient des cas des fistules obstétricaux, et 61(24.6%) étaient des cas des fistules non-obstétrique. L'âge moyenne étaient de 32.2 ans pour ceux de fistules obstétricales et de 45.54% pour les cas de fistules non-obstétricaux. La majorité (47.6%) des femmes avec fistules obstétrical étais célibataires, tan disque chez les femmes avec fistule non-obstétricaux la majorité étaient mariées (49.2%). Plus de la moitie 53.8% avait au moins fait les études secondaires. Presque 40% des participants étaient sans emplois. Plus the 80% des patients avec fistule non-obstétrical et 67.9% avec fistules obstétricaux résidais dans une zone urbaine. La césarien a étaient réaliser dans 31% des cas avec 25% des hystérectomies. Dans 36.9% des cas

les nouveau- ne sont mort pendant le travail. La cause principale des fistules urogénitales d'origine obstétricale était le travail obstructif (58.5%). La cause principale des fistules urogénitales d'origine non-obstétricale était les hystérectomies totales abdominale (88.5%). Le taux de femmes déclaré continent et ferme étaient de 95% avec 1,3% des échecs et 3.8% des fistules fermer mais incontinent.

Conclusion : Les fistules obstétricales et non-obstétrical est toujours un problème de santé publique dans notre pays, touchant des femmes au prime de leur vie. Les causes principales des fistules obstétricales et non-obstétricales sont le travail obstructif, les hystérectomies abdominales. Le taux du succès après réparation chirurgical était de 95%, et le taux d'échec étaient de 1.3% à 24 mois post chirurgie. Nous avons noté une diminution du temps d'attente entre la survenue des fistules et la prise en charge allant de 42 mois en 2014 à 7 mois en 2024. Ceci présage une lueur d'espoir dans la lutte contre les fistules obstétricales et non-obstétricales**.**

Keyword. Fistules Obstétrique, non-obstétrique, prognostique

LIST OF ABBREVIATIONS

ARV: Anorectal fistula

CMC Essos: Centre Medico-chirurgical Essos

RVF: Rectovaginal Fistula

UTHY: University Teaching Hospital Yaounde

VVF: Vesicovaginal Fistula

WHO: World Health Organization

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CHAPTER 1: INTRODUCTION

1.1. Background.

Obstetric and non-obstetric fistulas are abnormal communication between the genitourinary and the genito-digestif tract, with the obstetric fistulas being caused by obstetric complications while non -obstetric fistulas are caused by complications of gynecologic surgeries, inflammatory bowel disease and radiotherapy. Obstetric fistulas are more frequent in sub-Saharan Africa than non- obstetrics fistulas where access to quality obstetric care is still a challenge and a large percentage of fistulas are related to complications of childbirth[1].Whereas in the developed world fistulas are mostly of non-obstetrical[2].The World Health Organization(WHO),estimates that there are 130000 new cases of Obstetric fistulas each year. A prospective study in sub-Saharan Africa reported an annual incidence of 33000 new cases each year [3]. In Cameroon more than 20000 women are estimated to be living with fistulas with 2000 new cases each year.[4] The disability and suffering from obstetric fistulas remain a neglected public health issue 10. WHO referred to fistula as the single most devastating morbidity of neglected childbirth [11]. This condition is largely unknown in more developed countries because it has been virtually eliminated there, due to the availability of high-quality emergency obstetric services 1 In Cameroon, fistula patients have low level of education, married at young age and have poor access to quality maternal health care services12. Several authors suggest that obstetric fistulas should be considered as a Neglected Tropical Disease (NTD) 13 Concerning the associated factors with obstetric fistulas, the socio-demographic factors independently associated with obstetric fistulas included teenage deliveries, illiteracy, low socioeconomic status and short stature. (Table 4). The most common are vesicovaginal fistulas (VVF) and urethrovaginal fistulae.[3] Although small fistulas can close spontaneously with urethral catheterization, the standard therapy of VVFs is surgical repair [6, 7]. Published evidence demonstrate that the overall success rate after surgical repair varies from 82 to 100% regardless of through abdominal or vaginal approach [6, 8, 9]. Obstetric fistulae tend to be much larger.

These women are stigmatized, socially and economically isolated and face complications related to untreated fistulas. Despite the efforts made by the administrative authorities and Non-Governmental Organizations to remedy the tragic situation through periodical free medical campaigns organized at designated health facilities during which obstetrical and non-obstetrical

fistulas are surgically repaired, obstetric and non-obstetric fistulas remain a problem we cannot ignore.

1.2. Problem statement.

Women suffering from fistulas in Cameroon are more likely to lack finances to access quality lifesaving and life transforming needed surgeries to change the narrative. Obstetric and non-obstetric fistulas if left untreated could lead to life altering and life threatening complications(infertility ,repeated urogenital infections, vaginal stenosis, renal insufficiency and kidney failure, difficult sexual life) and a negative psychosocial impact(Depression, social isolation, hopelessness ,helplessness, anxiety)[15] .Even when these women finally get to the center for fistula repair, complications inherent to the surgery, complex anatomic site location of the fistula and the risk of a failed repair still looms as a dark shadow over the hope of complete healing and social reinsertion in our setting of developing countries[15].

1.3. The significance of the study.

The findings of this study will help us evaluate where we are as to the progress made in the diagnosis, management, and outcomes of obstetric and non -obstetric fistulas in these two health facilities in the last decade. It will be a reference for informed decisions in future planning and strategizing in the fight against fistulas. It will raise further awareness on the prevalence, the plight and challenges faced by these women who develop these complications.

1.4 Research goal.

The goal of this study is to advance the knowledge of obstetric and non-obstetric fistula in our context, thereby helping in the prevention of obstetric and non-obstetric fistulas, reducing its and improving outcomes of repairs.

1.5. Research questions.

1.5.1. General Questions.

What is the epidemiology, anatomic and prognostic profile of obstetric and non-obstetric fistulas in the University Teaching Center Hospital and the Medico-surgical Clinic Of Essos Yaounde.

1.5.2. Specific Questions.

What is the sociodemographic, Obstetric profile of women with obstetric and non-obstetric fistulas in the University Teaching Hospital Center Yaounde and the Medico Surgical Center of Essos?

What are the anatomic descriptions of these fistulas?

What type of surgical techniques was used?

What were the outcomes?

1.6. Research objectives.

1.6.1. General objectives.

Evaluate prognosis of obstetric and non-obstetric fistulas in women who benefitted from surgical treatment from obstetric and non-obstetric fistulas from 2014 to 2024 in two hospitals in Yaounde.

1.6.2. Specific Objectives.

1.Describe the sociodemographic and obstetric profile of women with obstetric and non-obstetric fistulas who benefitted from surgical treatment from 2014 to 2024 in these hospitals.

2.Outline the anatomic types of obstetric and non-obstetric fistulas of women who underwent surgical treatment from 2014 to 2024 in two hospitals in yaounde.

3.Report surgical technics used in treating women with obstetric and non- obstetric fistulas from 2014 to 2024 in these two hospitals.

4.Assess the outcomes after surgical repair of obstetric and non- obstetric fistulas in women from 2014 to 2024 in these hospitals.

1.7. Research Hypothesis

Identifying Sociodemographic and obstetric profile women affected by of obstetric and non-obstetric fistulas could help in reducing its prevalence.

Appropriate surgical repair technic of obstetrical and non- obstetrical fistulas could greatly improve the prognosis of obstetric and non-obstetrics fistulas.

CHAPTER 2: REVIEW OF LITERATURE

2.1. Generalities.

2.1.1. Definition of concepts.

- Fistula: It is an abnormal opening or passage between two organs or between an organ and the surface of the body. (NCI Dictionary of cancer terms).
- Obstetrical: Pertaining to the care and treatment of women in childbirth and during the period before and after delivery. (Collins English Dictionary).
- Obstetrical fistula: An abnormal opening between a woman's genital tract and her urinary tract or rectum caused by complications of childbirth. It could be a genitourinary fistula or a rectovaginal fistula
- Non obstetrical fistula: An abnormal opening between a woman's genital tract and her urinary tract or rectum not related to complications of childbirth. It could be a genitourinary fistula or a recto vaginal fistula.

2.1 2. Review of Anatomy

2.1.2.1. The pelvic bone.

At birth, the bones that make up the pelvis are the ilium, ischium, pubis, sacrum, and coccyx. The ilium, ischium and pubis fuse by age 16 to 18 years to form a single bone, referred to as the pelvic bone. Thus, in an adult, the bones of the pelvis consist of the right and left pelvic bones, the sacrum, and the coccyx. The bony pelvis is the rigid foundation to which all of the pelvic ligaments and muscles are anchored.

Ilium — The most superior component of the pelvic bone is the ilium. The upper part of the ilium expands to form a flat fan-shaped "wing," which provides support for the lower abdomen, and is also called the false pelvis. The medial surface of the ilium has two concavities forming the lateral borders of the pelvic outlet (the inferior opening of the pelvis). The superior and larger of these two concavities is the greater sciatic notch (boundaries are the sacrum, ilium, and ischial spine).

Ischium — The ischium is the posterior and inferior part of the pelvic bone. The posterior margin of the bone is marked by prominent projection called the ischial spine, an important surgical landmark.

Sacrum — The sacrum is composed of five sacral vertebrae that are fused together. Nerve foramina are positioned anterior and laterally, through which run the sacral nerves. Overlying the middle of the sacrum is a rich neurovascular bed.

The coccyx The coccyx is attached inferiorly and is the posterior border of the pelvic outlet.

Pubis — The anterior and inferior part of the pelvic bone is the pubis. The superior and inferior pubic rami are located anteriorly and articulate in the midline at the pubic symphysis.

2.1.2.2. The Pelvic Ligaments.

Two major ligaments link the pelvic bones to the sacrum and coccyx, the sacrotuberous ligament and the sacrospinous ligament.

Sacrospinous ligament — The sacrospinous ligament is a strong, triangular-shaped ligament; the apex attaches to the ischial spine laterally and the base attaches to the distal sacrum and coccyx

Sacro tuberous ligament — The sacrotuberous ligament is also a triangular-shaped ligament. It has a broad base that extends from the posterior superior iliac spine along the lateral margin of the sacrum and coccyx

2.1.2.3. The pelvic muscles

The pelvic muscles include the muscles of the pelvic sidewall and of the pelvic floor.

Muscles of the pelvic sidewall — The obturator internus and piriformis are the muscles of the pelvic sidewalls (figure 2).

Muscles of the pelvic floor — The skeletal muscles of the pelvic floor include the levator ani muscles, the coccygeus muscle, the external anal sphincter, the striated urethral sphincter and the deep and superficial perineal muscles (figure 3). The levator ani muscle complex consists of the pubococcygeus (also called pubovisceral), the puborectalis, and iliococcygeus muscles [5,6]. The levator ani muscles insert into the lateral sides of the organs being supported or opened/closed (eg, urethra, vagina, rectum). These muscles interact explicitly with the pelvic organs which they support as opposed to merely being an opening through which they pass.

Pelvic floor muscle function and shape — Pelvic floor muscles have a constant resting tone except during voiding, defecation, and the Valsalva maneuver. This activity serves to close the urethral and anal sphincters, narrow the urogenital hiatus, and provide a constant support for the pelvic viscera. The levator muscles and the skeletal components of the urethral and anal sphincters all have the ability to contract quickly at the time of an acute intraabdominal pressure, such as a cough or sneeze, in order to maintain continence and to relax during evacuation.

2.2.2.4. Pelvic Nerves and Vasculature.

Levator ani nerve — The levator ani nerve originates from S3, S4, and/or S5 and innervates both the coccygeus muscle and the levator ani muscle complex [3,10]. After exiting the sacral foramina, it travels 2 to 3 cm medial to the ischial spine and arcus tendineus levator ani across the superior (intrapelvic) surface of the coccygeus, iliococcygeus, pubococcygeus, and puborectalis muscles

Pudendal nerve and course — The pudendal nerve provides sensory and motor innervation to the perineum; it is critical for urinary and anal continence as well as for sexual function.

Vascular supply — The internal pudendal artery is the main arterial supply of the perineum. The pudendal artery courses inferiorly from its origins in the anterior trunk of the internal iliac artery (figure 6). The internal pudendal artery and a contribution from the external pudendal artery, which originates from the femoral artery, provide a rich blood supply to the perineum

2.2.2.5. The Female Upper Genital Tract.

The female upper genital tract consists of the cervix, uterine corpus, fallopian tubes, and ovaries. A sagittal view of the female pelvis is shown in the figure (figure 1).

Uterus — The uterus includes the uterine corpus and uterine cervix (figure 2).

Uterine corpus — The corpus, or body, of the uterus has an inverted triangular shape (figure 3). The most superior portion is called the fundus and the most inferior portion that is continuous with the cervix is called the isthmus, or the lower uterine segment. There are no anatomic landmarks that divide these portions from the rest of the uterine corpus.

The uterus is made up of three layers:

Endometrium – The endometrium is the lining of the uterine cavity, with a superficial layer that consists of glandular epithelium and stroma. The thickness of the endometrium changes with the menstrual cycle or other hormonal stimulation.

Myometrium – The myometrium is the thickest layer of the uterus. It is composed of smooth muscle fibers that are oriented diagonally and crisscross with fibers from the contralateral side of the uterus.

Serosa – The serosa is the thin outer lining layer of the uterus, investing the body of the uterus, consisting of visceral peritoneum.

Uterine cervix — The cervix is a tubular structure that serves as the conduit between the endometrial cavity and the vagina. The superior portion is continuous with the uterus.

The inferior portion of the cervix protrudes into the vagina.

The cervical canal opens into the endometrial cavity at the internal os and into the vagina at the external os. The ectocervix is the surface of the cervix that protrudes into the vagina.

Adnexa — The uterine adnexa consist of the ovaries and fallopian tubes.

Ovary — The ovaries are suspended lateral and/or posterior to the uterus, depending upon the position of the patient. The supporting structures of the ovaries include the utero-ovarian ligament that attaches the ovary to the uterus; the infundibulopelvic ligament (also referred to as the suspensory ligament of the ovary), through which the ovarian vessels travel, that attaches the ovary to the pelvic sidewall; and the broad ligament, which condenses to form the mesovarium. It is also attached to the broad ligament through the mesovarium.

The ovary consists of an outer cortex, where the ova and follicles are located, and medulla, where the blood vessels and connective tissue compose a fibromuscular tissue layer (figure 5).

Fallopian tube — The fallopian tubes arise from the uterine corpus posterior and superior to the round ligaments.

Each tube is divided into four distinct portions: the interstitial portion, where the tube passes through the uterine cornu; the isthmus, with a narrow lumen and thick muscular wall; the ampulla, with a larger lumen and mucosal folds; and the fimbria, located at the end of the tube

with frond-like projections that increase the surface area of the end of the tubes, thereby facilitating contact with ovulated ova .

Blood supply to the uterus, tubes, and ovaries — The majority of the blood supply to the uterus, tubes, and ovaries derives from the uterine arteries and the ovarian arteries.

The uterine arteries originate from the anterior division of the internal iliac arteries in the retroperitoneum (picture 3). They may share a common origin with the obliterated umbilical artery, internal pudendal, or vaginal artery.

The uterine artery travels through the cardinal ligament and passes over the ureter, which is located approximately 1.5 cm lateral to the cervix.

. The ovarian arteries arise from the abdominal aorta. The right ovarian vein returns to the inferior vena cava while the left ovarian vein returns to the left renal vein. The ovarian vessels travel through the infundibulopelvic ligaments in close proximity to the ureter, along the medial aspect of the psoas muscle.

2.2.2.6. The lower genital tract.

The female lower genital tract consists of the vulva and vagina.

Vulva and clitoris (external female genitalia) — The vulva, or external female genitalia, includes the labia majora, labia minora, clitoris, vulvar vestibule, external urethral meatus, and vaginal orifice.

Labia – The labia minora bifurcate anteriorly to form medial and lateral folds. The lateral folds unite ventrally over the clitoris to form the prepuce of the clitoris.

Vagina — The vagina is a hollow, distensible, fibromuscular tube with rugal folds that extends from the vestibule to the uterine cervix. The longitudinal shape of the vagina resembles a trapezoid, narrowest at the introitus and becoming progressively wider as it approaches the vaginal apex and cervix.

The average length of the anterior vaginal wall is 6.3 cm with a wide range: 4.4 to 8.4 cm. Similarly, the average length of the posterior vaginal wall is 9.8 cm with a range of 5.1 to 14.4 cm

[30]. The vaginal width is largest at its cranial portion and decreases as it passes through the pelvic diaphragm to be smallest at the introitus.

Clitoris – The components of the clitoris include the glans, body, and paired crura. The clitoral body is comprised of paired erectile tissue structures, which originate from each crus. The proximal clitoral body is found cephalad to the midpubic arch on the anterior surface of the pubic symphysis. The crura run bilaterally along the ischiopubic rami.

Vulvar vestibule – The vulvar vestibule is the area enclosed by the labia minora into which the urethra and vagina open. Within the vestibule, the ducts of the Skene (paraurethral) glands open on each side of the lateral margin of the urethra. The ducts of the Bartholin glands (greater vestibular glands) open on the posterior lateral margin of the vaginal opening at the four and eight o'clock positions (figure 17).

Hymen – The hymen is a ring-like membrane that surrounds the vaginal orifice and typically has one or more central perforations (figure 18). After rupture of the hymen, from sexual intercourse or trauma, fringe-like hymenal remnants persist surrounding the vaginal opening**.**

2.2.2.7. The lower urinary tract.

The structures of the urinary system located within the pelvis include the urethra, bladder, and distal portion of the ureters

Urethra — The female urethra connects the bladder to the vulva. It averages approximately 2 to 3 cm in length and 6 mm in diameter. The junction of the urethra to the bladder is called the bladder neck, or vesical neck. The urethra then continues its course fused to the vagina for its distal two-thirds, and terminates at the external urethral meatus in the vulvar vestibule directly above the vaginal introitus. The female urethra is slightly curved as it passes from the bladder in the retropubic space, through the perineal membrane, to the vestibule.

Internal urethral sphincter (smooth muscle) – The internal urethral sphincter is primarily composed of oblique and longitudinal smooth muscle fibers, with a few circularly oriented outer fibers. The precise function of this longitudinal smooth muscle is not known, however, it has been suggested that these longitudinal fibers serve as "filler volume" within the circular smooth muscle and striated urethral sphincter, whose presence improves the efficiency of the sphincter

mechanism by allowing closure of the urethral lumen with only a small amount of circular muscle shortening [35].

External urethral sphincter (striated muscle) – The skeletal muscle component of the urethral sphincter consists of the external urethral sphincter (also called sphincter urethrae), as well as the compressor urethrae and the urethrovaginalis muscle described previously (figure 22). These three muscles, which function as a single unit, have been called the striated urogenital sphincter [27]. Together, they are approximately 2.5 cm in length and encircle the urethra in its mid-portion from just below the bladder neck to the perineal membrane within the deep perineal space. The striated urogenital sphincter provides approximately one-third of urethral resting tone and is responsible for the voluntary and reflex increases in intraurethral pressure needed to maintain continence. The smooth muscle portion of the urethra is innervated by the autonomic nerves of the pelvic plexus, while the striated urethral sphincter is innervated by branches of the pudendal nerve [36].

Bladder — The bladder is located in the midline, posterior to the pubic bone. The bladder is separated from the pubic bone by a potential space, called the retropubic space, or the space of Retzius, which contains the venous plexus of Santorini.

The dome of the bladder is contiguous with the parietal peritoneum of the anterior abdominal wall. Inferiorly, the peritoneum sweeps off the bladder into the vesicouterine pouch. The remainder of the bladder is retroperitoneal.

The regions of the bladder include the dome, superiorly, and the base, inferiorly. The base of the bladder lies directly on the anterior vaginal wall and consists of the trigone and detrusor loop, a thickening of the detrusor muscle, the thickness of which does not vary with filling of the bladder.

The blood supply to the bladder includes the superior and inferior vesical arteries, which are branches of the anterior trunk of the internal iliac artery. Bladder innervation is provided by the parasympathetic and sympathetic autonomic fibers of the pelvic and hypogastric nerve plexuses, respectively.

Ureters — The ureters are retroperitoneal structures that run from the renal pelvis to the bladder. They are approximately 25 to 30 cm in length from the renal pelvis to the trigone of the bladder.

The pelvic brim divides them into abdominal and pelvic segments, each of which is approximately 12 to 15 cm in length.

The ureters travel into the pelvis along with the ovarian vessels making the identification of the ureter imperative prior to performing an oophorectomy [42].

The ureter usually lies posterior and medial to the infundibulopelvic ligament, but in cases where it lies in close proximity to the ovarian vessels, it may be necessary to open the retroperitoneal space lateral to the infundibulopelvic ligament and create a window between the ovarian vessels and the ureter in order to safely secure the ovarian vascular pedicle.

The ureters then descend into the pelvis within a peritoneal sheath (ureteric fold) attached to the medial leaf of the uterine broad ligament and the lateral pelvic sidewall .

Just inferior to the internal cervical os, the ureter passes under the uterine arteries ("water under the bridge"), along the lateral side of the uterosacral ligament, approximately 1.5 cm lateral to the internal cervical os . The ureter then courses medially as the uterosacral ligament is traced from the sacrum toward the vagina. At the level of the ischial spine, the ureter is approximately 2.3 cm lateral to the uterosacral ligament [43]. The ureter is closest to the uterosacral ligament at its distal end, approximately 1 cm.

The ureter passes through the areolar tissue of the tunnel of Wertheim (i.e., the cardinal ligament/anterior bladder pillar) to the anterolateral surface of the cervix .

The ureters then pass close to the anterolateral fornix of the vagina and enter the posterior aspect of the bladder 5 to 6 cm apart and run obliquely through the bladder wall for 1.5 cm before terminating at the trigone.

The ureter is supplied by the blood vessels it crosses (i.e., the ovarian, internal iliac, superior vesical, and inferior vesical arteries). Above the pelvic brim, the blood supply enters from the medial side while below the pelvic brim the blood supply enters laterally.

2.2.2.8. The Perineum.

The area between the vagina and anus is often clinically referred to as the "perineum"; however, anatomically, the perineum is the entirety of the pelvic outlet inferior to the pelvic floor. The area between the vagina and anus is more aptly termed "the perineal body."

The borders of the anatomic female perineum are the ischiopubic rami, ischial tuberosities, sacrotuberous ligaments, and coccyx. An imaginary line connecting the ischial tuberosities divides the perineum into the urogenital triangle anteriorly and the anal triangle posteriorly. In the standing position, the urogenital triangle is oriented horizontally and the anal triangle is tilted upward so that it faces more posteriorly .

Perineal membrane — The perineal membrane is a thick fibrous sheet that spans the urogenital triangle (figure 14). It attaches laterally to the pubic arch and has a free posterior margin anchored in the midline by the perineal body. Although anatomists and clinicians have historically used the term urogenital diaphragm to describe this structure, this term has been abandoned, as it erroneously implies a muscular diaphragm rather than a thick sheet of connective tissue [24,25].

The urethra and vagina penetrate through a hiatus in the perineal membrane (the urogenital hiatus) to exit at the vestibule. The perineal membrane, therefore, provides fixation of distal urethra, distal vagina and perineal body to the pubic arches. The levator ani attaches to the perineal membrane's cranial surface, vaginal fascia, and the perineal body.

Urogenital triangle — The urogenital triangle is divided into a superficial and deep perineal space by the perineal membrane. The superficial perineal space contains the superficial perineal muscles (ischiocavernosus, bulbospongiosus, superficial transverse perineal muscles), the erectile tissue of the clitoris, the vestibular bulbs, and Bartholin glands. The deep perineal space lies just deep to the perineal membrane and inferior to the levator ani muscles**.**

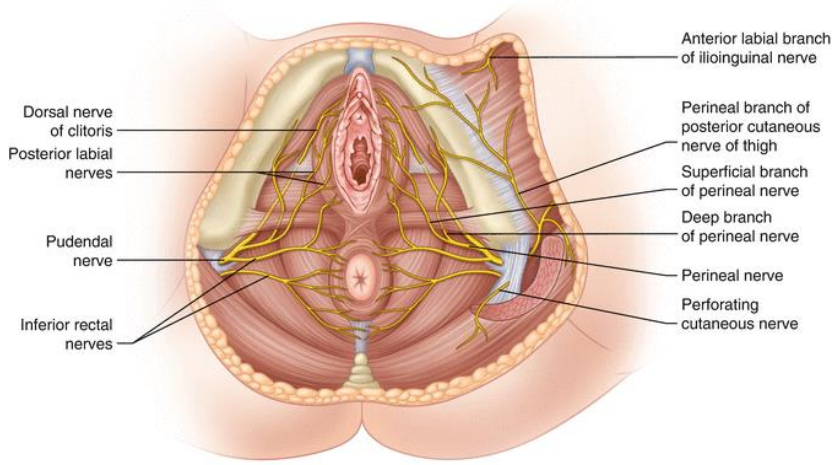
Perineal body — The perineal body marks the point of convergence of the bulbospongiosus muscles, superficial and deep transverse perinea, perineal membrane, external anal sphincter,

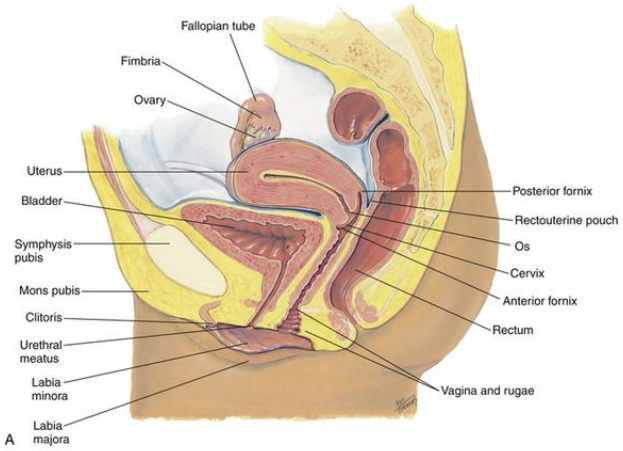
posterior vaginal muscularis and fibers from the puborectalis and pubococcygeus muscles. The perineal body plays an important role in support of the distal vagina and in normal anorectal function. The vascular and nerve supply to the perineum, including the deep and superficial perineal spaces, is provided by the pudendal neurovascular bundle.

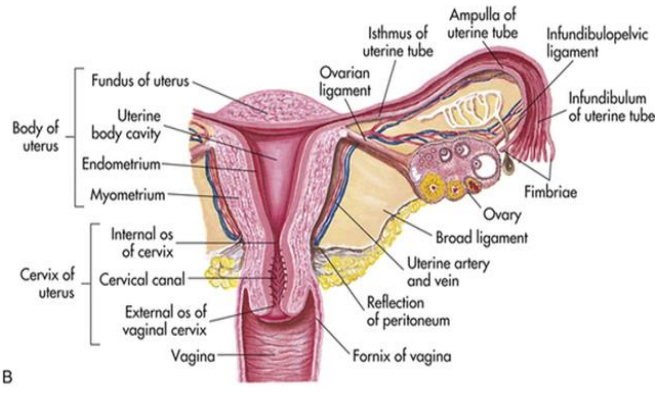
Anal triangle — The anal triangle is formed laterally by the medial margins of the sacrotuberous ligaments, anteriorly by the inferior edge of the perineal membrane and perineal body, and posteriorly by the coccyx. The superior extent of the anal triangle is the levator ani muscles. The anal canal and anal sphincter muscles are located in the middle of the anal triangle. Lateral to the anal sphincter, complex on each side, is the ischioanal fossa**.**

Ischioanal fossa — The ischioanal fossa, previously termed the ischiorectal fossa, is the space inferior to the levator ani muscles and superior to the perineum [28].

*Figure 1. The female reproductive organs **(A.B.C.)***







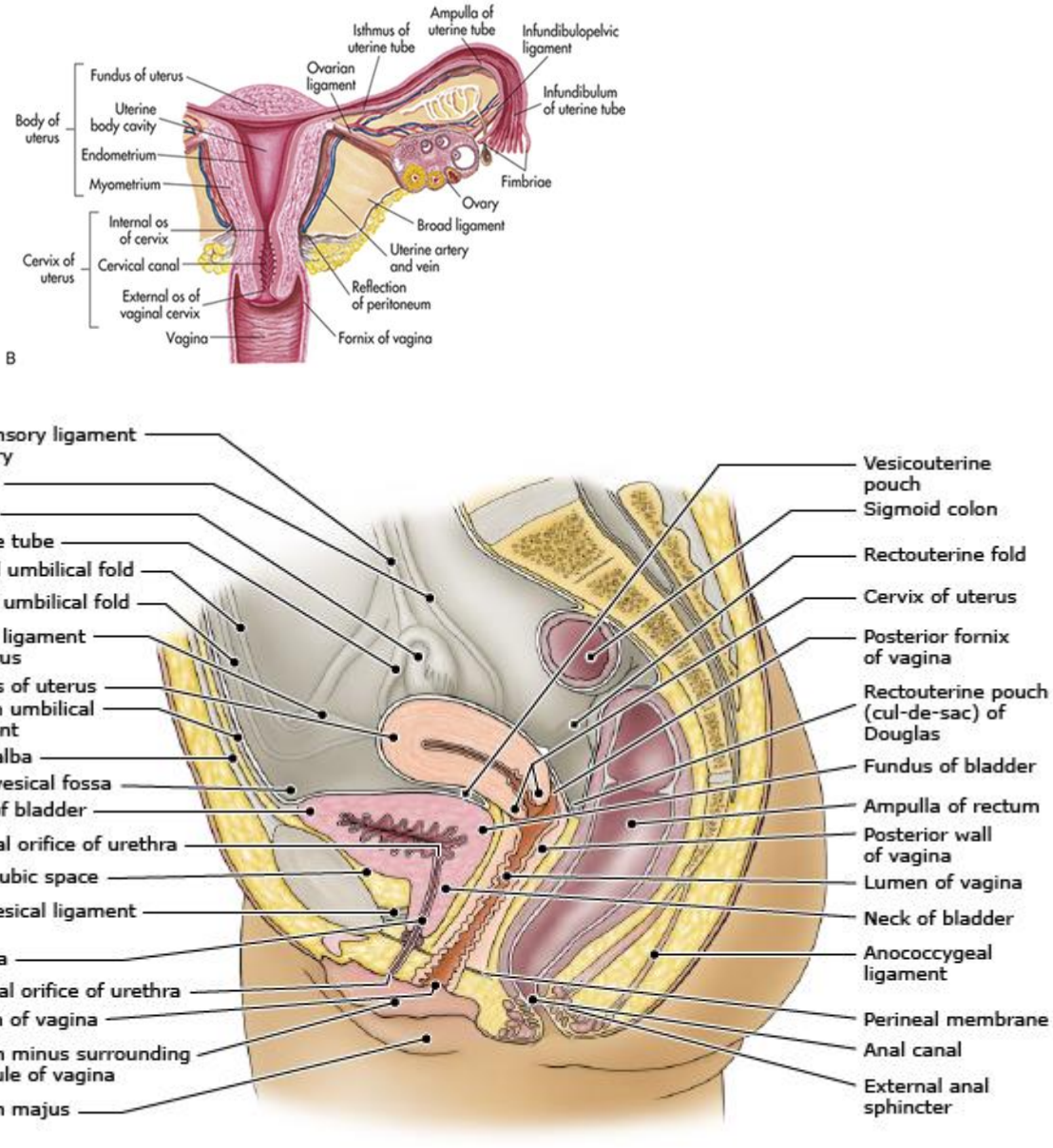


Figure 2. Sagittal aspect of female pelvis.

2.2. Obstetric and non- obstetric fistulas.

Obstetric and non-obstetric fistulas could be urogenital fistulas or rectovaginal fistulas. Obstetric fistulas are fistulas caused by obstetric causes while non-obstetric fistulas are caused by non - obstetric cause.

2.2.1. The type of urogenital fistula

2.2.2.2. Epidemiology.

The incidence of urogenital fistulas in resource-limited countries is difficult to ascertain and studies report rates of fistulas arising from obstetric causes and not from other etiologies. The World Health Organization estimates that there are 130,000 new cases of obstetric fistula each year, calculated from an assumption that fistula is likely to occur in 2 percent of the 6.5 million cases of obstructed labor that occur in developing countries [1]. A prospective study of maternal morbidity in sub-Saharan Africa reported an annual incidence of 33,000 obstetric fistulas [2]. The prevalence of obstetric vesicovaginal fistula is directly related to the prevalence of obstructed labor and the accessibility of emergency obstetric care, including facilities capable of performing cesarean delivery. Obstetric fistula closely parallels maternal mortality because both conditions are directly linked to the accessibility of emergency obstetric care. The fistula problem is most severe in sub-Saharan Africa because maternal mortality is highest there, but fistulas are also found in other parts of the world where fertility is high, the status of women is low, and obstetric services are poor, such as Afghanistan, Pakistan, Bangladesh and parts of India. Obstetric fistula is a disease of poverty. Some have classified it as one of the "neglected tropical diseases" [3].

By contrast, in industrialized countries, obstetric fistulas are rare. In the United States**,** estimates of urogenital fistula formation range from less than 0.5 percent after simple hysterectomy to 10 percent after radical hysterectomy [5-6]. Similar data from the English National Health Service show a vesicovaginal or urethrovaginal fistula occurring after 1 in 788 hysterectomies, with a higher rate of 1 in 87 occurring after radical hysterectomy for cervical cancer [7]. In a 20-year cohort study of fistulas from Norway, there were only four genitourinary fistulas related to obstetric care in 116,389 deliveries, and these were related to complications of cesarean section, cervical cerclage, and uterine rupture, and not from neglected prolonged labor [8]. According to data in the United States National Hospital Discharge registry, out of 2,329,000 operations performed on the female urinary and genital systems in 2007, there were fewer than 5000 procedures for vesicovaginal fistula repair [9]. In wealthy countries, vesicovaginal fistulas largely result from complications of surgery, not from neglected obstructed labor.

Resource-limited countries lack the ability to treat all patients who currently have obstetric fistulas. It is estimated that a million or more women in sub-Saharan Africa currently

have an unrepaired urogenital, with between 30,000 and 130,000 new cases occurring each year [1,2]. The current total capacity for fistula repair in sub-Saharan Africa is still quite limited, perhaps around only 10,000 cases per year [10]. This remains inadequate to meet the existing clinical needs.

.2.2.2.1.3. Etiology and Pathogenesis.

Obstetric trauma from prolonged, obstructed labor is the cause of the majority of vesicovaginal fistulas in these settings. The incidence of postoperative fistulas has increased as pelvic surgery has become more accessible. As an example, in a series of 164 genitourinary fistulas reported from a teaching hospital in Ghana, nearly 92 percent were the result of obstetric complications and 7 percent were complications of difficult hysterectomy for large uterine leiomyomata [17]. Other causes of urogenital fistula include traditional practices (eg, genital cutting or vaginal "salt packing") and sexual violence against women (especially in conflict zones). The injury is compounded by economic and societal issues that impact the accessibility to and quality of health care.

The United States, estimates of urogenital fistula formation range from less than 0.5 percent after simple hysterectomy to 10 percent after radical hysterectomy. Although radical hysterectomy is associated with an increased rate of urogenital fistula formation, it is not clear whether there will be an appreciable increase in the overall fistula formation rate with laparoscopic and robotic technique [18]. According to data in the United States National Hospital Discharge registry, among 2,329,000 operations performed on the female urinary and genital systems in 2007, there were less than 5000 procedures for vesicovaginal fistula repair [19].

Most urogenital fistulas occur after hysterectomy for benign disease. A study in the United Kingdom showed a 0.12 percent incidence of vesicovaginal fistula following all types of hysterectomy [20]. The highest incidence occurred following radical hysterectomy, with a rate of 1.14 percent, and the lowest rate was 0.02 percent following vaginal hysterectomy for pelvic organ prolapse. Among women having a hysterectomy for benign indications, patients over 50 years had a lower incidence of fistula formation than women less than 40 years [21]. Intraoperative risk factors for vesicovaginal fistula at the time of hysterectomy include: uterus

weight >250 g, longer operative times (approximately five hours or more), and concurrent ureteral injury [13]. Most urogenital fistulas are due to urinary tract injuries that were not recognized intraoperatively. Pelvic pathology that may have predisposed to injury is present less than half of the time. In developing countries, vesicovaginal and other urogenital fistulas are estimated to occur in 2 percent of obstructed labors.

- **Obstetric fistula** –

Obstetric fistulas are uncommon in developed countries, but bladder and urethral injury have been associated with operative vaginal delivery and manual extraction of the placenta [15]. Vesicouterine and vesicovaginal fistula may occur after cesarean section, peripartum hysterectomy, and uterine rupture at term. Occasionally, the ureter may be involved.

Obstructed labor — Labor becomes obstructed when the fetal head can no longer advance through the birth canal despite strong uterine contractions. All pregnant women are potentially at risk because obstruction can develop during any labor. When obstructed labor is not diagnosed and treated in a timely fashion, obstetric fistula can develop as a result of pressure necrosis. In countries with poor maternal health services, several factors contribute to inadequate care and a delay in diagnosis and management of obstructed labor, and result in a high rate of obstetric fistulas. These factors include: low social, economic, and political status of women resulting in poor maternal health services; delivery at home with care by untrained birth attendants; limited or no access to emergency obstetric services; infrastructure and economic barriers to travel; lack of or poor quality of secondary and tertiary health care services, and low quality health care in general.

●Mechanisms

- **Obstetric fistula**

An obstetric fistula develops at a point of tissue necrosis. The maternal soft tissues (bladder, vagina, cervix, rectum) become compressed between the boney plates of the fetal head and the maternal pelvic bones. With prolonged compression, tissue ischemia occurs and necrosis develops in the vagina and the connective tissues that separate the vagina from the bladder and rectum. Once they

are necrotic, these tissues slough away and one or more fistulas are formed involving the vagina and the urinary and/or gastrointestinal tracts.

- **Associated tissue injury**

The tissue surrounding a fistula is also in poor condition. An obstetric fistula resulting from obstructed labor is not caused by laceration of otherwise healthy tissues that fail to heal properly; rather, the obstetric fistula is the product of a generalized "field injury" caused by tissue compression. Prolonged obstructed labor produces an extensive crush injury that destroys wide swaths of tissue

- **Surgical complications**

Urogenital fistulas following gynecologic surgery are typically a discrete injury to otherwise healthy tissue. Most post hysterectomy fistulas are small and are located at the vaginal cuff where the bladder was dissected off the lower uterine segment and cervix. A pool of urine leaking from the injured bladder prevents normal healing of the edges of the vaginal cuff, thereby allowing a fistula to form between the raw surfaces of the bladder and the vagina.

A small proportion of vesicovaginal fistulas in sub-Saharan Africa result from surgical complications usually associated with hysterectomy. Currently, access to surgical services is limited in many developing countries. As this access increases, the number of cases of fistula associated with surgery will increase.

Contributing factors – Many different factors contribute to the ultimate development of fistula and there is no specific duration of obstructed labor after which an injury occurs. Tissue necrosis is the final result of a complex set of interactions involving the amount of force exerted on the impacted tissues, the degree of distension of the bladder, the level in the pelvis at which labor has become obstructed, the blood flow through the affected tissues, the overall resilience of the tissues, and the amount of time these processes continue.

- **Timing of onset**

Most fistulas from prolonged obstructed labor will develop within the first two weeks after delivery, and sometimes the injury is immediately apparent after delivery in cases where labor has been extremely prolonged.

- **Associated complications**

The process of obstructed labor may also produce a broad spectrum of other maternal and neonatal injuries (eg, neurologic, musculoskeletal), referred to as the obstructed labor injury complex. Stillbirth rates of 84 to 93 percent have been reported by patients presenting with obstetric fistula.

- **Traditional practices**

Various traditional forms of genital cutting continue to be practiced in many countries as a rite of passage to womanhood.

In this practice, the vagina of a postpartum woman is packed with mineral salts to "tighten it." It may create a fistula by direct chemical burning, particularly after a prolonged labor. In some cases, genital cutting may be performed by traditional medical practitioners for what they perceive as therapeutic purposes based on their understanding of gynecologic or behavioral pathology. This form of genital cutting, referred to as gurya cutting in Niger, can result in genitourinary fistula by direct injury to the affected tissues [25]. **Economic and societal issues** — Economic, societal, and cultural factors contribute to the circumstances in which injuries that result in obstetric fistula occur. These injuries overwhelmingly affect resource-poor, uneducated, and socially and politically disenfranchised patients. These conditions contribute to injury.

Postsurgical fistula

Postsurgical urogenital fistula may be caused by direct injury during dissection, in which case, the injury is often recognized at surgery or in the immediate postoperative period. More subtle causes include clamp or crush injury, cautery, or suture impingement, kinking, or placement through the bladder or ureter. Blood supply is

compromised to the affected tissues with resulting necrosis and eventual tissue breakdown. The process takes from days up to a month and urine leakage may not be observed until sometime after surgery [16]. Intraperitoneal leakage may also occur, in some circumstances without vaginal leakage.

The use of synthetic mesh in repair of stress incontinence and pelvic prolapse has introduced another cause of bladder injury, as well as urethrovaginal fistulas. Synthetic mesh may be placed directly into the bladder, or it may be under some tension and gradually wear down the native tissue causing an opening into the bladder or urethra.

- **Radiation therapy**

Radiation therapy causes a progressive small vessel endarteritis that impairs the vascular supply of tissues within the radiation field and therefore can lead to problems with healing from surgical procedures and ultimately to urogenital fistulas.

Inflammation

Inflammation, such as occurs with pelvic inflammatory disease, diverticulitis, or inflammatory bowel disease, can cause tissues to be both friable and hypervascular. These changes lead to poor tissue healing, which makes tissue more susceptible to tearing or other damage during manipulation, and ultimately can lead to fistula formation.

2.2.2.5. Evaluation and diagnosis of suspected urogenital fistulas

2.2.2.5.1. History

Eliciting the medical history is guided by the clinical suspicion of the presence of a fistula. This is typically based upon symptom development in relation to a recent surgery. The history should include standard questions regarding symptom onset and duration, pelvic health history (e.g. cancer, radiation, trauma, obstructed labor), symptom characteristics (leakage volume, smell, color and consistency of vaginal fluid) to exclude hematuria or leakage of substance other than urine (e.g. vaginal discharge), and flow characteristics (continuous, intermittent, positional) The history should include questions to differentiate symptoms

associated with urogenital fistula from other etiologies of urinary incontinence. Most of these patients are changing heavy pads frequently because they are constantly wet.

An obstetric fistula should be suspected in women who present with a complaint of continuous urine loss beginning immediately following childbirth, particularly after a long labor. The amount of time from the onset of symptoms to the presentation of the patient to a health care provider depends on the patient's ability to access health care. There are many barriers to accessing a health care facility, particularly a facility that can provide treatment for a fistula. These obstacles include patient awareness that treatment is available and where to find it, distance, expense, arranging care for children, and cultural and linguistic differences between patients and clinicians.

- **Physical examination**

On pelvic examination, a continuous pool of urine is evident in most patients. Smaller fistulas, particularly ones that persist after previous attempts at repair, may not be so readily discernible. Simple digital examination is often sufficient to document the

- Delay in making the decision to seek care in an obstetric emergency Delay in arriving at a suitable health care facility once the decision to seek care has been made
- Delay in receiving appropriate care once the patient arrives at a health care facility presence of a fistula, especially if large amounts of urine are pooling in the vagina, but examination of the vagina with a speculum and a good light source is mandatory prior to attempting surgical repair.
- More than one fistula may be present, and they can occur in almost any location, depending on the point at which the progress of labor became obstructed and the types of interventions that were attempted prior to delivery. In some cases, the cervix or urethra may have been completely destroyed. The anatomy of the vagina may be completely distorted and dense scarring is often present, making the exact location of the fistula difficult to determine. Sometimes, the fistula may be easily diagnosed by palpating the defect in the bladder or rectum. In some cases, so much tissue may have been destroyed that the raw surface of the pubic bone may be palpated directly. Obstructed labor may

result in total amputation of the proximal urethra. In such cases, upon digital palpation in the vagina, the finger can directly about the pubic bone.

The presence of a fistula can usually be confirmed with a simple dye test using sterile water mixed with indigo carmine or methylene blue dye.

2.2.2.5.2. Pelvic examination

A split speculum examination (using just the lower blade of the speculum) should be performed, and the entire vagina should be visualized. On vaginal examination, recently formed fistulas may appear as a small, red area of granulation tissue with no visible opening, or an actual hole may be seen. For more mature fistulas, it may be difficult to visualize the vaginal orifice. Very small fistulas may be difficult to visualize due to size and the anatomy of the vagina (eg, fornices are difficult to examine). An examination under anesthesia and use of dye tests may be needed to find the opening. It is important to remember that more than one fistula may be present and more than one structure may be involved (e.g. a vesicovaginal fistula and a ureterovaginal fistula).
In a woman whose prior hysterectomy is related to the fistula, the vaginal orifice is typically located in the upper third of the vagina or at the vaginal cuff. Urine leakage may often be seen during the examination, and there may be a tell-tale odor or pooling of urine when commencing the examination.

2.2.2.5.3. Dye test

To find small fistulas, any dyed sterile fluid (eg, sterile infant formula, or indigo carmine or methylene blue mixed with saline, where available) may be instilled into the bladder through a bladder catheter [26]. The urethra may be compressed with a gauze sponge to prevent the inadvertent egress of dye from the urethra, and the bladder is filled incrementally with 60 mL aliquots of colored fluid. A tampon or large cotton swabs are placed in the vagina and then checked for dye. If no leakage is seen, the patient is asked to cough or perform a Valsalva maneuver. Blue staining on the swab or tip of the tampon from the vaginal apex indicates a vesicovaginal fistula, while wetness with clear fluid may indicate an ureterovaginal fistula. If an ureterovaginal fistula is suspected, oral phenazopyridine (100 or 200 mg, in

countries in which this drug is available) is taken on the day of the test (approximately one to two hours

before examination) to turn the urine orange. In combination with the use of blue dye in the bladder, this will distinguish a fistula communicating between the vagina and ureter (orange urine) from located in the bladder (blue urine). However, the findings are less certain with complex fistulas (eg, uretero-vesical-vaginal) or if ureteral reflux occurs. Dye studies alone are not sufficient to completely evaluate the number and location of urogenital fistula.

2.2.2.5.4 Cystoscopy and imaging studies

Cystoscopy is used to assess the bladder for residual injury, surgical materials, and the number of intravesical fistula orifices. Retrograde pyelography documents ureteral integrity. The intravenous pyelography (IVP) is less useful for noting any disruption in ureteral integrity because it may miss ureteral leakage that is immediately adjacent to the trigone when dye filling the bladder obscures a small leak. Small amounts of dye may not show up on conventional radiography, and puddling may result from ureteral or bladder leakage or both. When a normal renal unit is seen on IVP, but the ureter is never visualized, complete transection preventing accumulation of dye in the ureter must be considered.

2.2.2.6. Classification of urogenital fistulas.

2.2.2.6.1 Obstetric Fistula Classification Systems

In current practice, there is no universally accepted, standardized obstetric fistula classification system and several are used. However, the most commonly used are those developed by Kees Waaldijk and Judith Goh. For ease of communication, fistula surgeons should use one system consistently for record keeping, case selection, audits and studies.

There are also some commonly used terms to describe fistulas that do not constitute a classification system but are descriptive and therefore useful for communication. The descriptions can be based on the site, size and extent of scarring of the fistula:

Site

- Urethra–vaginal: occur within 3.5 cm of the external urethral meatus.

- Juxta urethral: most common site of a fistula and is at the urethrovesical junction.
- Mid vaginal: 4 cm or more from the external urethral orifice.
- Juxta cervical: adjacent to the cervix, more common in multiparous women and post caesarean section. [28]
- Intracervical: between the bladder and the cervical canal and almost always the consequence of a caesarean section.

Circumferential: most commonly the bladder has been completely separated from the urethra so there is a disruption in the continuity of the urinary tract. The back of the pubic bone can easily be palpated through the vagina at the site of the gap between the urethra and the bladder.

- Ureterovaginal: where one or even both ureters drain into the genital tract. These are usually iatrogenic after a caesarean section and/or hysterectomy.
- Vault: occur at the vaginal vault after an elective or emergency hysterectomy
- size/diameter
- Tiny: admitting only a small probe.
- Small: <1.5 cm.
- Medium: 1.5–3 cm.
- Large: >3 cm, may involve loss of most of the anterior vaginal wall and a circumferential loss of the urethrovesical junction.
- Extensive: major loss of bladder and urethra with a large gap in between. Scarring

The extent of scarring can range from minimal to extreme. In the former, the fistula margins are soft and mobile, whereas in the latter, the margins are rigid and fixed. It can also affect the lateral and posterior wall of the vagina, causing complete stenosis in extreme cases. Stenosis can affect the proximal or distal vagina or can extend throughout. The most common site is midvagina.

2.2.2.7.1.1. Waaldijk Classification System

Kees Waaldijk's classification system for vesicovaginal and rectovaginal fistulas is based on damage to the continence mechanism, 0–5 cm from the meatus, circumferential loss and size. It can be used to determine what type of operation will be needed and gives an indication of the prognosis.

Table I. Classification of fistulas according to anatomic/physiologic location

Type I	Fistulas not involving the continence/closing mechanism		
Type II	Fistulas involving the continence/closing mechanism	**A** Without (sub)total urethra involvement	**a** Without circumferential defect
b with circumferential defect			
B with (sub)total urethra involvement	**a** Without circumferential defect		
b with circumferential defect			
Type III	Miscellaneous, e.g. fistulas involving the ureter and other exceptional fistulas		

Table II: Classification of fistulas according to size

Small	<2 cm
Medium	2–3 cm
Large	4–5 cm
Extensive	≥6 cm

Table II. Using the classification system to predict surgical principles

Type of fistula	**Bladder/urethra direction of closure**	**Pubocervical fascia**	**Anterior vaginal wall closure**
Type I	Any, use common sense	No special measures	Adapt to fistula margins
Type II Aa	Transverse	Transverse repair with or without fixation	Transverse adaptation
Type II Ab	Circumferential end-to-end	Re-fixation	Transverse adaptation
Type II Ba	Longitudinal, with transverse urethral tissue	Fixation	Flap
Type II Bb	Longitudinal, with circumferential nonurethral tissue	Re-fixation	Flap
Type III	Not applicable	Not applicable	Not applicable
Large		4–5 cm	
Extensive		≥6 cm	

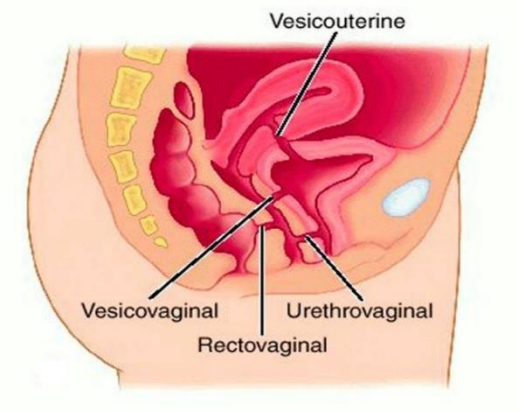


Figure 3 ***Localisation of fistulas***

2.2.2.2.7.1.2 Camey classification of fistulas.

- **Simple fistulas:**

The fistula is found on the posterior aspect of the bladder, a distance from the cervix and the ureteral orifices. Their size is less than 3cm, has never been operated. Many at times these are retro- trigonal fistulas. Some small trigonal fistulas can be considered in this group.

- **Complexes Fistulas. :**

This group involves all fistulas greater than 3cm, near the cervix and ureteral orifices, all fistulas located in the trigono-cervico- urethral region but does not involve the anterior aspect or retro - pubic aspect of the urinary tract. Residual fistula and recurring fistulas also belong to this group.

- **Very complex fistula :**

It is the consequence of total destruction of a large part of the urinary tract., involving the posterior and anterior aspect of the bladder and the cervix in a circumferential lesion called transection ureters are partially destroyed in the proximal portion, many at times its destruction could be total.

- **Classification according to etiology**

This involves two groups.

Obstetrical fistulas urogenital fistulas arising from and linked to pregnancy and child birth.

Non- obstetric fistulas urogenital fistulas of diverse causes.(post radiotherapy post gynecologic surgery).

- **Pronostic Classification.**

Fistulas have to be classified according to difficulty in assuring good surgical repair. Prognostic classification takes into consideration various principles.
It involves two elements accessible during a gynecologic exam.

- **The Arrowsmith score.**

It measures the degree of vaginal involvement (V) and is represented by the following score.

- Score 0 : Minimum vaginal defect. (V0)
- Score 1 : average vaginal defect. (V1).
- Score 2 : moderate vagina defect (V2)
- Score 3: severe vagina defect. (V3)

It also measures the degree of urethral involvement. (U)

- Score 0 : urethra intact (U0)
- Score 1: urethra partially destroyed. (U2)
- Score 2 : urethra completely destroyed. (U3

The TEBEU's pronostic classification.

Criteria of good prognosis.3 prognostic factors: Size less than 2cm, retro trigonal location, soft vagina tissues.

Minor criteria of poor prognosis :(Bladder wall other than the retro trigonal, Size between 2 to 4cm, Vagina less scarring.

Major criteria of poor prognosis: Complete circumferential defect, size >4cm, Major scarring or stenosis.

The combination of the above variables helped in defining prognostic classes as

- Class I: Three criteria of good prognosis.
- Class II. One minor criteria of bad prognosis.
- Class III. Two minor criteria of poor prognosis.
- Class IV. Three minor criteria of poor prognosis or one major criteria of poor prognosis.
- Class IVB: At least two major criteria of bad prognosis.

- **Combined pronostic classification.**

It associates the two elements of Arrowsmith's classification the type(T) of fistula, its location, Size(S) and the number of times the fistula has been operated(N).It is the Goh »s classification modified by Browning, modified by the WHO .:

Table IV: Combined pronostic classification WHO

Classe	**Exemple**
Classe I	Fistula retro-trigonal fistula < 2cm no scarring
Classe II	• retro-trigonal fistula 2-4cm with moderate scarring. Trigonal fistula of 2-4cm with moderate scarring.
Classe III	• Central cervical fistula with no scarring. • . Juxta cervical fistula with no scarring.
Classe IV A	**Urethal** • **Extensive vesical fistula** • Latero-Cervical / Transsection. • Vesico uterine • Uretro-vaginal post hysterectomy.
Classe IV B	• vesical atrophy • Major vagina scarring • Extensive vesical et urethral destruction. • Transsection with loss of urethral. Substance.

This prognostic classification will aid us in classifying surgery into two classes.

- Basic surgery: Class I-II.
- Advanced surgery: Class III-IV.

2.2.2.8. Management.

The best management of urogenital fistulas, other than prevention, is the recognition and repair of the injury at the primary surgery. If diagnosed in the first few weeks after surgery, continuous urinary drainage may resolve a minority of vesico-vaginal fistulas.

Ureteral stenting can aid healing of an otherwise uncomplicated uretero-vaginal fistula. If these simple techniques are not successful, urogenital fistulas are managed with surgical repair. There are several procedures to accomplish this repair. The choice depends upon the type of fistula, patient's characteristics and preferences, and surgeon's experience and preference. Vesicovaginal fistulas, as well as other urogenital fistulas, are very debilitating to patients repair attempt has the highest chance of closure via the vaginal route. Successful repair can be expected in 80 to 90 percent of patients, but multiple surgeries may be required [30]. These patients should be evaluated when they first become symptomatic and by practitioners experienced in treating these conditions.

In patients with advanced cancer, or medical comorbidities, surgical repair may not be feasible. These unfortunate women will benefit from intensive perineal care, a well-fitted diaphragm drained by a urinary catheter in its center or urinary diversion following placement of percutaneous nephrostomies.

- **Timing of surgery**

The timing of fistula repair is dependent on the surgical-readiness of the surrounding tissue. If the tissue is healthy, early repair can be done. This is applicable for obstetric injuries, including urethral injury, bladder tears, and vesico-uterine fistulas. After gynecologic surgery, 6 to 12 weeks is sufficient to allow most granulation tissue to dissipate, increasing the chance of a successful repair. In cases where the tissue is healthy, earlier repair can be considered. During the waiting period, catheterization of the bladder may decrease symptoms and allow for spontaneous closure [31, 32]. Early excision and repair of the fistulous tract within one to two weeks of leakage has become more common [33-35], even with fresh obstetric fistulas [36].

Active pelvic infection precludes an immediate surgical approach. Radiology-assisted percutaneous nephrostomy allows temporary urinary drainage until repair can be undertaken. Inflatable stents placed percutaneously or a ureteral stent placed via

cystoscopy may be able to dilate ureters obstructed by surgical clips, suture, or areas of fibrosis and facilitate drainage.

- **Post hysterectomy vesicovaginal fistula**

Small post hysterectomy vesicovaginal fistulas can be cannulated with a lacrimal duct probe, small feeding tube, or pediatric Foley catheter into the fistula tract to allow the surgeon to draw the vagina toward the introitus, facilitating vaginal dissection. If the fistula tract is difficult to cannulate, a novel technique using a cystoscopically passed glide wire can be used to pull a small catheter through the vagina into the bladder [42].

Alternatively, stay sutures can be placed lateral to the fistulous opening and traction can be used to deliver it into the lower vagina, thus avoiding the need to enlarge the opening. The vaginal epithelium is incised around the fistula, and then vaginal epithelial flaps are raised and removed in a wide circle (2 to 3 cm in diameter) around the fistula tract (Latzko procedure) [43]. Multiple layers (usually two) of 2-0 or 3-0 absorbable sutures are placed in a transverse interrupted fashion with an imbricating technique to facilitate closure without tension. Sutures at the lateral edges of the fistula are placed just beyond, and above and below, the fistula edges. The second layer utilizes transverse U-shaped sutures that actually tie even further Spontaneous healing of a small (less than 5 mm) lesion in otherwise healthy tissue may occur if a stent can be placed across the fistula site and left in place for at least four to eight weeks [40]. During the first seven days after ureteral stents are placed, a separate transurethral catheter should be placed for bladder drainage to prevent any ureteral reflux.

Active pelvic infection precludes an immediate surgical approach. Radiology-assisted percutaneous nephrostomy allows temporary urinary drainage until repair can be undertaken. Inflatable stents placed percutaneously or a ureteral stent placed via cystoscopy may be able to dilate ureters obstructed by surgical clips, suture, or areas of fibrosis and facilitate drainage.

Beyond the lateral edges of the fistula tract. Curved needle drivers may be helpful in facilitating suture placement deep in the vagina. Three of four layers may be needed, but two usually suffice. There may be a minor amount of vaginal shortening as a result of this procedure.

Circumferential, longitudinal or vertical suture lines are best avoided, since these may bring the ureters too close to the midline and facilitate ureteral kinking, tissue ischemia, obstruction, and further fistula formation. Similarly, circumferential purse string sutures are usually avoided since tissue ischemia at fistula edges may occur.

Occasionally, the posterior cul-de-sac (pouch of Douglas) is entered during repair of high vaginal vault fistulas. This may aid the repair since the posterior peritoneum may be raised from the pelvic floor as a flap and used as a third or fourth layer in the Latzko closure. The vaginal epithelium must be carefully reapproximated to close the cul-de-sac after this repair. A modification to the traditional Latzko may also increase the chance of success. Prior to closure of the fistula, either anterior or posterior to the fistula, removal of a small rim of vaginal epithelium is performed. On the side where tissue was not removed, the epithelium is mobilized at least 1 cm lateral to the fistula on both sides, and approximately 2 cm distal. This allows a flap (wider than the fistula) to cover the fistula closure without any overlapping suture lines. Interposition of biologic grafts may also increase the rate of successful repair [44-46]. Layered closure is recommended for more distal and complex fistulas. The surrounding tissue is mobilized with special attention to minimizing tension followed by complete excision of the fistulous tract. It is important not to excise too much lateral tissue to prevent bleeding of the bladder edges and further decreasing bladder volume. The bladder defect is closed in one or two layers with 3-0 or 4-0 absorbable interrupted sutures. When near the trigone, the sutures should be placed in a transverse fashion to prevent kinking of the ureters. The dense connective vaginal tissue (endopelvic fascia) and vagina are closed over the bladder using 2-0 absorbable sutures. Prevention of overlapping suture lines is important to insure a water tight seal of the repair. Methylene blue, indigo carmine, or sterile milk may be instilled into the bladder to test the integrity of the repair [33].

If the fistula is close to a ureteral orifice, cystoscopy with carefully restricted volumes of fluid can be performed at the conclusion of the repair to confirm ureteral patency. Options for coloring the urine to aid visualization include indigo carmine (if available), a preoperative oral dose of phenazopyridine 100 to 200 mg (dose determined by availability), or intravenous fluorescein. Ureteral stents may be placed prior to commencing the repair and then removed at the end of the procedure if there is no ureteral compromise. Methylene blue solution, sterile

infant formula, water, or saline should be instilled transurethral after closure of the first layer to assure that the closure is water tight. A cystogram can be done postoperatively prior to removal of the catheter to confirm healing.

- **High vaginal vault fistula from other causes**

Other causative factors contributing to fistulas high in the vaginal vault include those secondary to radiation necrosis or a long-obstructed labor with cesarean hysterectomy. These are typically vesicovaginal fistulas but may involve ureter or, rarely, the urethra. A comparison of vaginal repair (Latzko) technique with abdominal repair technique in 91 women found no differences in patient sexual satisfaction or quality of life at six months postoperatively [47]. When compared with the abdominal repair technique, the vaginal repair technique was associated with significantly shorter operative time, lower blood loss, and shorter duration of hospitalization. However, fistulas that develop after surgery are usually larger, with more fibrosis and tissue scarring; therefore, they may require laparotomy for repair. Because of the morbidity associated with abdominal approach repair, in cases where a vaginal approach is feasible, this should be the route of first attempt.

- **Vaginal approach**

In the Mackenrodt technique [48], the vaginal flaps are raised away from the bladder and preserved for use in the final closure layer. New tissue sources are also often brought into this repair. The Martius graft, or labial fibrofatty tissue graft, is most commonly used to reinforce repairs even high in the vaginal vault [49]. Gracilis muscle grafts are also used on occasion [50]. These grafts lend strength, support, a blood supply, and sealant to the fistula closure. Gluteal muscle and peritoneum are other sources of tissue interposition [51]. In one surgeon's series of 120 patients with complex vesicovaginal fistulas undergoing repair with tissue interposition (peritoneal, Martius, or labial), the cure rate was 95 percent after the surgeon's first repair [51]; many had had previous failed attempts at surgical repair elsewhere.

A newer approach is use of a Singapore flap (a fascio-cutaneous flap from the inner thigh) in the treatment of complex obstetric fistula. One study including 45 women reported successful

repair rates that were more than twice that of traditional repairs (46 versus 19 percent) [52]. This technique can be applied to distal non-obstetric fistulas as well.
In cases in which tissue interposition is difficult or not possible, alternative techniques have been proposed [53].

- **Abdominal approaches**

For recurrent or complex fistulas, we consider an abdominal approach, which can include abdominal laparoscopic or robot-assisted techniques that involve mobilization and interposition of omentum. In general, the fistula is resected, the vagina and bladder are closed, and omental tissue is interposed between bladder and vagina to separate the suture lines and act as a neovascular pedicle [54]. This approach can be adapted for laparoscopic, robot-assisted, and open procedures.

A case series of five women with vesicovaginal fistula reported all were successfully treated using a robotic procedure that included interposition of sigmoid epiploic between the repaired vagina and bladder [55]. The abdominal approach also may be preferred for patients having concomitant abdominal or pelvic procedures, as well as patients with a complex fistula involving the ureter, bowel, or cervix.

- **Transurethral approach**

A small Canadian study reported fistula repair in three patients using a cystoscope, a laparoscopic needle driver, and an absorbable barbed suture in the bladder and separate sutures placed on the vaginal side [56]. This study is promising because the surgical technique allows for repair on the bladder side without having to open the bladder.

Urethrovaginal fistulas — the urethrovaginal fistula in the developed world most often follows attempted repair of urethral diverticulum repair, anterior colporrhaphy, midurethral sling placement, and obstetric forceps rotations [57, 58]. These are usually readily closed by wide mobilization into the lateral periurethral spaces and layered closure in a tension-free manner. Vertically placed layers, when possible, reduce the risk of urethral shortening postoperatively. Careful dissection of distinct tissue layers will allow closure that does not place suture lines

directly over one another. Martius graft placement is simple and often helpful in the repair of these fistulas. (See "Urethral diverticulum in females".)

- **Ureteral fistulas**

➢ **Ureterovaginal fistulas**

The repair of ureterovaginal fistulas requires an approach and technique that will both restore normal function of the ureter and close the fistulous defect.

Ureteral injuries can be repaired using reimplantation or anastomotic procedures, as appropriate. Transurethral or percutaneous ureteral stenting may allow relief of obstruction and preservation of renal function and, in some circumstances, healing may occur.

➢ **Stenting**

Ureteral stents will allow closure of the fistula in many cases. A small study of 19 cases of ureterovaginal fistula (18 from hysterectomy and 1 from cesarean section) treated with ureteral stenting reported an overall cure rate of 83 percent [59]. These fistulas were considered uncomplicated, and the stents were left in place for an average of 66 days. Stenting was less effective, and the patient required surgical repair, when concomitant vesicovaginal fistula was present. Complication rates were also low; 18 percent developed pyelonephritis, and 9 percent developed a stricture.

➢ **Re-implantation**

A simple ureteral re-implantation is the most effective repair for most post hysterectomy ureterovaginal fistulas that persisted after a trial of ureteral stenting. Ureterovaginal fistulas from gynecologic surgery are usually close to the bladder, beneath the trigone, or at the level of the uterine artery or infundibulopelvic ligament, thus facilitating re-implantation. Support the anastomosis, although they are not necessary, and they do make handling the ureter easier. When used, stents can be left in the bladder, or secured to a transurethral or suprapubic catheter. The bladder incision is then closed.
A drain is placed next to the reimplantation site to minimize peritoneal irritation if urine leakage occurs.

The drain is removed when drainage is minimal (i.e., less than 100 cc/24 hours). The catheters and stents have traditionally been left in place for at least a few weeks. However, removal of the stent immediately or within a week does not appear to compromise results. An intravenous pyelogram (IVP) should be obtained to confirm successful repair: persistent leaks are stented, and urinomas drained percutaneously if they occur.

- **Anastomotic repair**

End-to-end or side-to-end anastomoses of ureteral segments carry a relatively high rate of subsequent ureteral stenosis, whether or not stents are used. However, for the rare injury above the pelvic brim, this may be the only option, rather than percutaneous diversion or ureterostomy.

End-to-end anastomoses are performed by spatulating the ends of the ureter to increase the suture line circumference. Closure is achieved in one layer using 4-0 or 3-0 absorbable sutures. A drain, coming out of the overlying skin, may be placed to divert any escaping urine away from the peritoneal cavity. If stents are used, they are usually removed in two to four weeks, but this may be delayed if follow-up IVPs show continuous leakage.

If large defects in ureteral length exist, a segment of isolated small bowel can be anastomosed to the bladder and the ureter attached to the bowel segment. This is rarely required. Fibers, which protects and supports the blood vessels both within and around the ureter (Waldeyer's sheath) [28]. Bleeding from the vaginal cuff with large sutures are a common cause of ureteral injury.

The most important aspect of ureteral blood supply is its unpredictable source. Eighty percent

of all ureters have a single artery that runs along the entire length. This artery usually originates from the renal artery, but may also be supplied by the aorta, ovarian, iliac, uterine, middle hemorrhoidal, superior vesicle, and vaginal arteries. Twenty percent of ureters do not have a

single vessel running their course. These ureters are supplied by an anastomosing network of small vessels from the major arteries named above.

Care must be taken during dissection of the ureter not to compromise its blood supply. Above the pelvic brim, dissection should be done with a lateral approach, while in the pelvis; the approach should be taken anteriorly [25]. Disruption of the ureteral blood supply may lead to loss of peristalsis, segmental dilatation, and eventual fistula formation after a delay of days or weeks.

- **Uteroperitoneal fistulas**

A leaking or completely transected ureter will drain into the peritoneal cavity. Patients will present with abdominal distention, and the fluid will be easily seen on computed tomography scan. A sample of the fluid will evidence markedly elevated urea nitrogen and creatinine. Reimplantation is the best management. Benign, malignant and chylous ascites are in the differential diagnosis of this rare type of urogenital fistula. A defect in the dome of the bladder can also lead to intraperitoneal urine collection. With documentation of intraperitoneal urine, a cystogram and cystoscopy with retrograde dye injection of the ureters is necessary to locate the defect.

- **Obstetric fistulas**

Obstetric fistulas are classified according to their anatomic location (figure 1).

The mainstay of treatment for obstetric fistulas is surgical repair. A few fistulas, particularly if they are small and are diagnosed immediately after delivery, may heal spontaneously if an indwelling urinary catheter is placed and is allowed to remain for several weeks [38].

Obstetric fistula repair

- **Preoperative preparation**

A basic general medical screening of the patient should be performed prior to surgery. It is usually not necessary (and often is not even possible) to carry out an extensive preoperative medical work-up unless obvious physical signs and symptoms of significant systemic disease are present. Patients should be fit enough to undergo the operation. If they are not, the operation should be postponed. Active parasitic infections, such as malaria, should be treated preoperatively. If the patient is extremely anemic, it may be preferable to treat her with iron supplementation for several months, or intravenous iron if available, prior to attempted repair.

The patient should be washed thoroughly with soap and water before surgery, but no specific preparation of the fistula site is necessary other than what would normally be carried out in the operating room. Although most surgeons use prophylactic antibiotics (such as a single dose of gentamicin), there are currently no good data that demonstrate that this improves the outcome of fistula repair operations.

- **Procedure**

The basic principles of obstetric fistula repair are [40, 41]: Application of these principles to any individual case may be quite challenging, particularly if the fistula is complicated. Fistula repair surgery should be performed by an experienced pelvic surgeon. Broad mobilization of the fistula so that it can be closed without tension at the site of the repair Water-tight closure of the injury

Adequate bladder emptying in the postoperative period so that the suture line does not become over-distended and break down

- **Exposure of fistula**

The starting point for successful fistula repair is to visualize the entire fistula and expose it fully so that the surgeon is aware of the margins for closing it completely. The precise steps depend on degree of scarring and local pathology that is present. These steps will vary enormously from patient to patient. Generally, the initial incision is one that circumscribes the fistula so that the surrounding tissues can be adequately mobilized for closure. The next step is to mobilize the surrounding tissue. The edges of the fistula should be free enough that they can be brought together without tension on the suture line. Many attempted fistula repairs are unsuccessful because the

fistula was not adequately mobilized at the initial dissection. For large fistulas, almost the entire anterior vagina may need to be mobilized, as well as dissection into the retropubic space of Retzius. In cases where there is heavy vaginal scarring, relaxing incisions in the surrounding scar tissue may be required to free up the fistula so that it can be closed. In many cases, this may require a generous mediolateral episiotomy that must subsequently be repaired.

- **Closure of bladder wall**

Once the fistula has been exposed and the surrounding tissues have been widely mobilized, the bladder wall is closed. The most important point is to make sure that the closure is water-tight or the repair will likely fail.

- **Initial closure**

Closure is typically accomplished using either interrupted sutures or a continuous running suture of delayed-absorbable material (eg, 3-0 polyglactin 910, Vicryl). The use of interrupted sutures has the advantage that should one suture fail the entire suture line is not disrupted, as would be the case in a break involving a continuous running suture.

- **Avoid permanent suture**

Permanent suture should not be used for fistula repair unless it can reliably be removed 7 to 14 days after surgery. If permanent sutures are left in place, they will often become the nidus for the formation of a bladder or vaginal stone. Sutures left in place may also lead to breakdown of the repair and/or pain and discomfort.

- **Possible imbrication suture**

There is some debate as to whether a second layer of imbricating suture in the bladder wall is required. A second layer serves to buttress and support the initial closure, but if dense scarring or markedly reduced bladder capacity is present, it may not always be possible to place a second layer.

- **Test bladder wall integrity**

The integrity of the bladder wall closure should be tested. This is generally done by instilling a solution of sterile water colored with indigo carmine or methylene blue dye (5 to 10 mL in 500 mL of saline) into the bladder via a bladder catheter. The bladder should be filled with roughly 250 mL of fluid and the suture line carefully checked for leakage. If a leak is discovered, the repair must be revised until it is watertight; failure to do this virtually guarantees failure. The intention here is to fill the bladder to a reasonable volume to check the integrity of the repair, not to make it undergo a "pressure test," which could itself break down the repair by over-distension.

Close vaginal epithelium

The vaginal epithelium is closed using either interrupted or running absorbable sutures. Absorbable sutures should be used if possible. Many surgeons place a vaginal pack for one or two days to improve hemostasis and provide support to the healing tissues.

Additional surgical considerations

- **Possible use of vascular flap**

Use of a vascular tissue flap as an adjunct to repair is an ongoing controversy in fistula repair. The most commonly used flap is a bulbocavernosus fat pad interposition (Martius flap). Because the obstetric fistula results from a crush injury that involves a broad swath of tissue, the rationale for using a flap is to bring a fresh blood supply to the surgical field with the aim of improving

wound healing. Another potential advantage of the use of full-thickness Martius skin grafts to close the vagina is that they may preserve vaginal depth and reduce the rate of post repair vaginal stenosis [42]. However, patients who have undergone a repair using a Martius flap may develop stress urinary incontinence in 10 to 20 percent of these repairs [43]. At present, there seems to be a movement away from the routine use of bulbocavernosus flaps in obstetric fistula repair.

The available evidence regarding whether to use a vascular flap comes largely from observational studies. For example, a retrospective review of 46 obstetric fistula repairs in India compared those done with and without a Martius flap and found substantially better results in patients who had undergone a repair with a flap [44]. In contrast, a study of 440 fistula repairs done in Ethiopia with and without the use of a Martius flap

found no significant difference in outcomes between the two groups [45]; the author attributed the high rates of success attained in both groups to the experience of the surgeon rather than the use of a flap.

Use of a vascularized pedicle flap, such as a gracilis muscle transposition flap or Singapore fasciocutaneous flap, has been reported in more complicated cases, such as those with broader areas of tissue loss or repeated prior failed attempts at fistula closure [46,47].

- **Creation of neourethra**

Fistulas in which the urethra has been transected ("circumferential fistula") or destroyed remain among the most challenging to repair.

In many cases, an attempt is made to create a neourethra by mobilizing vulvar and labial tissues [48,49]. In some cases, it may be possible to mobilize a flap from the anterior bladder itself, roll it into a tube, and bring it down as a neourethra [50]. Patients who develop stress urinary incontinence after a vesicovaginal fistula repair, and particularly those who have stress incontinence after fistulas involving the urethra, may be candidates for some type of suburethral sling. When sling operations are performed, they should use the patient's own tissues (rectus fascia, fascia lata). Commercial "mesh kit" suburethral slings have no role in obstetric fistula surgery [51].

- **vesicouterine fistulas**

This type of fistula is most often seen after cesarean delivery and represents 1 to 4 percent of urogenital fistulas [34]. This type of fistula has also been reported to occur after uterine scar dehiscence, placenta percreta, and intrauterine device-associated injury. These patients usually present with vaginal leakage of urine, which can be seen to be entering the vagina from the cervix. Some patients present with Youssef's syndrome, which is characterized by cyclic hematuria (menouria), absence of vaginal bleeding (amenorrhea), and urinary incontinence due to vesicouterine fistula [46]. Cystogram demonstrates flow of dye into the endometrial cavity and then into the vagina via the cervix. Spontaneous healing has been reported in 5 percent of patients treated only with bladder catheterization for up to eight weeks [54]. Closure requires resection of the fistulous tract from both bladder and uterus, closure

of the openings, and then interposition of the omentum or peritoneum. Abdominal laparoscopic and robotic approaches have been effective in surgical management. A vaginal approach can also be used. Hysterectomy can be performed, and the bladder portion of the fistula excised and closed in layers

Surgical sealants

Fibrin-based surgical sealants have been described to aid in fistula repair, but there is no evidence regarding their efficacy.

2.2.1.8. POST OPERATIVE CARE

A bladder catheter should be left in place for at least 7 up to 14 days [45,]. Drains and catheters need to be secured to prevent unintentional removal.

2.2.2.9. Complications.

The first repair is the best chance at successful repair of the fistula. Unsuccessful repairs occur in 7 to 20 percent of patients [48]. Unsuccessful repairs require complete evaluation of the bladder, ureters, and kidneys before planning subsequent surgeries. Repair failure often occurs as a pinpoint fistula seen at the lateral corners of the prior repair. Good lighting, adequate exposure, and patience are useful in the re-evaluation of a patient that continues to leak after a repair. Infection needs to be eliminated, and often repeat repairs will require consideration of using soft tissue grafts. Stenting or percutaneous drainage may be used to allow further periods of healing, or to drain urinomas or abscesses. Occasionally, stents or catheters are sewn in place, requiring limited exploration for removal. Sutures placed into the bladder lumen may cause gravel or stones, which can grow to several centimeters in diameter. Removal to control infection may be required long after a successful fistula closure. Other complications are the same as for other types of gynecologic surgery (eg, infection, hemorrhage).

Fistula surgeons have traditionally reported "success" as their ability to close the hole between the bladder and the vagina. From the obstetric fistula patient's point of view, however, "success" occurs only when the fistula is closed, when she has normal bladder storage and emptying functions, when she has regained normal sexual functioning, when her menstrual cycle

has returned, when she has normal reproductive capacity often including the ability to have additional children, and when she is accepted once again as a full participating member of her local community and the wider society in which she lives. The complexity of obstetric fistula repair varies across patients. The degree of scarring at the fistula site, the size of the fistula, and the extent to which the continence mechanism of the urethra and bladder neck is involved all appear to have considerable prognostic significance [37,52-54]. The World Health Organization has developed criteria for differentiating between simple and complicated fistulas that may be helpful in predicting surgical outcomes, but this system has not been validated [55]. A different system defines surgery as easy, intermediate, or difficult based on a clinical scoring system [56]. Given the enormous variability in the types and kinds of fistulas that are seen, it is extremely difficult to compare outcomes.

The best opportunity to correct the problem and close the fistula lies in the initial operation; the success rate drops steadily with subsequent repairs [56]. In a study of 384 women who completed a review 6 months after fistula surgery, the odds of having a closed and dry outcome decreased with the increasing number of surgeries [56].

Persistent incontinence after surgical repair

In general, there are three possible outcomes from a fistula repair operation: "closed and dry," when the fistula has been repaired and continence has been restored; "not closed," when the repair has not been successful; and "closed but wet," when the fistula has been closed, but the patient still experiences transurethral loss of urine [56]. In the past, it has often been assumed that these patients have "type III stress incontinence." Further investigation has demonstrated that this is often not the case. Patients who are still incontinent after successful fistula closure may have any number of reasons for their urine loss, including stress incontinence, detrusor overactivity, incomplete bladder emptying or urinary retention, the presence of a bladder stone, marked reduced bladder capacity, etc.

When postoperative incontinence is present, the cause must be identified. The first step is to determine if a fistula is still present. This is best done by performing a vaginal examination and a dye test. A catheter is inserted into the bladder, the urethra is compressed with a gauze pad to prevent leakage around the catheter, and the bladder is filled with a solution of colored saline or sterile water. Leakage through an unclosed fistula should be apparent. Examination may reveal

leakage from the repair site or even a separate vesicovaginal fistula that had been inadvertently overlooked. In general, unless complete breakdown of the repair is obvious immediately after surgery, it is prudent to wait at least six weeks for optimal healing to occur before making another attempt at surgical repair. In such cases, continued catheter drainage may allow the fistula to heal, particularly if the defect is small.

Some women with continued incontinence may have an ureterovaginal fistula that was not accurately diagnosed before surgery. Use of oral phenazopyridine (to turn the urine orange) in combination with a dye test of the bladder can help to identify these defects. Facilities that can perform an intravenous urogram will be able to document an ureterovaginal fistula radiographically, but this technology is often not available in low-resource settings.

If extraurethral loss of urine through a fistula cannot be documented and the patient still has leakage, the patient should be evaluated for etiologies of transurethral urinary incontinence, including stress incontinence, detrusor overactivity, incomplete bladder emptying, or a bladder stone. Although not yet widely available in centers performing fistula surgery, equipment to perform urodynamic studies is likely to prove invaluable in making a precise diagnosis in women with post repair incontinence [48].

A bladder stone develops in some patients following fistula repair, particularly if non absorbable sutures were used. Passage of a short metal catheter into the bladder not only allows measurement of the postvoid residual, but it also allows the bladder to be probed for the presence of a bladder stone. If the presence of a stone is suspected, cystoscopy can confirm its presence. Removal of a bladder stone is best performed under anesthesia in an operating room.

A theoretically attractive alternative in appropriately selected patients is the use of a removable urethral plug (eg, FemSoft) [59]. This is a "high technology" solution to incontinence developed in the industrialized West, but directly applicable to the obstetric fistula patient with a nonfunctioning urethra. The insert keeps the urethra closed; it is removed by the patient every three hours to void, and is then reinserted. The main difficulty with the urethral plug is making it accessible to patients. The only current source for such technology is usually through a specialist fistula center that keeps them in store for patient use. As these devices have not been

commercially successful in the developed world, they are increasingly difficult to locate in resource-limited countries.

The treatment of last resort is an ileal conduit or some type of continent urinary diversion. For patients in low-resource settings, any treatment that requires ongoing maintenance, supervision, or the use of catheters, bags, or other appliances may be problematic.

Long-term outcomes

There is little known about the long-term outcomes for patients in resource-limited settings who undergo obstetric fistula repair. Postoperative data on fistula repair have generally included only the patient's condition at the time of discharge from hospital, often only a few weeks after surgery. Most patients come from rural areas where communication is poor and access to reliable transportation is difficult. Some patients who are still incontinent after surgery return seeking care, but the long-term outcomes for most patients remain unknown. There is an urgent need for better information on long-term clinical outcomes, including postoperative continence, particularly after subsequent childbirth, future reproductive health, and the ability of these patients to reintegrate into their home communities. Because motherhood is the desired and expected life-goal for many African women and because fistulas often develop in a woman's first pregnancy, there is a real need to understand the likelihood of fertility after previous fistula repair and the outcomes of the pregnancies that occur. Current evidence suggests that former fistula patients have reduced fertility and a high risk for obstetric complications in subsequent pregnancies [58]. One A longitudinal study of 481 women discharged with a closed fistula from three repair centers in Guinea followed for a median of 28 months after surgery reported 73 recurrent fistulas in this population for a cumulative incidence of 71 fistulas per 1000 person-years. Of 447 women who were continent at the time of discharge from hospital, there were 24 cases of post repair urinary incontinence, a cumulative incidence of 23.1 per 1,000 person-years. Of the 305 women who were at-risk for pregnancy after fistula repair, there were 73 total pregnancies (67 pregnant once, 5 pregnant twice, and 1 pregnant three times). There were 11 ongoing pregnancies at follow-up and 6 women had aborted or miscarried. Of the 50 women who delivered during the follow-up period, there were 29 vaginal deliveries (19 home births and 10 in health facilities), resulting in 8 stillbirths, 5 recurrent fistulas, and 1 maternal death. There were also 21 cesarean sections (9 elective and 12 emergencies). The emergency cesarean sections resulted in four

stillbirths and two recurrent fistulas [53]. These data clearly demonstrate the deficiencies in health care systems that continue to affect the lives of birth-injured women. The best outcomes after fistula repair result from scheduled cesarean delivery in a health facility, but such services remain beyond the reach of those women most at risk for fistula formation.

- **Urinary diversion**

Cases in which there is no viable bladder tissue remaining and cases in which the entire urethra has been destroyed have a poor prognosis for cure. Controversy exists as to whether or not such patients should be offered some form of urinary diversion, such as an ileal conduit (which, in effect, is an operation to move the fistula from the pelvis to the abdominal wall) or a continent urinary diversion, such as a Mainz II pouch or a ureterosigmoidostomy, which divert the urine into the large intestine [44].

2.2.2. Rectovaginal fistulas.

2.2.2.1. Etiology

Anovaginal fistulas (AVFs) and rectovaginal fistulas (RVFs) most frequently result from obstetric trauma, especially in resource-limited countries where prolonged obstructed labor can lead to pressure necrosis of the rectovaginal septum. These fistulas can also occur following a failed repair of a third- or fourth-degree laceration of the perineum, from unrecognized injury at the time of vaginal delivery, and from episiotomy infection. Radiation damage and Crohn disease are two other important causes of RVF.

RVFs may also occur following difficult hysterectomies, especially those performed for severe endometriosis with involvement or obliteration of the posterior cul-de-sac (pouch of Douglas); from extension or rupture of perirectal, perianal, and, rarely, Bartholin's abscesses; and from any surgical procedures involving the posterior vaginal wall, perineum, anus, or rectum. In older women, RVFs can occur as a result of diverticulitis, colon cancer, or fecal impaction. In addition, treatment options for pelvic organ prolapse such as pessaries and various mesh repair procedures have been associated with RVFs

2.2.2.2. Classification of Genito -digestive fistulas

Although a variety of classification systems exist for these fistulas by size, location, or etiology, none is correlated with patient outcomes.

Table V. Genito–Anorectal Fistulas (Recto vaginal Fistulas*)*

Site (distance between distal edge of fistula and hymen)	
Type 1	>3 cm
Type 2	2.5–3 cm
Type 3	1.5 to just less than 2.5 cm
Type 4	<1.5 cm
Size (length of the largest diameter)	
(a)	<1.5 cm
(b)	1.5–3 cm
(c)	>3 cm
Scarring characteristics	
i	None or mild fibrosis around the fistula and/or vagina, vaginal capacity >6 cm
ii	Moderate or severe fibrosis, vaginal capacity <6 cm
iii	Special consideration, e.g. radiation damage, inflammatory disease, malignancy, previous repair

2.2.2.3. Clinical Manifestations

Women suffering from rectovaginal fistulas (RVFs) present with uncontrollable passage of gas or feces from the vagina. A malodorous vaginal discharge and fecal soiling of the undergarments are also common complaints. These symptoms may be more pronounced when patient bowel movements are loose. Occasionally, a small fistula may be asymptomatic.

Patients suspected of having AVFs should also be questioned about symptoms of fecal urgency as well as fecal incontinence associated with urgency. These additional symptoms often suggest disruption of the external anal sphincter.

2.2.2.4. Evaluation and Diagnosis

All patients suspected of having anovaginal fistulas (AVFs) or rectovaginal fistulas (RVFs) should undergo a vaginal examination. The diagnosis is made on vaginal examination. Fistulas that occur below the dentate line are called anovaginal fistulas (AVFs) or low fistulas. AVFs are usually found within the first 3 cm from the anal verge. Fistulas that open on the perineal body are called anoperineal fistulas.

Fistulas cephalad to the dentate line are true rectovaginal fistulas (RVFs) and are classified by some experts as high fistulas. The distinction between AVFs and RVFs is important as the anal sphincter complex is often involved with the former.

Fistulas of the colon above the rectum are referred to as colovaginal fistulas. In addition, patients diagnosed with fistulas should have a complete evaluation of their anal sphincter complex to rule out concomitant sphincter injury. If a surgeon is unclear as to whether the anal sphincter is intact, end anal ultrasound can detect defects in both the internal and external anal sphincter complexes.

It is critical that the clinician evaluate the entire sphincteric mechanism in women with RVFs to exclude coexisting causes for incontinence, such as a disrupted anal sphincter. Although concomitant sphincter injury has been reported to exist in up to one-third of women presenting with RVFs [33], concomitant internal or external sphincter injuries (or both) are probably more frequent when the location of the fistula is within the distal 3 cm of the anal canal. Anatomic and physiologic studies have shown that this is the normal length of the sphincter complex. Failure to recognize and repair such a sphincter injury may result in continued incontinence following a successful fistulectomy.

Pinpoint fistulas can be difficult to locate on vaginal examination. The use of a Sims speculum and magnification, such as a colposcope, may be helpful. Lacrimal duct or silver wire probes can also be used to assist in identifying the fistula tract. A few drops of methylene blue dye can be mixed with lubricating gel and massaged into the anterior rectal wall. Alternatively, an enema consisting of warmed saline and a few drops of methylene blue dye can be instilled into the rectum using a genitourinary syringe. Using a peroxide solution will avoid staining the tissues . If a tract cannot be found easily, the patient's hips can be elevated, water placed in the posterior vagina, then air (50 to 100 cc) placed in the rectum with a catheter-tip syringe

connected to a Robertson catheter. Air will generally pass anteriorly through a small tract and bubble through the vaginal water. Proctoscopy or an anorectal speculum may also be useful in visualizing the fistulous tract from the rectal side.

2.2.2.5. Differential diagnosis.

The differential diagnosis of anovaginal and rectovaginal fistulas (AVFs and RVFs) includes conditions that cause fecal soiling, such as fistula-in-ano, perianal abscess, and anal incontinence, and conditions that cause malodorous vaginal discharge, such as vaginal infection. AVFs and RVFs can be distinguished from these entities based upon the patient's symptoms and the physical examination. Among the conditions in the differential diagnosis, fistula-in-ano is most commonly confused with AVF.

2.2.2. 6. Indications for surgery.

For women with small fistulas and minimal symptoms, nonsurgical management is appropriate [9]. Optimizing the patient's bowel function, particularly controlling diarrhea, is beneficial. However, for the majority of patients with anovaginal or rectovaginal fistulas, the symptoms are intolerable. Thus, surgical repair is indicated.

The surgical approaches to fistula repair vary by the etiology of the fistula, its location and size, the quality of the surrounding tissue, the patient's underlying comorbidities, and any previous attempts at repair.

2.2.2.6. Preoperative Preparation.

There is no consensus regarding the best preoperative regimens for women undergoing repair of anorectal fistula (AVF) or rectovaginal fistula (RVF). In our practice, we prescribe a liquid diet for 24 to 48 hours prior to surgery, followed by a mechanical bowel cleansing; we give a single dose of preoperative antibiotic 30 minutes before surgery.

2.2.2.6.1. Diet

Dietary manipulation is required in all women undergoing AVF or RVF repair. The ultimate goal is to avoid fecal seeding of the wound during the procedure and to decrease the

amount of stool that will pass over the repaired area in the first few weeks of healing. In most cases, a liquid diet should be followed for 24 to 48 hours prior to surgery.

2.2.2.6.2. Mechanical bowel cleansing

Mechanical bowel cleansing is routinely recommended. The author prefers to give oral agents (900mls of magnesium citrate or 4 to 6 liters of Golytely) 48 hours preoperatively. Administering these agents within 24 hours of the procedures can result in a thin fecal effluent being present at the time of the repair. In addition, a tap water enema or a Fleet enema can be given the night before surgery to complete the emptying of the lower colon and rectum. Alternatively, a Fleet enema can be given an hour prior to surgery.

2.2.2.6.3. Antibiotic prophylaxis

We administer a single dose of a broad-spectrum antibiotic, such as cefotaxin cefotetan, intravenously 30 minutes before the procedure. Alternatively, a combination of cefazolin and metronidazole also provides adequate coverage. For patients with a beta-lactam allergy, clindamycin plus gentamicin can be used as an alternative regimen; gentamicin should be dosed based upon actual patient weight. Additional antibiotic therapy is typically not indicated, unless there is fecal soiling during the procedure. In most patients, prophylactic antibiotics should be discontinued within 24 hours after the surgical procedure.

2.2.2.7 Surgical Principles.

2.2.2.7.1. Basic principles

The basic principles essential to all successful fistula repairs include:

2.2.2.7.1.1. Timing of repair

Most rectovaginal and anovaginal fistulas are amenable to early repair, provided there is no infection, induration, or inflammation present in the tissues involved. When active wound infection or tissue induration is present, patients should be provided with aggressive wound care (eg, sitz baths, debridement) and a 10 to 14 day course of broad spectrum

oral antibiotics. In addition, a low residue diet helps to decrease the frequency of bowel movements, prevent continuous seeding of the wound with liquid stool, and restore some degree of fecal continence. In these patients, surgery is deferred until all signs of infection, induration, and inflammation have subsided. Wide mobilization of the adjacent tissue planes

Complete excision of the fistula tract

Multilayered closure, which reapproximates broad tissue surfaces without tension and avoids "dead space" Proper timing of the repair

2.2.2.8. Surgical Approach.

Surgical approaches to anovaginal or rectovaginal fistula repair are dictated by fistula etiologies. Given that most rectovaginal fistulas result from obstetric trauma, the discussion below will focus on obstetric fistulas.

2.2.2.8.1. Fistulas due to obstetric injury

For women with anovaginal or rectovaginal fistulas from childbirth, we suggest a simple local repair with or without sphincteroplasty.

2.2.2.8.2. Fistulas with intact sphincter:

Simple fistulectomy

Small rectovaginal fistulas that do not involve the anal sphincter complex can often be repaired by simple fistulectomy via a transvaginal or transrectal approach.

An incision is first made around the fistula opening. The surgeon's non dominant index finger can be inserted into the rectum during the procedure to assist the repair . Sharp mobilization of the vagina and rectum in a circumferential fashion should be accomplished next by providing traction and counter traction on the edges of the fistula after the tissue planes are widely mobilized, the entire fistulous tract and any adjacent scar tissue are excised. The edges of the surgical wound should only contain fresh, viable tissue. The edges of the anterior rectal wall are then inverted, either by placing interrupted submucosal stitches of 3-0 or 4-0 delayed absorbable sutures or by

placing a purse string suture. The most cephalad and most caudal sutures should be placed at least 5 mm above and below the fistula. A second layer of sutures of 2-0 delayed absorbable type is then placed in the muscularis of the anterior rectal wall to invert and take tension off of the first suture line. This layer should begin and end approximately 5 mm above and below the first suture line.

An additional layer of adjacent rectovaginal tissue is then approximated to provide a third layer of closure and take tension off of the underlying layers of repair. If necessary, a modified Martius graft can be interposed between the rectum and vagina before this step finally, the vaginal mucosa is approximated with a continuous 3-0 suture. Complete hemostasis and closure of all potential dead space must be ascertained.

Depending upon the extent of repair, we frequently will place a small vaginal pack soaked in a very dilute Betadine solution or use petroleum-impregnated gauze to promote hemostasis and provide
gentle pressure against the incision line. If placed, the vaginal pack is typically removed within the first 12 to 24 hours postoperatively.

2.2.2.2.9.3. Fistulas with injured sphincter:

Tran's sphincteric approach

In patients with concomitant sphincter injury and absent perineal body or a small bridge of perineal skin, fistula repair may be performed in conjunction with repair of the external and internal sphincters and reconstruction of the perineal body and rectovaginal septum. The preferred approach in these patients is a midline perineal incision (transsphincteric or perineoproctomy) with wide mobilization of the posterior vaginal wall, followed by a multilayered closure as described for a chronic third- or fourth-degree laceration. In all cases, it is important that the fistula tract be excised in its entirety, as discussed above.

2.2.2.9. Fistulas above the sphincter:

Transverse transperineal approach

Rectovaginal fistulas located above the sphincter complex should be approached with a transverse trans perineal incision. This approach allows the surgeon to preserve the intact internal

and external anal sphincter and allows wide mobilization of the rectal and vaginal tissue. A transverse incision is made across the perineal body above the sphincter complex. Dissection is then carried out in the true recto vaginal space between the anterior rectal wall and the posterior vaginal wall to mobilize the tissues widely laterally and cephalad to the fistula tract. Dissection above the fistula tract is usually easy because the vagina and rectum are only loosely connected above this point. The fistula tract and any adjacent scar tissue are then excised with Metzenbaum or Cooley scissors. The rectal wall defect can be closed either longitudinally or transversely with interrupted 3-0 or 4-0 delayed absorbable sutures to invert the rectal mucosa without tension.

Following this procedure, patients are generally hospitalized overnight for pelvic rest (no vaginal insertions), pain control, observation for bleeding, and vaginal pack removal.

2.2.2.8.5. Fistulas due to radiation

Fistula formation following radiotherapy is believed to be the result of progressive endarteritis obliterans and tissue hypoxia. These fistulas can occur years after the completion of radiotherapy, can be large, and can appear high in the posterior vaginal wall. They are often associated with rectal stricture due to perirectal fibrosis. Refinements in modern radiotherapy have led to a decline in radiation-induced fistulas.

Radiation-induced fistulas can be either low fistulas or high fistulas. Low fistulas can be repaired locally with interposition of a fat graft, usually of a modified Martius type. High fistulas need to be approached transabdominally with interposition of an omental flap, a muscle flap, or a bowel onlay patch (Bricker-Johnson procedure). Permanent diverting colostomy should be performed when radiation necrosis is extensive, and temporary colostomy or ileostomy should be considered for all radiation-related fistulas.

2.2.2.8.6. Low fistulas:

- **Local repair with Martius graft interposition**

Successful local repair of radiation-induced fistulas needs to follow the basic surgical principles of other fistula repairs. Repair should be delayed until the radiation-induced necrosis process has resolved. A preoperative diverting colostomy diverts fecal stream away from the fistula area to allow for healing. At the beginning of the repair, margins of the fistula should be biopsied to

exclude residual or recurrent malignancy. At the end of the repair, a Martius graft should be interposed between the vagina and the rectum to bring in new blood supply, especially in patients with extensive tissue excision. Before the temporary diverting ostomy is taken down, the closure of the defect should be tested by placing water in the vagina and air in the rectum as described above. The success of radiation-induced fistula repair varies widely between series [15]

2.2.2.8.7. High fistulas:

2.2.2.8.7.1. Transabdominal repair with tissue interposition

High rectovaginal fistulas caused by radiation damage often need to be approached transabdominally. The transabdominal approach is facilitated by use of long instruments and retractors, such as those used in thoracic or deep pelvic surgery. A preoperative diverting colostomy diverts fecal stream away from the fistula area to allow for healing.

2.2.2.8.8. Other complex fistulas

Rectovaginal fistulas can also develop from pelvic malignancies or as complications following pelvic surgeries done for endometriosis or diverticular disease. These fistulas are usually high fistulas, and therefore a transabdominal procedure should be used for their repair. Minimally invasive, including robotic, techniques have been employed successfully, using the same surgical principles described above to achieve adequate visualization and bowel mobilization [19].

2.2.2.9. Adjuvant techniques

2.2.2.9.1. Modified Martius graft

A modified Martius graft is a bulbocavernosus muscle or labial fat pad graft used in closing large or difficult rectovaginal or vesicovaginal fistulas. A Martius graft does not provide any significant structural support to the repair, but it provides neovascularity, fills in dead space, and enhances granulation tissue formation at the site of repair. After fistula healing is confirmed, the colostomy can be reversed by suturing to a modified Martius graft can be used in patients with complex fistulas caused by inflammatory bowel disease or radiation injury, as well as in patients with recurrent fistulas. It is most useful

in the repair of rectovaginal fistulas located in the middle to upper third of the vaginal vault, where there may not be sufficient tissue to transpose between the vagina and the rectum. The procedure involves transposing a vascularized graft made of healthy tissue to the repair site.

2.2.2.9.2. Diverting colostomy.

Diversion of the fecal stream is not required in the management of most anovaginal or rectovaginal fistulas. However, a colostomy is a useful adjunct to the care of complex fistulas associated with a lower healing rate. Examples of such complex fistulas include radiation-induced fistulas, large rectovaginal fistulas with diameter greater than 4 cm, and some fistulas secondary to inflammatory bowel disease.

2.2.2.10. Post-operative care

Following an anovaginal or rectovaginal fistula repair, patients are observed overnight in the hospital, then discharged home with specific instructions on diet, bowel regimen, and general care.

2.2.2.10.1. In-hospital care.

Most patients can be discharged home on the first postoperative day, as long as they can be seen within one week for a wound check. Urinary retention is a common problem following fistula repair. It is reasonable to place a Foley catheter and a vaginal pack at the end of the surgical procedure and remove them both on the evening of the surgery or, alternatively, the morning of the first postoperative day. Antibiotics in the postoperative period are probably unnecessary in the absence of clinical infection.

2.2.2.10.2. Diet.

Dietary manipulation should be considered to decrease the amount of stool that will pass over the repair in the first few weeks of healing. A clear liquid diet is prescribed for the first 24 to 72 postoperative hours. A low-residue diet should then be instituted for at least three to four weeks. The low-residue diet should be discontinued if constipation develops.

2.2.2.10.3. Bowel regimen.

A stool softener should be given for one month to lubricate the stool. If the patient complains of constipation, milk of magnesia or other laxatives can be given to ease bowel movements. Enemas should be avoided.

2.2.2.10.4. General care

Ambulation is allowed. Women should be instructed in wound care and taught how to perform Sitz baths starting two to three days following the procedure. A heat lamp or a blow dryer on a cool setting can also be used to keep the area dry.

2.2.2.11. Morbidity and mortality

Perioperative deaths are rare following anovaginal (AVF) and rectovaginal (RVF) fistula repair. The major morbidities associated with AVF or RVF repair include recurrent fistula; wound infection; urinary tract infection; bowel obstruction or perforation; vaginal, anal, or rectal stenosis; fecal incontinence; and sexual dysfunction. The rates vary depending upon the etiologies that cause the fistulas.

2.3. Prevention of Obstetrical and non- obstetrical fistulas.

2.3.1. Primary Prevention.

This implies quality antenatal care, good quality of care during labor and delivery.

Timely referrals of complicated labor cases.

Best surgical practices during gynecologic surgeries,

2.3.2. Secondary prevention.

Avoid per vaginal delivery in patients who have suffered from fistulas,

2.4. Publications on the subject.

Table VI. Epidemiology and prognosis of obstetric and non- obstetric fistulas.

year	Country	Title	Authors	Study type	Results.
2020	Ethiopia	Determinants of time to recovery from obstetric fistula by using the data of university of Gondar teaching hospital fistula center, Gondar–Ethiopia: A parametric survival.	Endeshaw Assefa Derso and al.	Retrospective and cohort study.	The status of urethra, width of fistula, mode of delivery,place of delivery was influential determining outcome of fistula repair.
2023	Ethiopia	Predictors and outcomes of surgical repair of Obstetric fistula at Mekelle Hamlin Fistula Center, Northern Ethiopia	Henok Kumsa and al	Retrospective Review.	Obstetrical patients who had a formal education were more likely to be successfully repaired than obstetrics fistula patients who had no formal education. Obstetric fistula patients who had alive birth were 32 times more likely to get repaired compared to those who had a still birth.
2023	Nigeria	Profile and outcomes of Obstetric fistula surgeries in fistula care Centre in South East Nigeria.	EN Yakubu.	Retrospective study	At the time of discharge following repair,76.5% were closed. The outcomes of surgeries were not influenced by the type of vesicovaginal fistula repaired.

2023	Malawi	Predictors of outcomes in patients with repeat surgery for Obstetric fistula :A retrospective review.	Lennart P .Maljaars and al.	A retrospective.	Successful fistula closure was achieved in 288(83%) and continence was achieved in 185(64%). Lack of urethral involvement (Goh's classification: proximity to the urethra) was shown to be a good predictor of the outcomes :fistula closure and subjective and objective continence.
2020		Comparison of theabdominal and transvaginal techniques in the surgical treament of vesicovaginal fistula and analyszing the factors affecting recurrence	Fuat kizilay and al	Retrospective and Cohort study	Recurrence was more frequent with the the group with radiotherapy history. Rates of first and second recurrence was more frequent in the transvaginal group,the length of hospital stay was longer in the transabdominal group

2024	Democratic republic of Congo.	Epidemiological,anatomical,andtherapeutic profile of obstetric fistulas in the democratic Reublic of Congo.About 1267 patients.	JL paluku and al	Descriptive retrospective.	Mean age at time of surgicla repair was 33.2 years. 33.2% were aged 20-29years. Mea nage of the fistula at repair was 10 years.Urogenital fistulas are more common than genitodigestive fistulas. Uretho-Vaginal and vesico-uterine anatomical entities were predominant amongst urogenital fistula. The repairs were successful for 126/1267 making an 86.6% sucess rate.
2023	Cmeroon	Epidemologic and therapeutic aspects of urogenital fistula foloowing obstetric and gynecologic surgery at the Nkwen B	William Ako Takang and al.	Longitudinal and descriptive study with a retrospective and prospective phase.	Mean age 43.5 years.The prevalence of fistulas was 64.6%.Most commom surgery that exposed to urogenital fistula was total abdominal hysterectomy.(60%),followed by caesarean section. Vesicovaginal fistula (55%) uretovaginal fistulas(40%) The use of Martuis graft had no effect in the overall closure rate.
2015	Cameroon	A comparative study of the the outcome of surgical management of vesico vaginal fistulas with and without interposition of the Martuis graft.A aptist hospital.	PM TEBEU and al	A comparative descriptive study.	

2020	Burkina Faso	Prognostic factors and long term outcomes of obstetric fistula care using the Tanguieta model	Anne caroline benski and al	Retrospective study.	230/274 women where successfully repaired aftre 12 months of follow up.Factors associated with poor repair outcome include prescence of sclerotic tissue(odds ratio[OR],0.25% ;95% Confidence Interval[CI],and intra operative complications.

The prognosis of obstetric and non-obstetric fistulas

Year	Country	Title	Author	Type	Effectif	Résultats de l'étude
1996	Poland	Prognosis of fertility after surgical closure of vesicouterine fistula	Lotocki et *al.*	Descripti ve	110	Mean age 31,8 ans

CHAPTER 3 METHODOLOGY

3.1 Study design.

The study was a hospital based retrospective cross descriptive study.

3.2 Study duration and period.

The study took place between January 2024 to September 2024.

The study covered a period of 10 years, from April 214 to April 2024.

3.3 Study setting and area.

The study was conducted in two health facilities in Yaounde.

The University Hospital Center of Yaoundé

The University Hospital Center of Yaoundé (UHCY) is a central level health facility. In the Cameroonian health pyramid, it is a first level referral hospital. The obstetrics and gynecology service are led by a Professor in Obstetrics and Gynecology of UHCY, assisted by a Coordinator and three matrons responsible of different units namely.

- Hospitalizations in Obstetrics and Gynecology.
- The labor and delivery /emergency unit.
- External consultations.

This service has a capacity of 41hospital beds, a waiting room, a labor room of 4 beds, a theatre, an ultrasound room ,a class room, offices for doctors, matrons, residents ,nurses and 5 external consultation boxes.

Centre Medico Chirurgical Essos Yaounde (CMC).

The Centre Medico Chirurgical of Essos is a private health facility located at Essos. It offers services such as general and specialist consultation notably (Obstetrics and Gynecology, Surgery, anesthesia and reanimation. It has a theatre equipped for gynecologic, general surgeries. Other services include outpatient consultations. Its Health personnel comprises of General practitoners,specialist doctors, Specialist Nurses, Nursing assistants.

3.4. Study population.

The medical files of patients who were diagnosed with obstetrical and non-obstetrical fistula and underwent surgical repair during the study period in both health facilities.

3.4.1 Inclusion Criteria.

Medical files of patients treated surgically for Obstetric and non -Obstetric fistulas during the study period from April 2014 to April 2024 in these two health facilities.

3.4.2. Exclusion Criteria.

Patients whose medical files are not exploitable (less than 50% of information) absence of postoperative reports, lost to follow up were excluded from the study.

3.5. Sampling Method.

Non probabilistic sampling, all patients treated surgically for obstetric and non-obstetric formulas from 2014 to 2024.

3.6 Sample size.

The minimum sample size will be calculated using the Schwartz formula.

n=t2xpx(1-p)/m2 where

n: Minimum sample size needed to obtain significant results.

t: level of confidence, the value being fixed at 95% or 1.96.

p: Proportion of the population experiencing that risk.

m: margin of error.

According to a study done in Cameroon in 2020 the prevalence of fistulas was 4 cases for [65]

n= [1.96x1.96x.085(1-0.085]/0.05x0.05

n=131.

So, the minimum sample size required for this study is 131.

3.7. Data collection tool.

Data will be collected with the use of data collection forms to be filled by data collectors from information obtained from fistula register, theatre report registers and patient medical files.

The questionnaire will be divided into various parts.

- The Sociodemographic, obstetrical, reproductive, clinic, therapeutic -obstetrical characteristics of the patients.
- The clinical presentation:
- The type location, size, number, of fistulas and quality of tissues,
- The management.

- Complications.
- Prognosis.

3.8. Study procedure.

3.8.1. Compliance with administrative requirements

After completion of the research proposal and internal validation by supervisors an ethical clearance was requested from the Ethics committee of the faculty of Medicine and Biomedical Sciences University of Yaounde 1. Thereafter administrative authorizations were requested from the Institutional ethics committee of research on Human Health in the two hospitals-UTHY and CMC ESSOS.

3.8.2. Recruiting and training of research Assistants

Two research assistants (junior Residents in Obstetrics and Gynecology) was recruited and trained on how to collect information from surgery registers, patient files and fill in the questionnaire.

3.8.3 Data collection

Using the data collection form, information from patient medical file, surgery registers will be collected and filled into the forms for each patient.

3.9. Data analysis.

Data management and analysis was done using Statistical Package for the Social Science (SPSS) version 20 and Microsoft excel 2016.Responses from the questionnaire was edited, codded and entered into Excel prior to exportation into the SPSS. The data file was created and saved in the personal laptop computer and protected with a password.

Descriptive statistics such as percentages for categorical variables was used to summarize data. Such was employed in describing the socio-obstetrical characteristics of the patients. Frequencies was presented in tables, graphs and charts.

The test of Student was used for qualitative variables, to find associations the Odds ratio has been determined and p-value P<0.05 and 95% confidence interval (CI) was considered statistically significant.

3.10. Ethical considerations.

3.10.1. Confidentiality ,consent and anonymity.

Patient personal and medical information were treated with confidentiality and anonymity. Information obtained from medical files of patients was stored by the principal investigator in a confidential manner. Anonymity was ensured by use of codes. Verbal consent from the patient was obtained through phone calls.

3.10.2. Honesty.

Honesty will be maintained in this study by properly explaining the methods that will be used to support all the steps involved in data collection, analysis and results. Scientific integrity will be maintained by providing references to all sources of materials which will be used for this study.

3.10.3. Beneficence and non-maleficence.

The study will pose no direct harm to the patient.

3.11. Resources

3.11.1. Human Resource.

- The principal investigator.
- Two research assistants.
- A supervisor and a co-supervisor.
- A statistician.

3.12.2. Material resource.

- A personal Computer.
- A computer Modem.
- A rime of A4 papers.
- Pens.

CHAPITRE 4 : RESULTS

PROGNOSIS OF OBSTETRIC AND NON-OBSTETRIC FISTULAS FROM 2014 TO 2024 IN TWO HOSPITALS IN YAOUNDE

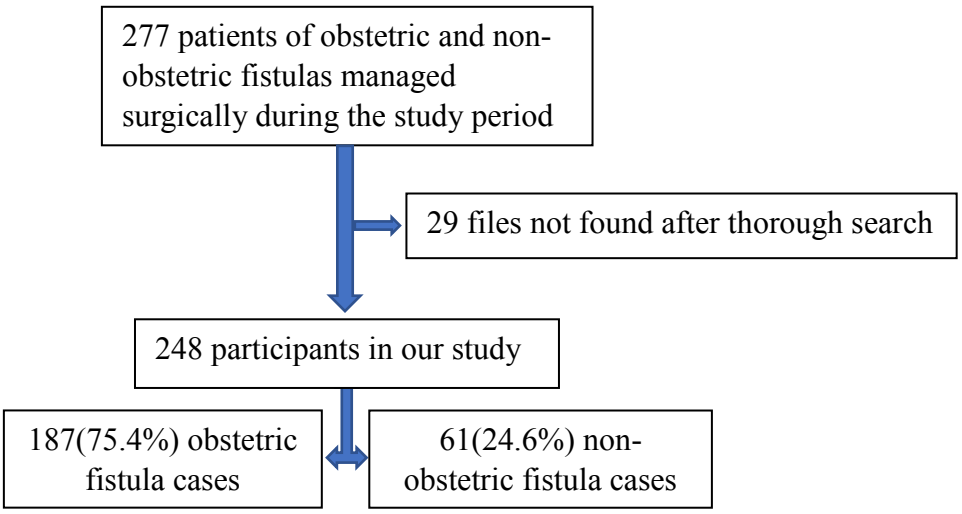


Figure 4: Participants recruitment flow chart

A total of 277 patients managed surgically for obstetric and non-obstetric fistulas from 2014 and 2024 in UTHY and CMC ESSOS. Only 248 medical files were found, which were recruited for the study (Figure 1). Also, 187 participants were obstetrical fistulas and 61 non-obstetrical fistulas.

4.1. SOCIODEMOGRAPHIC AND OBSTETRIC PROFILE OF OBSTETRIC AND NON-OBSTETRIC FISTULAS

In our study, the minimum age was 15 years, the maximum 75 years with a mean age of 35.54(±11.31) years. More than a third (76%) of participants with obstetric fistulas and 73% with non-obstetric fistulas were between 25 to 49 years. Majority (67.9%) and (83.6%) of obstetric and non-obstetric fistulas patients lived in urban areas. More than 90% of participants declared being Christians in both the obstetrical and non -obstetrical cases (TableIXa).

Table IXa: Distribution of study participants according to sociodemographic variables

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Age				**<0.001**
Mean(±sd)	32.28(±8.89)	45.54(±12.11)	35.54(±11.31)	
Median(Q1,Q3)	31.0(25.0,37.0)	46.0(39.0,52.0)	34.0(27.0, 42.0)	
Age groups				**<0,001**
15 – 24 years	36 (19.3)	3 (4.9)	39 (15.7)	
25 – 49 years	143 (76.5)	38 (62.3)	181 (73.0)	
≥ 50 years	8 (4.3)	20 (32.8)	28 (11.3)	
Nationality				0.421
Cameroon	185(99.0)	61(100.0)	246(99.2)	
Chad	1(0.5)	0(0.0)	1(0.4)	
Central African republic	1(0.5)	0(0.0)	1(0.4)	
Region of Dorigin [N=246]				0.692
Southwest	6 (3.2)	1 (1.6)	7 (2.8)	
Adamawa	2 (1.1)	1 (1.6)	3 (1.2)	

Centre	77 (41.6)	20 (32.8)	97 (39.4)	
East	5 (2.7)	2 (3.3)	7 (2.8)	
Far North	8 (4.3)	2 (3.3)	10 (4.1)	
Littoral	16 (8.6)	3 (4.9)	19 (7.7)	
North	1 (0.5)	0 (0.0)	1 (0.4)	
Northwest	13 (7.0)	4 (6.6)	17 (6.9)	
West	55 (29.7)	26 (42.6)	81 (32.9)	
South	2 (1.1)	2 (3.3)	4 (1.6)	
Place of residence				**0.018**
Urban	**127 (67.9)**	51 (83.6)	178 (71.8)	
Rural	60 (32.1)	10 (16.4)	70 (28.2)	
Religion [N=204]				0.291
Christian	133 (90.5)	52 (91.2)	185 (90.7)	
Muslim	11 (7.5)	2 (3.5)	13 (6.4)	
Others	3 (2.0)	3 (5.3)	6 (2.9)	

In our study population 47.6% of patients with obstetric fistulas were single, 34.1% were married., while in the non- obstetrical fistula group 49.2% were married,26.2% single. Only 3.2 % and 3.8% of cases with obstetrical fistulas were either separated or divorced respectively. In the obstetrical fistula population 53.8% had been to secondary school,19.3% had a university education. Only 5.9% had never been to school with 21% at the primary level. In the non-obstetrical population, the trends are similar, with 5.0% never been to school,25.0% stopped schooling at the primary level,56.7%at the secondary level and 13.3% with a tertiary education.

The unemployed was 42.2% in participants with obstetrical fistulas and 39.3% in those with non-obstetrical fistula. More than 30% in both groups were in liberal profession, (32.6%) in obstetrical and 39.3% in the non-obstetrical group.

As concerns living conditions 83.2% of obstetrical fistula patients were living with their family, while 5.4% were living alone. In patients with non-obstetrical fistulas 90.2% were living with their families with 9.8% living alone (table IXb).

Table IXb: Distribution of study participants according to sociodemographic variables

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Civil Status on admission				**0.006**
Married	63 (34.1)	30 (49.2)	93 (37.8)	
Single	88 (47.6)	16 (26.2)	104 (42.3)	
Widow	6 (3.2)	8 (13.1)	14 (5.7)	
Divorced	7 (3.8)	1 (1.6)	8 (3.3)	
Concubine	15 (8.1)	4 (6.6)	19 (7.7)	
Separated	6 (3.2)	2 (3.3)	8 (3.3)	
Separated or divorced after fistula	13 (7.0)	2 (3.3)	15 (6.1)	0.131
Educational status				0.707
Never been to school	11 (5.9)	3 (5.0)	14 (5.7)	
Primary	39 (21.0)	15 (25.0)	54 (22.0)	
Secondary	100 (53.8)	34 (56.7)	134 (54.5)	
Superior	36 (19.4)	8 (13.3)	44 (17.9)	
Profession				0.243
unemployed	78 (42.4)	24 (39.3)	102 (41.6)	
Student	20 (10.9)	3 (4.9)	23 (9.4)	
Salaried	26 (14.1)	9 (14.8)	35 (14.3)	
Retired	0 (0.0)	1 (1.6)	1 (0.4)	

Liberal profession	60 (32.6)	24 (39.3)	84 (34.3)	
Living conditions				**0.014**
with family	154 (83.2)	55 (90.2)	209 (85.0)	
Alone	10 (5.4)	6 (9.8)	16 (6.5)	
others	21 (11.4)	0 (0.0)	21 (8.5)	

More than a third 44.4% of patients were multiparous with 27.75 extreme multiparous (Table X).

Table X: Distribution of study participants according to gravid data

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Gravity				**0.002**
Nulligravida	00(0.0)	06(9.8)	06(2.4)	
Primigravida	38(20.3)	08(13.1)	46(18.6)	
Multigravida	149(79.7)	47(77.1)	196(79.0)	
Parity				**<0.001**
Nulliparity	00(0.0)	14(23.0)	14(5.6)	
Primiparity	52(27.8)	13(21.3)	65(26.2)	
Multiparity	83(44.4)	15(24.6)	98(39.5)	
Grand multiparity	52(27.8)	19(31.1)	71(28.2)	
Menopause	58(31.0)	13(4.9)	71(10.3)	**0.003**

As concerns participants with obstetrical fistulas 92.5 % had attended one antenatal care visit. The place of delivery was at the maternity in 93% of the cases. Multiparous participants were the majority with 44%.

Obstetric fistulas were more common (75.4%). The median age of fistulas before repair is 22.5 months. For the obstetrical fistulas 92.5% did at least one antenatal care visit,93% gave birth at a maternity,5.9% gave birth at home. Delivery was assisted in 31.7% of cases by a medical doctor, by a nurse in 31.7% of cases and by a midwife in 29% of cases. The number of hours in labour ranged between 1 hour and 96 hours with a median of 13 hours. Participants who gave birth prevaginal represented 69% of cases. While 31% underwent a caesarean section. Of the 31% who underwent caesarean section 25.9% underwent hysterectomy. More than a third (36.8%) of new-borns died, with 75% of those who died during labour.

Table XI: Distribution of study participants according to characteristics of index pregnancy (participants with obstetric fistulas)

Variable	Frequency (n), N=187	Percentage (%)
Antenatal care of index pregnancy	173	92.5
Place of delivery of index pregnancy		
At home	11	5.9
Maternity	173	93.0
Started at home the maternity	2	1.1
Delivery assisted by		
Medical Doctor	58	31.7
Midwife	53	29.0
Nurse	58	31.7
Family members/neighbour	3	1.6
Not known	11	6.0
Preventive treatment by urinary catheter	22	11.8
Mode of delivery		
Vaginal	129	69.0

Caesarean section	58	31.0
Vaginal delivery was [N=129]		
Instrumental	8	6.2
With fundal pressure	58	45.0
Hysterectomy following Caesarean section [N=58]	15	25.9
New-born alive[N=187]	118	63.1
If new-born death, moment [N=69]		
Before on set of labour	7	10.1
During labour	52	75.4
<7 days after delivery	9	13.0
>7 days after delivery	1	1.5

The median age of obstetrical fistulas was 24 months. The median age of non-obstetric fistulas was 20.5 months. The average duration of labour was 13hours with a maximum of 96hours.

Table XII: Distribution of study participants according to median age of fistula and duration of labour for

Variable	Obstetric Fistula n (%), N=187	Non-obstetric Fistula n (%), N=61	Total n(%), N=248	p-value
Age of fistula				
(in months)				
Min. – Max.	1 - 444	1 - 372	1 - 444	
Median (IQR)	24.0(5.0, 24.0)	20.5(6.0, 69.0)	22.5(5.0, .5)	0.719
Duration of labour				
(in hours)				
Min. – Max.	1 – 96	---		
Median (IQR)	13.0 (7.0, 45.0)	---		

p-values from Mann-Whitney U test, IQR=Interquartile range

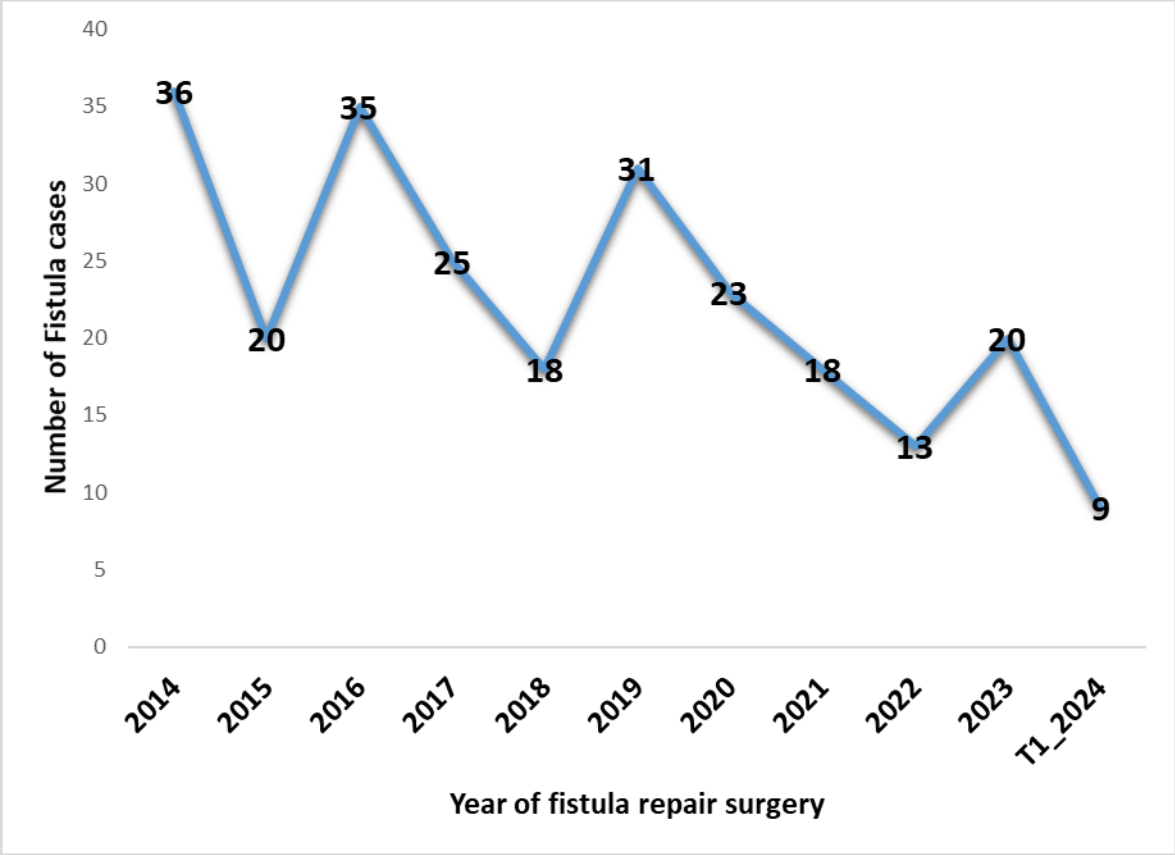


Figure 5a: Line graph of evolution of number of fistula cases across the study period.

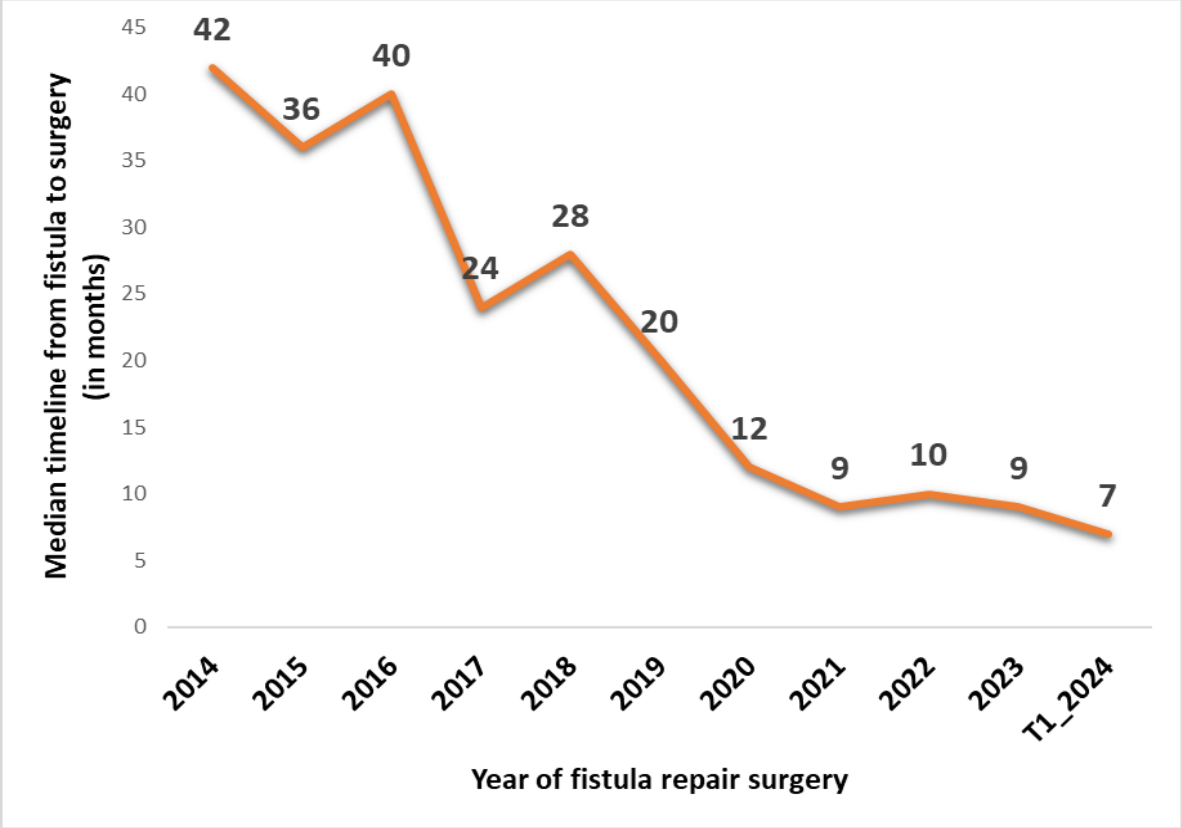


Figure 5b: Line graph of evolution of median timeline from fistula to surgery across the study period

We note a downward trend in the average age of fistulas from 20214 to 2024.

Obstructed labour caused 58.8% of urogenital obstetric fistulas and16% of urogenital obstetric fistulas. Perineal tear and poorly repaired episiotomy caused 68.4% of genito- digestive fistulas. Precipitated labour caused 8.5% 0f urogenital fistula sand 14.3% of genito-digestive fistulas. Caesarean section was responsible for 13% of obstetrical urogenital fistulas and caesarean hysterectomy responsible for 8.5% of urogenital fistulas.

Table XIII: **Distribution of study participants according to cause of obstetric fistula**

Causes of Obstetric fistula	Urogenital Fistula n (%),N=82	Genito-digestive Fistula n (%), N=98	Combined Fistula n (%),N=7	Total n(%), N=187
Obstructed labour	48(58.5)	16(16.3)	5(71.4)	69(36.9)
Perineal tear or episiotomy	0(0.0)	67(68.4)	0(0.0)	67(35.8)
Precipitated labour	7(8.5)	14(14.3)	0(0.0)	21(11.2)
Caesarean section	13(15.9)	0(0.0)	0(0.0)	13(7.0)
Instrumental delivery	6(7.3)	1(1.0)	1(14.3)	8(4.3)
Caesarean hysterectomy	7(8.5)	0(0.0)	1(14.3)	8(4.3)
Uterine revision	1(1.2)	0(0.0)	0(0.0)	1(0.5)

Hysterectomy was a major cause of non- obstetrical urogenital fistulas in 88.5% of cases followed by myomectomy with 3.9% of the cases.

Table XIV: Distribution of study participants according to cause of non-obstetric fistula

Causes of Non-obstetric fistula	Urogenital Fistula n(%),N=52	Genito-digestive Fistula n(%),N=9	Combined Fistula n(%),N=0	Total n(%), N=61
Hysterectomy	46(88.5)	2(22.2)	---	48(80.3)
Radiotherapy	1(1.9)	2(22.2)	---	3(4.9)
Myomectomy	2(3.9)	1(11.1)	---	3(4.9)
Congenital	1(1.9)	0(0.0)	---	1(1.6)
Rape	0(0.0)	1(11.1)	---	1(1.6)
Uterine prolapse surgery	1(1.9)	0(0.0)	---	1(1.6)
Debulking surgery	0(0.0)	2(22.2)	---	2(2.3)
Cervical conisation	1(1.9)	0(0.0)	---	1(1.6)
Spontaneous after constipation	0(0.0)	1(11.1)	---	1(1.6)

This table evaluate the attitude of the patient towards fistulas and the social impact of the condition. In the obstetric fistulas group 32.6% of the patients wished to hide their condition while in the non-obstetrical group 34.4 % wished to hide. More than half 66.6 % in the obstetrical group said they were open to discuss their condition with 80% ready to share with their family, and just 17.6% with friends. Only $.8%of patients in the obstetrical group thought of or tried to commit suicide, while 6.6% in the non- obstetrical fistulas group thought of or tried to commit suicide.

Table XV: Distribution of participants according to attitude towards obstetric and non-obstetric fistulas

Variable	Obstetric Fistula n (%), N=187	Non-obstetric Fistula n (%), N=61	Total n (%), N=248	p-value
Wished to hide	61(32.6)	21(34.4)	82(33.1)	0.914
Wished to talk about it	124(66.3)	42(68.9)	166(66.9)	
Wished to talk about it, to who				0.328
Family	119(80.4)	46(88.5)	165(82.5)	
Friends	26(17.6)	6(11.5)	32(16.0)	
Health Personnel	3(2.0)	0(0.0)	3(1.5)	
Did seek medical Help	176(94.1)	58(95.1)	234(94.4)	0.285
Did think or tried to commit suicide	9(4.8)	4(6.6)	13(5.2)	0.575
Did separate from partner	22(11.8)	4(6.6)	26(10.5)	0.376
Did stop work or left Job	14(7.5)	8(13.1)	22(8.9)	0.334

4.2. ANATOMICAL TYPES OF OBSTETRIC AND NON-OBSTETRIC FISTULAS

4.2.1 Characteristics of urogenital fistulas

The number of fistulas was unique in 88% of participants and at least two in 11% of cases. More than half of cases had soft vaginal wall tissues. Most of the fistulas (73.8%) were less than 2cm in largest diameter. The major prognostic classification group was Class IV A with 37.6% of cases.

Urogenital fistulas were 54%, Genito digestive 43% and combined 2.8%. Urogenital fistulas of obstetric origin made up 43.9%of obstetrical fistulas, urogenital fistulas of non -obstetrical origin made up 54.0% of cases, genito-digestive fistulas of obstetric origin made up 52.4% of cases

Table XVI: Distribution of participants according to anatomical type of fistula

Anatomic location of fistula	Frequency, N=248	Percentage
Urogenital	134	54.0
Genito-digestive	107	43.1
Combined	7	2.9

Table XVII: Distribution of participants according to anatomic location and type of fistula

Anatomic location of fistula	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Urogenital	82(43.9)	52(85.2)	134(54.0)	
Genito-digestive	98(52.4)	9(14.8)	107(43.1)	**<0.001**
Combined	7(3.7)	0(0.0)	7(2.9)	

With regards to urogenital fistulas of obstetric origin 92.1% had unique lesions, the state of the surrounding tissues was soft in 49.4%, there was moderate fibrosis in 42.7%. The size of the fistula was less than 2cm in 70.8% of case. More than one third were classified as class IVA according to the Tebeu's prognostic classification. In the non - obstetric urogenital fistula group 88.7% had unique lesions,63.5% had soft surrounding tissues, there was moderate fibrosis in

28.9% of cases,78.8%had a fistula size of less than 2cm.According to Tebeu's prognostic classification 38.5% were classified in IVA.

Table XVIII: Distribution of study participants according to characteristics of urogenital fistulas

Variable	Obstetric Fistula n(%), N=89	Non-obstetric Fistula n(%), N=52	Total n(%), N=141	p-value
Number of urogenital lesions				0.089
Unique	82(92.1)	43(82.7)	125(88.7)	
Multiple	7(7.9)	9(17.3)	16(11.3)	
Vaginal wall				0.206
Soft	44(49.4)	33(63.5)	77(54.6)	
Moderate fibrosis	38(42.7)	15(28.9)	53(37.6)	
Major fibrosis	7(7.9)	4(7.7)	11(7.8)	
Size of the fistula				**0.031**
>4cm	10(11.2)	0(0.0)	10(7.1)	
2-4cm	16(18.0)	11(21.2)	27(19.1)	
<2cm	63(70.8)	41(78.8)	104(73.8)	
Prognostic Classification of urogenital fistula				0.650
Class I	11(12.4)	7(13.5)	18(12.8)	
Class II	21(23.6)	11(21.2)	32(22.7)	
Class III	16(18.0)	9(17.3)	25(17.7)	
Class IVA	33(37.1)	20(38.5)	53(37.6)	
Class IVB	8(9.0)	5(9.6)	13(9.2)	

Uretero-vaginal,trigonal and retrotrigonal were the most common anatomic locations with 18.4%,18.4%and 16.9% respectively**.**

Table XIX : Distribution of study participants according to prognostic classification of urogenital fistula by WHO

Prognostic Classification of urogenital fistula (WHO)	Obstetric Fistula n(%), N=89	Non-obstetric Fistula n(%), N=52	Total n(%), N=141	p-value
Class I	11(12.4)	7(13.5)	18(12.8)	0.541
Class II	21(23.6)	11(21.2)	32(22.7)	
Class III	16(18.0)	9(17.3)	25(17.7)	
Class IVA	33(37.1)	20(38.5)	53(37.6)	
Class IVB	8(9.0)	5(9.6)	13(9.2)	

Table XX: Distribution of participants according to location (topography) of urogenital fistula lesion

Variable	Obstetric Fistula n(%), N=89	Non-obstetric Fistula n(%), N=52	Total n(%), N=141
Uretero-vaginal	13(14.6)	12(23.1)	25(18.4)
Trigonal	17(19.1)	8(15.4)	25(18.4)
Retrotrigonal	15(16.9)	8(15.4)	23(16.9)
Cervical	12(13.5)	4(7.7)	16(11.8)
Juxtacervical	13(14.6)	1(1.9)	14(10.3)
Vesicovaginal septum	7(7.9)	2(3.9)	9(6.6)
Vaginal vault	3(3.4)	6(11.5)	9(6.6)

Urethro-vaginal	2(2.2)	4(7.7)	6(4.4)
Partial cervico-ureteral disinsertion	3(3.4)	2(3.9)	5(3.7)
Destruction of ureter	2(2.2)	1(1.9)	3(2.2)
Total cervico-ureteral disinsertion	1(1.1)	0(0.0)	1(0.7)
Vesicouterine	0(0.0)	1(1.9)	1(0.7)

The number of lesions in the genito-digestive fistulas of obstetric origin was unique in 89.5% of case. Fibrosis tissues surrounding the fistulas was absent in 54.3% of cases, moderate in 40.0% of cases.

More than 60% were sphincterian,30.55 was supra- sphincterian. According to the topographic location 73.3 % were located at the inferior third of the rectum.

The genito-digestive fistula of obstetric origin was less than 2cm in size in 63.8% of cases.

In non-obstetric genito-digestive fistulas, all the cases were unique. Up to 33% had moderate fibrosis,66.7% had a size of less than 2cm,44.4 %was supra-sphincterian and located in the lower one third portion of the rectum. The prognostic classification was Class I and class II in 33% of cases respectively.

Table XXI: Distribution of study participants according to characteristics of genito-digestive fistulas

Variable	Obstetric Fistula n(%), N=105	Non-obstetric Fistula n(%), N=9	Total n(%), N=114	p-value
Number of genito-digestive lesions				
unique	94(89.5)	9(100.0)	103(90.4)	0.289
multiple	11(10.5)	0(0.0)	11(9.6)	
Fibrosis				0.783
Absent	57(54.3)	5(55.6)	62(54.4)	
Moderate fibrosis	42(40.0)	3(33.3)	45(39.5)	
Major fibrosis	6(5.7)	1(11.1)	7(6.1)	
Relationship with anal sphincter				**0.012**
Sphincterian	67(63.8)	2(22.2)	69(60.5)	
Suprasphincterian	32(30.5)	4(44.4)	36(31.6)	
Juxtacervicale	4(3.8)	2(22.2)	6(5.3)	
Supravaginal	2(1.9)	1(11.1)	3(2.6)	
Topographic classification				**0.009**
Inferior third	80(76.2)	4(44.4)	84(73.7)	
Middle third	19(18.1)	2(22.2)	21(18.4)	
Superior third	6(5.7)	3(33.3)	9(7.9)	
Size genito digestive fistula				0.834

<2cm	67(63.8)	6(66.7)	73(64.0)	
2-4cm	26(24.8)	3(33.3)	29(25.5)	
>4cm	12(11.4)	0(0.0)	12(10.5)	
Class of the genito-digestive fistula				0.541
Class I	43(41.0)	3(33.3)	46(40.4)	
Class II	27(25.7)	3(33.3)	30(26.3)	
Class III	21(20.0)	2(22.2)	23(20.2)	
Class IVA	10(9.5)	1(11.1)	11(9.6)	
Class IVB	4(3.8)	0(0.0)	4(3.5)	

4.3. DESCRIPTION OF SURGICAL TECHNICS OF OBSTETRIC AND NON-OBSTETRIC FISTULAS.

More than 63%of patients with obstetrical fistulas had to wait for more than 1 year in order to undergo surgery. In the non-obstetrical fistula population 72% had to wait for more than 1 year.

Almost three quarter 73.8% of non -obstetric fistula patients were being operated for the first time while this number stands at 64.7% in the obstetrical fistula cases.

The vaginal route was mostly used in more than 80% of cases in both obstetric and non-obstetric fistulas.

Table XXII: Distribution of study population according to data related to fistula repair surgery

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Time from onset of symptoms to repair				0.211
[0 – 6] months	47(25.1)	21(34.4)	68(27.4)	
]6 – 12] months	28(15.0)	8(13.1)	36(14.5)	
]1 – 2] ans	19(10.2)	4(6.6)	23(9.3)	
]2 – 3] ans	15(8.0)	6(9.8)	21(8.5)	
]3 – 4] ans	6(3.2)	2(3.3)	8(3.2)	
]4 – 5] ans	8(4.3)	2(3.3)	10(4.0)	
>5 ans	64(34.2)	18(29.5)	82(33.1)	
Number of previous fistula repair surgeries				0.601
0	121(64.7)	45(73.8)	166()	
1	20(10.7)	6(9.8)	26(11.4)	
2	15(8.0)	5(8.2)	20(8.7)	
3	18(9.6)	3(4.9)	21(9.2)	
4	6(3.2)	2(3.3)	8(3.5)	
5	4(2.1)	0(0.0)	4(1.7)	
7	2(1.1)	0(0.0)	2(0.9)	
8	1(0.5)	0(0.0)	1(0.4)	
Route of entry				0.736

Vaginal	163(87.2)	49(80.3)	212(85.5)
Abdominal	16(8.6)	10(16.4)	26(10.5)
Mixed	8(4.3)	2(3.3)	10(4.0)

Fistuloraphy was the surgical technic mostly used in urogenital fistulas of obstetrics (65.2%) and non-obstetric origin (55.8%), followed by fistuloraphy coupled with fistuloplasty (20.2%) in obstetrical urogenital fistulas. Uterovesical re-implantation was done 23.1% of cases of non-obstetric urogenital fistulas.

Table XXIII: Distribution of study population according to data related to urogenital fistula repair surgical technic

Variable	Obstetric Fistula n(%), N=89	Non-obstetric Fistula n(%), N=52	Total n(%), N=141	p-value
Technic urogenital repair				0.262
Fistulorhaphy	58(65.2)	29(55.8)	87(61.7)	
Fistulorhaphy and fistuloplasty	18(20.2)	8(15.4)	26()	
Uterovesical re-implantation	5(5.6)	12(23.1)	17()	
Martuis Flap	8(9.0)	3(5.8)	11()	
Water tight test. Satisfactory	86(96.6)	50(96.2)	136(96.5)	0.987

Conversion to complete perineal tear with layered closure was the surgical technic mostly used in genito- digestive obstetric fistula 78.1% and genito-digestive non -obstetric fistulas (55.6%).

Table XXIV: Distribution of study population according to data related to genito-digestive fistula repair surgical technic

Technic Genito-digestive Repair	Obstetric Fistula n(%), N=105	Non-obstetric Fistula n(%), N=9	Total n(%), N=114	p-value
Trans anal advancement flap repair	22(21.0)	4(44.4)	26(22.8)	
Conversion to complete perineal tear with layer closure	82(78.1)	5(55.6)	87(76.3)	0.135
Simple Fistulotomy	1(0.9)	0(0.0)	1(0.9)	

4.4. OUTCOMES AFTER SURGICAL REPAIR

The immediate post-operative period was marked by haemorrhage in 3.2% of obstetrical fistulas and 4.9% of non -obstetrical fistulas. Only 1.6% of patients were transfused in both groups. Most of the surgeries lasted less than 1hour,56.7% in the obstetrical fistulas and 42.6% in non-obstetrical fistulas. The average length of hospital stay was 6.5 days in both groups.

Table XXV: Distribution of study population according to immediate post-operative outcome

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Haemorrhage	6(3.2)	3(4.9)	9(3.6)	0.780
Blood transfusion	3(1.6)	1(1.6)	4(1.6)	0.998
Length of surgery[158]				0.210
<1 hour	106(56.7)	26(42.6)	132(53.2)	
1 – 3 hours	69(36.9)	21(34.4)	90(36.3)	
>3 hours	18(9.6)	8(13.1)	26(10.5)	
Length of hospital stay (in days)				
Min-Max	5 – 21 days	5 – 21 days	5 – 21 days	
Median (IQR)	7.0 (6) days	8.0 (6.5) days	8.0 (6) days	0.124

On discharge 95.7% of obstetrical fistulas patients and 89.6% for non-obstetrical were continent and closed.

At 24 months follow up 95.4% of obstetric fistulas and 93.3% of non-obstetric fistulas were closed and continent.

Table XXVI: Outcome of fistula with respect to urinary or faecal incontinence

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Results on discharge				0.780
Closed and continent	132(95.7)	43(89.6)	178(94.2)	
Closed and incontinent	2(1.5)	0(0.0)	2(1.0)	
Failure	4(2.9)	5(10.4)	9(4.8)	
Missing data			59	
Results at 3months follow up				0.689
Closed and continent	125(91.9)	32(88.9)	157(91.3)	
Closed and incontinent	5(3.7)	1(2.8)	6(3.5)	
Failure	6(4.4)	3(8.3)	9(5.2)	
Missing data			76	
Results at 6months follow up				0.504
Closed and continent	94(94.0)	29(90.6)	123(93.2)	
Closed and incontinent	3(3.0)	2(6.3)	5(3.8)	
Failure	3(3.0)	1(3.1)	4(3.0)	
Missing data			116	
Results at 12 months follow up				0.592

Closed and continent	77(95.1)	21(87.5)	98(93.3)	
Closed and incontinent	4(4.9)	2(8.3)	6(5.7)	
Failure	0(0.0)	1(4.2)	1(1.0)	
Missing data			143	
Results at 24 months follow up				0.750
Closed and continent	62(95.4)	14(93.3)	76(95.0)	
Closed and incontinent	3(4.6)	0(0.0)	3(3.8)	
Failure	0(0.0)	1(6.7)	1(1.3)	
Missing data			168	

With data related to reproductive health 30.2% of obstetrical fistula patients and 52.5% of non-obstetrical fistulas had resumed sexual activity. Among participants in this study 35% desired conception. Of these 58.6% were treated for obstetrical fistulas while 35.5 % were treated for non- obstetrical fistula. One third(35.6%) of participants desiring conception conceived.

Table XXVII: Outcome related to future pregnancy following fistula repair surgery

Variable	Obstetric Fistula n(%), N=187	Non-obstetric Fistula n(%), N=61	Total n(%), N=248	p-value
Resumption/started sexual activity	57(30.5)	32(52.5)	89(35.9)	0.087
Post-operative timeline for resumption of sexual activity [N=89]				0.154
<3months	2(3.5)	0(0.0)	2(2.2)	
3-6months	34(58.6)	21(67.7)	55(61.8)	
6months-1year	21(36.2)	8(25.8)	29(32.6)	

>1year	1(1.7)	2(6.5)	3(3.4)	
Desire for conception [N=89]	34(58.6)	11(35.5)	45(50.6)	0.078
Conception[N=45]	13(38.2)	3(27.3)	16(35.6)	0.243
Type of fistula if conception [N=16]				
Urogenital	10(76.9)	3(100.0)	13(81.3)	0.119
Genito-digestive	3(23.1)	0(0.0)	3(18.7)	
Outcome of the pregnancy[N=16]				**0.003**
Early pregnancy loss	0(0.0)	2(66.7)	2(12.5)	
Premature delivery	1(7.7)	0(0.0)	1(6.2)	
Delivery at term	12(92.3)	1(33.3)	13(81.3)	
Mode of delivery[N=14]				0.999
Vaginal	0(0.0)	0(0.0)	0(0.0)	
Caesarean section	13(100.0)	1(100.0)	14(100.0)	
Outcome of newborn[N=14]				0.999
Alive	13(100.0)	1(100.0)	14(100.0)	

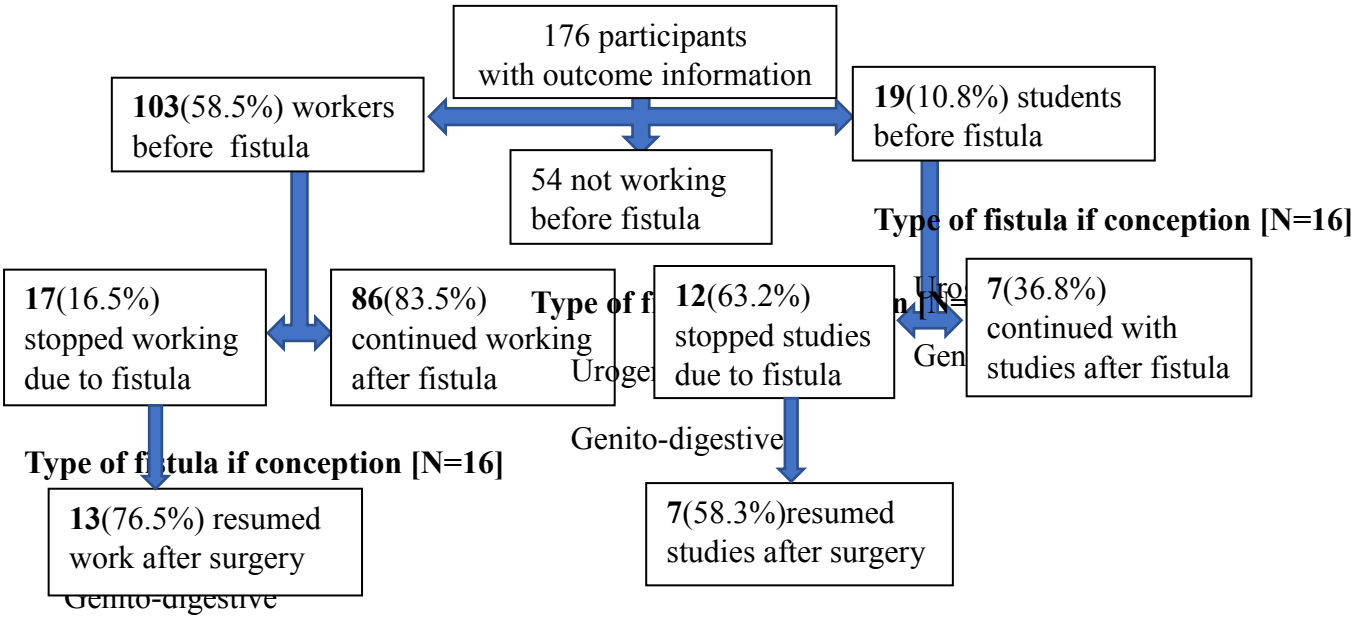


Figure 6: Distribution of study participants according to school and work resumption in relation to fistula and surgery.

Table XXVII: Distribution of participants according to social reintegration data

Resumption of activity after surgery	Frequency (n), N=132	Percentage (%)
Learnt a skill	13	9.9
Resumed social activities	119	90.2
Been in a relationship	103	78.0

CHAPITRE 5 : DISCUSSION

The main objective of our study was to evaluate the epidemiological, anatomical and prognostic aspects of Obstetrics and non-obstetrical fistulas in two hospitals in Yaounde from 2014 to 2024.It consisted specifically to describe the sociodemographic and obstetric profile of women with obstetric and non- obstetric fistulas, describe the anatomic types of obstetric and non-obstetric fistulas, the surgical technics and the outcomes after repair in the university teaching hospital Yaounde and the Centre Medico-chirurgical d'Essos**.**

5.1. Sociodemographic and Obstetric Profile.

Our study population had a mean age for obstetrical fistlas is 32.54(+ -11.31) years. This is similar to results obtained by Kabore et al in Burkina Faso in 2021[61] who reported a mean age of 35 years in women with urogenital fistulas. This age corresponds to the age when most women are having children, hence the risk of obstetric fistulas. The mean age for non-obstetrical fistulas was 45, 5years.This correspond to the mean age obtained by Takang and al in Nkwen, Bamenda[]62. We had an unemployment rate of 41.6%.Bohoussou et al Cote d'Ivoire[] had an unemployment rate of 80%,while Takang et al had a an unemployment rate of 75%.Our higher employment rates could be explained by the fact that majority of our participants reside in urban areas, had at least secondary education making it easier to be employed. Majority (90.7%) declared being Christians this high percentage of Christians could be explained by the religious demographics in Cameroon and the Centre region where the study was carried out. More than a third of participants, 47.60% were single in the obstetric fistula and 26.2 % in the non- obstetrical fistula group. Kabore et al. [61] in Burkina Faso had 70% of participants were married .Up to 16% of the women in our study declared living alone. This could be explained by the isolation and stigma women with obstetrical and non-obstetrical fistulas face. In the Centre region where this study was carried out and from where majority of the participants originate, bride price is usually high, making it difficult for intending couples to marry before starting their families. Majority cohabit and start having children before getting married. Only 6.3% separated as a result of fistula. This 6.0% were mainly Muslims, who mostly will separate or divorce their spouse because of the religious believe that a woman with fistula (continuous flow of urine from the vagina, or loss of stools through the vagina is unclean and should therefore live separately. In our study 54.4% had attended secondary school,17.9 % university level. This is in contrast with what Lussy Paluku et al [64] in the DRC had were 40% had no formal education, 30.1% primary

school and 28.7% secondary school. This difference is due to the fact that majority of our participants reside in urban areas, hence easier access to education amenities.

We had 71.8% of study participants residing in urban areas. This is in contrast to Lussy Paluku [64] were 80.6% lived in rural areas. Even in an urban setting access to quality obstetric and gynecologic surgery care is still a challenge in Cameroon. Many women either do not have the means or therefore do not seek care on time, or when they do, they seek care in the wrong places. This could also mean we are not capturing all the cases of obstetric and non- obstetric fistulas in the region.

The average duration of labor was 13hours with extremes between 1 and 96 hours. Most of the deliveries (93%) took place at a maternity, assisted by a health personnel 60% of the cases Medical doctor, Midwife, a nurse. Vaginal delivery in 69% of cases and cesarean section in 31% of cases. Salifou and al in Benin [3] had an average duration of labor of 37+-35.4hours with extremes of 8hours and 96hours.Our Still births in index pregnancy was 36.89%. This is figure is far less than what JL paluku et al in the DRC[64], who had a perinatal mortality rate of 58.3%.This lower death rates could be explained by the fact that majority of our patients live in urban settings, where obstetric emergency services are easier to reach than our counter parts in the DRC. The average age of obstetric fistulas at the time of repair was 24.5 months (1.9years).This is far less than what Tebeu et al. [66] obtained in 2019 which was 5.8years.This drop in the time from fistula to surgical repair could be due to the fact that free surgical campaigns are organized all year round, reducing their waiting time for surgery in the centers where this study was carried out. The major cause of obstetrical urogenital fistulas was obstructed labor (36.9%), followed by cesarean section 15.9% (Obstetrical Genito digestive fistula was caused by instrumental vaginal delivery or poorly repaired episiotomy or complexes perineal tears. Non- obstetrical urogenital fistulas were mainly caused by total abdominal hysterectomy (80.3%) for benign indications. Takang et al. [62] had a percentage of 60% hysterectomies. And al Tebeu et al [65] in 2014 had an average of 46.15% hysterectomy as the causes. Pushkar et al. [68] in 2022 had a proportion of 66.30%. While the main cause of non-obstetric genito-digestive fistula (14.75%) was radiotherapy and debulking gynecologic surgery, Tebeu et al. [65] in 2014 had severe infections as a major cause for genito-digestive fistulas with 40% of cases.

5.2. Anatomic types of fistulas.

Obstetric fistulas represented 75.40% of cases while non-obstetric fistulas represented 25.59%.In our setting obstetrical fistulas is more common than non-obstetrical fistulas. This trend could be explained absence or in accessible quality emergency obstetric care [11].

In our series urogenital fistula represented 85.2.5% of non-obstetrical fistulas. This proportion is higher than that obtained by Tebeu et al [65] in 2014 who had 72.20% of non-obstetrical urogenital fistulas. Urogenital fistulas of Obstetric causes represented 43.9 % of obstetrical fistulas. While genito-digestive fistulas represented 52.4%. Just 3.7% of Obstetrical fistulas were mixed while non -obstetrical fistulas had no combined cases.

Anatomical forms recurrent in our series included are ureterovaginal and trigonal localisations of urogenital fistulas was the most frequent types at 18.4%, followed by retro trigonal fistulas (16.9%).

The number of fistulas was at least two or more in 9.6% of cases and unique in 90.4% of cases. Fibrotic tissues were absent in more than half of cases (54.4%). Over 60% of genito-digestive fistulas are sphincterian. More than 70% is localized in the one third inferior portion of the anal canal. Fistulas size was less than 2cm in 64% of cases. More than one third (40%) of the Genito-digestive fistulas was class I.

5.3. Surgical technics

More than half of the participants had to wait for more than year before benefitting from a surgery with mean age of fistula at 22.5 months. A Sizable percentage (64.2%) of cases were undergoing surgery for the first time, Tebeu et al had the average age of fistula at 5.8 years while 35% had had a previous surgical fistula repair at least more than once. The vaginal route was used in 85.5% of cases. The transvaginal approach was done in 54.45% of cases by dimitry Puska et al. The approach is determined by fistula type, is linked to lesser blood loss,shorter hospital stay.so it is preferred over the trans abdominal approach. Fistuloraphy was the major surgical technic used in genitourinary fistulas in our study (84.4%) while conversion to a complete perineal tear with layered closure was the major technic in genito- digestive fistulas.

5.4. Outcomes

5.4.1. Surgical Outcomes

With respect to urinary or faecal incontinence 95.72% and 89.6% of our participants for obstetrical and non-obstetrical fistulas respectively were closed and continent on discharge. The failure rate on discharge was 2.9% for obstetrical fistulas and 10.4% for non -obstetrical fistulas. The continent and closed rate at 3 months follow up was 91.9% for obstetric fistulas and 88.9 for non-obstetric fistulas. Halidou et al[69] in Zinder, Niger had a successful closure rate 95.5% with a failure rate of 4.63%.At 24months the closed and continent rate was 95.4%for obstetric fistulas and 93.3 % for non-obstetrical fistulas. Closed and incontinent was 4.6% the obstetrical fistulas group and 3.8 in the non-obstetric fistula group with failure rates being zero in the obstetrical group and 6.7% in the non-obstetric group.

5.4.2. Social reintegration.

This variable sort to find out which women as a result of fistulas are socially isolated and were able to resume social activities after the repair. In this study 5.4% of patients with obstetrical fistulas and 9.8% of patients with non- obstetric fistulas declared they were living alone. Up to 7.5% of cases with obstetric fistulas and 13.1 % of patients with non-obstetric fistulas did stop work and other social activities (attending church, visiting family and friends) because of the fistula. Up to 11.8% of the patients with obstetric fistulas and 6.6% of patients in the with non-obstetric fistula were separate from their partners as a result of the fistula. Almost one third of participants with obstetric fistulas wished they could hide the fact that they had this condition while 34.4% wished they could hide the diseases. After surgery participants retuned back to work (), started committed romantic relationships (), started taking part in social activities, went back to school. This situation emphasizes the feelings of shame, hopelessness that accompanies those who suffer from obstetric and non -obstetric fistulas in our context. Some patients, up to 4.80% with obstetric fistulas and 6.65% with non -obstetric fistulas declared they tried or thought of committing suicide. Nduka et al in Nigeria, also describes the sense of worthlessness, shame and stigma among patients with obstetric fistulas[70]. Others Ap Alio in Niger, Samaila Bala Baba et al also found similar trends[71,72]. Alison MelAyadiet al in Uganda found that patient with

obstetrical fistula had improved self-esteem after successful surgical repair[73] Further studies need to be done in order to measure the magnitude of the problem.

5.4.3 Sexual and reproductive outcomes.

At least more than one third (35.9 %) of participants had resumed sexual activity following fistula repair surgery. Fehlman et al reported 62% resumption of sexual activity.[74] Of these 58.6% desired conception in the obstetric group while just 11% in the non-obstetrical group wished to conceive, whereas Fehlmanet al had 40% of participants who desired conception. In our study, 13 (38.2 %) of those surgically treated for obstetric conceived, while (27.3%) of those treated for non-obstetric conceived. In the study by Fehlman et al 13% conceived.[74] Of these 81.3% carried the pregnancy to term and all gave birth to live new borns through elective Caesarean section. Those who had been repaired for urogenital fistulas made up 81.3% of those who conceived. Delmou et al had a pregnancy rate of 17.4% after repair with mode of delivery 45.3% elective caesarean section, 16.3% vaginal, 38.4% prevaginal delivery. [44] Data regarding out comes of sexual and reproductive health of patients after surgical repair is difficult to come by because most of these patients go back to their communities and do not honour rendez-vous Those who do come the information most of the time is lost because medical files of the patients are not meticulously filled..

Limits of the study.

The main limitation of the study was the fact that obtaining data concerning outcomes after surgery was an uphill task. Either the patients after discharge were fine and never came back for follow up visits or they came and the information was never entered into their files. This underscores our need for meticulous management of medical files.The findings in this study

CONCLUSION

Obstetric and non-obstetric fistula is a major public health problem in Cameroon even in urban settings were access to emergency obstetric care is more available affecting women in their prime. The average age of obstetric fistulas was 32.28+-8.89, while the average age for non-obstetric fistulas was 35.54=-11.31, with 71.8% residing in urban areas,42.3% single.

Obstetric fistulas were more common 187/248(75.4%), with urogenital fistulas contributing 54.05 % of cases. The major anatomic locations were uretero-vaginal (18.4%, Trigonal (18.4%) and retro-trigonal 16.9%. The main causes of Obstetrical fistulas are Obstructed labour, severe perineal tears and poorly repaired episiotomy while total abdominal hysterectomy was the main cause of non -obstetrical fistulas. More than one third of urogenital fistulas was classified class IVA according to WHO prognostic classification and according to Tebeu's prognostic classification, while 40.4%of genito-digestif fistulas was classified Class I. Fistuloraphy was the main surgical technic used(61.7%).the success rate of fistula repair on discharge was 94.2% and 93.2% at 6 months follow up. The failure rate was 4.8% on discharge and 3.0% at 6 months follow up.

Obstetric and non-obstetric fistula is a condition that still adversely affects a non-negligible proportion of young women, mentally, socially, financially and even in their sexual and reproductive health. Over the last decade regular specialised medical campaigns have permitted access to surgical fistula repair surgeries with very high rates of success reducing the average waiting time for surgeries from 5.8years in 2014 to 1.9 years in 2024. Most of those treated have moved on to become productive members in their communities and families. This alone gives us hope of better days ahead.

RECOMMENDATIONS

Based on the findings and conclusions of this study, we therefore make the following recommendations:

TO THE MINISTRY OF PUBLIC HEALTH

- Organize national training workshops and campaigns to sensitize health workers on obstetric and non-obstetric fistulas, its complications and the need for quality follow-up of during pregnancy, labour and delivery. Subsidize all health care services related to labour, delivery, obstetric fistula and non-obstetric fistula related conditions.

TO THE FACULTY OF MEDICINE AND BIOMEDICAL SCIENCES

- Intensify the training of Medical Doctors and Specialist who can better prevent, diagnose and adequately cater for patients with obstetric and non-obstetric fistulas.
- Organize regular symposia to sensitize students, residents and Interns on its management, alongside separate lectures on obstetric and non-obstertic fistulas.
- **TO RESEARCH INSTITUTIONS AND CLINICIANS**
    - Do good quality contacts as recommended by WHO and closely follow-up women, in labour.
    - Identify signs of abnormal labour progression, organise proper management or prompt referral to an adequate health facility in order to prevent adverse materno-foetal outcomes.
    - Identify clinical signs pointing to non -obstetrical fistulas, diagnose and initiate treatment while waiting for paraclinical confirmations.
    - Refer patients on time to appropriate centres that can diagnose and manage complications of labour, complications of major gynaecologic surgeries and it
    - Create an electronic system of storing data in order to make it easier for future researchers to quickly access information.
    - Carry out a larger study which will include other fistula treatment centres such as the central Hospital Yaounde,the Norvegian Hospital Ngaoundere and treatment centres in the northern regions(Maroua and Garoua)

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APPENDICES

APPENDICE 1. DATA COLLECTION FORM.

Medical file number.
Date of admission.

I.1.Identification.

1. Age.
2. Cameroonian nationality:1-yes. 2-No.

If No precise country of origin.

3. Region of origin: 1. Adamawa. 2. Center. 3. East. 4. Far North. 5. Littoral. 6. North. 7. North West.

8. West. 9. South. 10. Southwest.

4. Telephone number……
5. Place of residence.1. Rural 2. Urban.
6. 6.Religon. 1.Christian. 2.Moslem. 3. Others.
7. Civil status at the time of admission.

1. Married. 2. Single. 3. Widow. 4. Divorced. 5. Concubine. 6.Separated.

8. Education.

1. Never been to school. 2. Primary. 3. Secondary. 4. Superior.

9. Profession.

1. unemployed. 2. Student. 3. Salaried. 4. Retired 5. Liberal profession.

10. If divorced or separated after fistula 1. Yes. 2.No
11. Living conditions.1. with family. 2. Alone. 3.others.
12. Hiv Status.1. known. 1. Positive. 2. negative. 2.unknown

I.2.Reproductive History

13. Gravidity .1. primigravida. 2. Paucigravida 3. Multigravida.
14. Parity. 1. primparous. 2. Pauciparous 3. Multiparous.
15. Age of first delivery.
16. Number of living children.
17. Number of deliveries after fistulas diagnosis.
18. Menstrual Cycle.1. Absent. 2.regular .3. Irregular.
19. Absent for How long?
20. If Present LMP.
21. Menopause. 1.Yes. 2.No. 3. Unknown.

I.3.Circumstances around fistula formation.

22. Number of years since fistulas formation.
23. Type of fistula

1. Obstetrical. 2. Non-Obstetrical.

If Obstetrical: Go to 25. If non obstetrical go to no 36.

24. Antenatal care of index pregnancy. 1 Yes. 2. No.

If Yes. Number of prenatal visits. 1. <4. 2.>4.

25. Place of delivery of index pregnancy. 1. At home. 2. Maternity. 3.Delivery started at home then maternity.

26. Delivery Done by:1. Medical Doctor. 2. Midwife. 3. Nurse. 4. Family member/neighbor 5.I don't know.

27. Duration of labor in Hours…….

28. Was a urinary catheter inserted during labor? 1.Yes 2. No 3.I don't know

29. Preventive treatment by urinary catheter

30. If yes number of days.

31. Place of delivery.1. At home. 2.At a maternity.3. started at home then finished at Maternity

32. Mode of Delivery.

1. Pervaginal. 1. Yes. 2. No.

2. Cesarean section. 1. Yes. 2. No.

3. Hysterectomy.1. Yes 2. No

4.. Instrumental Delivery.1. Yes 2.No.

Newborn alive 1. Yes. 2. No.

33. If No Moment of death. 1. Before on set of labor. 2. During labor. 3. <7 days after delivery.4.>7 days after delivery.

34. Cause of obstetric fistulas 1. obstruction. 2.Cesarienne.3. Instrumental delivery.4. rapid labor and delivery. 5. Uterine revision.6. trauma. 7.others.

35. Causes of non-obstetric fistulas.1. Gynecologic surgery. 2.Radiotherapy.3. Neoplasm.4. Chron's disease.

36. Sexually active 1. Yes 2.No. If no why?1) no partner 2) Fear of discomfort or pain 3) fear of pregnancy .4 too ill. 5. others.

37. Last sexual activity. 1.<1 month. 2. Between 1 and 6months. 3. 6 months and 1 year 4.> 1 year.

38. Dyspareunia. 1. Yes. 2. No.

39. Contraceptive methods.

1.None. 2.Natural. 3.Hormonal 4. Barrier.

40. Desir for conception:1. Yes 2. No

I.4.Patients attitude towards fistulas.

41. Do you wish to hide 1. Yes.2. No.

42. Do you wish to talk about it to 1. friends 1 Yes 2. No 3. Not applicable.2. Family. 1 Yes. 2 No.

43. Did you seek medical Help?.1. Yes. 2.No.

44. Did you think or tried to commit sucide.1. Yes. 2.No. 3. Not Applicable.

45. Did you separate from your partner?1. Yes. 2.No.3.No partner.
46. Did you stop work or leave your Job.1. Yes. 2.No. 3. Unemployed.

I.5.Clinical information on fistulas.

47. Motif of consultation.

1.Loss of urine from the vagina. 2.Urine odor 3. Loss of stool. 4.Stool in the vagina. 5.Vulvar itches. 6.vaginal itches 7. Dysuria. 8.Hematuria. 9.fecal incontinence. 10.others.

48. Age at onset fistula symptoms.
49. Age of fistula before surgical repair.
50. Time of onset of symptoms following index delivery/surgery /radiotherapy.

I.6 Physical Exam

51. weight. 2.Height. 3.BMI 4. Blood pressure.1 Diastolic blood pressure…..2.Systolic Blood pressure.3.Temperature.
52. Conjonctivae.1. colored 2. pale. Not applicable.
53. Walking Difficulties.1.yes.2.No.
54. vulvar urinary dermatitis.1.yes. 2.No.
55. Type of urine loss from vagina:1. Continuous. 2. Partial. 3.Positional
56. Genital Mutilation.1. Yes. 2.No.
57. If yes.1. Clitoris. 2.Clitoris and labia. 3.Infubilation. 4.others.
58. Obsterical Perineum Absent.1. Non. 2.Yes.
59. Loss of stool through the vagina.1. Yes. 2.No

I.7.External Genitalia and Speculum Exam.

60. Prescences of vagina scars. 1.Yes. 2.No.
61. Leucorhae1.Yes. 2.No.
62. Visible fistula. 1.Yes. 2.No
63. Inflammatory cervix. 1.Yes. 2.No.
64. Methylene Blue test.1. Not useful. 2. Yes. 3.No.

I.8.Bidigital Vaginal Exam

65. vaginal depth in ……. cm.
66. Length of the ureter…….cm
67. vaginal borders soft 1. Yes. No…
68. indurated vagina non 0. If yes degree 1. 2. 3
69. vagina brides.1Yes. 2.No.
70. Fistula is palpable.1.yes.2.No.

I.9.Characteristics of fistulas

71. Type. 1.urogenitsl 2. genito-digestive. 3.Mixte.
72. .If urogenital numbers.1. unique 2. Multiples.
73. Localisation of genitourinary fistulas.
    1.vesico vaginal septum:1. Yes 2. No [ ]
    2.Trigonal.1yes. 2.No [ ]
    3.trigono-cervico-uterovaginal.1. Yes . No [ ]
    4.Retrotrigonal fistula 1. Yes 2. No [ ].
    5.Cervico- ureteral. 1Yes 2. No [ ]
    6.Ureto-vaginal 1.yes 2.No. [ ]
    7.Cervical. 1.Yes 2. No [ ]
    8.Juxta cervical.1. Yes. 2.No [ ]
    9.Partial cervico -ureteral disinsertion. 1.Yes 2. No [ ]
    10.Total cervico -ureteral disinsertion. 1.Yes 2.No. [ ]
    11.Destruction of the ureter 1. Yes 2. No [ ]
    12.Fistule uretero- vaginal 1. Yes 2.No [ ].
74. Borders of the fistulas.1. soft. 2.rigid.
75. Size of the fistula.1.>4cm. 2.<4cm
76. final stage of urogenital fistula. Stage of the genitourinary fistula: 1.class .1 2.class 2 3.class 3. 4.class 4
77. Genito digestive fistula. Numbers.1. unique. 2.multiple.
78. genitodidestive. State of the sphincter.1. sphinct.2 Sussphincterien 3. tiers inf.4 tiers m. 5.tier sup.
79. Localisation.

1.tier inf.2. tiers moyenne. 3.tiers sup.4. sigmoide.

80. a Size genito digestive fistula 1. <0.5cm 2.0.5 -2.5cm. 3.>2.5cm.
81. Number of fistulas. 1 unique. 2.Multiple.
82. Borders of the fistulas.1. soft. 2. Rigid
83. genito digestive fistula stage.1. Class1. 2.class 2. 3 class 3 4 class 4

I.10.Operation

84. Time from onset of symptoms to repair.1. Immediate. 2. During the first year after diagnosis. 3.More than 1 year after diagnosis.
85. Number of previous surgeries: 1. None 2. One 3. Two 4. Three 5. four and more.
86. Age at surgical repair…….
87. Route of entry.1. vaginal. 2. Abdominal 3. Mixed 4. Unknown
88. Technic genitourinary repair. 1.Fistuloraphy. 2.fistulography and fistuloplasty. 3. Uterovesical re-implantation. 4. Urine derivation. 5.Martuis Flap.6. Falandry. 3.Gracilis.

89. Technic Genito- digestive Repair.1. Transanal advancement flap repair. 2.Conversion to complete perineal tear with layer closure. 3.simple Fistulotomy. 4. Fistula division and closure without bowel resection 5. Bowel resection.
90. Route of entry.1. Rectal 2. Abdominal 3. Mixed 4. unknown.
91. Water tight test. Satisfactory. 1.Yes. 2.No. 3.not applicable.

I.11.Immediate postoperative.

92. Hemorrhage. 1.yes. 2.No.
93. Blood transfusion.1. Yes. 2.No.
94. Choc.1. Yes. 2.No
95. autres.
96. Length of surgery.
97. length of hospital stay.

I.12.Longterm Outcomes

98. Dyspareunia.1. Yes. 2.No
99. Results on discharge.1. Closed and continent 2. closed and incontinent.3. Failure.
100. Results at 3months followup.1. Closed and continent.2. closed and incontinent. 3 failure.
101. Results at 6months follow up.1. Closed and continent.2. closed and incontinent.3. Failure.
102. Results at 12 months followup.1. closed and continent.2. Closed and incontinent.3. Failure.
103. Results at 24 months follow up. 1.Closed and continent. 2. Closed and incontinent.3 Failure
104. Vagina stenosis at 6 months.1.yes 2.No.
105. vagina depth at 6 months.
106. If incontinence 1. Total/continuous.2. When walking.3. When standing.4. when sitting.5. when lying down.
107. Start of sexual activity. 1.Yes. 2. No.
108. If Yes how long after surgery. 1< 3months. 2.3- 6months 3.6 months to 1year. 4.> 1 year
109. Desir for conception. 1.yes 2. No 3.not applicable.
110. Conception 1. Yes 2. No
111. Outcome of the pregnancy. 1.early pregnancy loss. 2.Late abortion. 3.premature delivery. 4.delivery at term.
112. Mode of delivery. 1.Vaginal. 2.cesarean section.
113. Outcome of newborn 1. Alive 2. Still birth.

I.13 Social reintegration.

114. Since after surgery have you1. resumed work 1. Yes. 2.No. 2. learn a skill.1. Yes 2. No 3. Gone back to school 1.yes. 2.No.

115. Since after surgery have you resumed social activities.1. Yes. 2.No
116. Since after surgery have you been in a relationship.1 yes. 2.No
117. .Since after surgery have you 1. returned to your husband or partner.2. returned to inlaws.3. retuen to your family 4. Others.

APPENDICE 2. INFORMATION SHEET.

Principal investigator: Mbeng epse Damkam Selma Ike.

Resident Obstetrics and Gynecology.

FMSB UY1

Tel number. 672390993.

Email: dselma2016@yahoo.com

Supervisor: Pr TEBEU Pierre –Marie,

Professor of obstetrics and gynecology

Co-supervisors: Pr. KWABONG ELIE

Professor of obstetrics and gynecology

Pr. NOA NDOUA Claude Cyrille.

Associate professor of obstetrics and gynecology

Title: The prognosis of obstetric and non-obstetric fistulas from 2014 to2024 in two hospitals in Yaounde

Study site: University Hospital Center Yaoundé.

Study duration: 8 months from January to August 2024.

APPENDICE 3: ETHICAL CLEARANCE FMSBYI

UNIVERSITÉ DE YAOUNDÉ I
FACULTÉ DE MÉDECINE ET DES SCIENCES BIOMÉDICALES
COMITÉ INSTITUTIONNEL D'ÉTHIQUE DE LA RECHERCHE
Tel/ fax : 22 31-05-86 22 311224
Email: decanatfmsb@hotmail.com

THE UNIVERSITY OF YAOUNDE I
FACULTY OF MEDICINE AND BIOMEDICAL SCIENCES
INSTITUTIONAL ETHICAL REVIEW BOARD

Ref. : N° 1491 /UY1/FMSB/VDRC/DAASR/CSD

CLAIRANCE ÉTHIQUE 10 SEPT 2024

Le COMITÉ INSTITUTIONNEL D'ÉTHIQUE DE LA RECHERCHE (CIER) de la FMSB a examiné

La demande de la clairance éthique soumise par :

M.Mme : MBENG SELMA IKE **Matricule: 20S1583**

Travaillant sous la direction de :

- **Pr TEBEU Pierre-Marie**
- **Pr NOA NDOUA Cyrille Dominique**

Concernant le projet de recherche intitulé : **Epidemiological ,anatomical and prognostic aspects of obstetrical and non-obstetrical fistulas in the last decade in two hospitals in Yaoundé**

Les principales observations sont les suivantes

Evaluation scientifique	
Evaluation de la convenance institutionnelle/valeur sociale	
Equilibre des risques et des bénéfices	
Respect du consentement libre et éclairé	
Respect de la vie privée et des renseignements personnels (confidentialité) :	
Respect de la justice dans le choix des sujets	
Respect des personnes vulnérables :	
Réduction des inconvénients/optimalisation des avantages	
Gestion des compensations financières des sujets	
Gestion des conflits d'intérêt impliquant le chercheur	

Pour toutes ces raisons, le **CIER** émet un avis **favorable** sous réserve des modifications recommandées dans la grille d'évaluation scientifique.

L'équipe de recherche est responsable du respect du protocole approuvé et ne devra pas y apporter d'amendement sans avis favorable du **CIER**. Elle devra collaborer avec le **CIER** lorsque nécessaire, pour le suivi de la mise en œuvre dudit protocole.

La clairance éthique peut être retirée en cas de non - respect de la réglementation ou des recommandations sus évoquées.

En foi de quoi la présente clairance éthique est délivrée pour servir et valoir ce que de droit.

LE PRESIDENT DU COMITE ETHIQUE

Mme Atiena Ondoa
née Obama Marie Thérèse

APPENDICE 4: ETHICAL CLEARANCE CMC ESSOS

REPUBLIQUE DU CAMEROUN
Paix-Travil-Fatrie.
UNIVERSITE DE YAOUNDE 1
FACULTE DE MEDICINE ET DE SCIENCES BIOMEDICALES
DEPARTEMENT DE GYNECO-OBSTETRIQUE

REPUBLIC OF CAMEROON
Peace-Work-Fatherland
UNIVERSITY OF YAOUNDE 1
FACULTY OF MEDICINE AND BIOMEDICAL SCIENCES
DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

.The Chair Person,
Ethical Review Board,
Centre medico-chirurgico d'Essos.

MBENG EPSE DAMKAM SELMA IKE.
Tel.+ 237672390993.
30th July 2024.

Dear Sir,

Objet: REQUEST FOR AUTHORIZATION OF RESEARCH

It is with honor and respect that I write to apply for an ethical approval to conduct the study titled" ***Epidemiological, anatomic and prognostic aspects of Obstetric and non-Obstetric fistulas in the last decade in two hospitals in Yaounde***"

I am a fourth year resident in Obstetrics and Gynecology. This research proposal has been written as part of the requirements for the award of a specialization diploma (DES) in Obstetrics and Gynecology. The goal of the study is to advance the knowledge and evidence base sorounding the management and outcomes of obstetric and non-Obstetric fistulae in our study setting. It will go a long way in defining best practices for fistulae patients in our setting, thereby reducing maternal morbidity.

I will be very grateful if my request is granted.

Yours sincerely,
The Principal Investigator.

Attachments:

- Copy of research protocol.
- Copy of school fee receipt.

CENTRE MEDICO-CHIRURGICAL D'ESSOS
01.08.24
BP 6600

APPENDICE 5: REQUEST ETHICAL CLEARANCE UTHYI

REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

MINISTERE DE LA SANTE PUBLIQUE

REPUBLIC OF CAMEROON
Peace – Work – Fatherland

MINISTRY OF PUBLIC HEALTH

CENTRE HOSPITALIER ET UNIVERSITAIRE DE YAOUNDE
YAOUNDE UNIVERSITY TEACHING HOSPITAL

C C H U U YAOUNDE

DIRECTION GENERALE

CELLULE D'APPUI PEDAGOGIQUE, DE LA RECHERCHE ET DE LA COOPERATION

BUREAU DE LA CAPRC

U U T H H YAOUNDE

N° 585/AR/CHUY/DG/DGA/DM/CAPRC/CEAAP/CEARC

AUTORISATION DE RECHERCHE

Dans le cadre de la rédaction d'un mémoire de fin d'études, en vue de l'obtention du Diplôme de fin de spécialisation en Gynécologie, Madame MBENG épse DAMKAM Selma Ike est autorisée à mener une recherche au CHUY sur le thème : « **Epidemiological anatomical and prognostic aspects of obstetrical and non-obstetrical distulas in the last decade in two hospitals in Yaoundé** ».

Ces travaux se dérouleront dans le service de Gynécologie-Obstétrique sous la supervision de Pr. Elie NKWABONG, Chef du service.

Toutefois, elle devra obligatoirement déposer un exemplaire de mémoire au CHUY (Bureau de la CAPRC).

En foi de quoi la présente autorisation dont la durée de validité est de 03 mois à compter de la date de signature, lui est délivrée pour servir et valoir ce que de droit.

Yaoundé, le 15 AOUT 2024

LE DIRECTEUR GENERAL

REPUBLIQUE DU CAMEROUN – Centre Hospitalier et Universitaire Yaoundé – Le Directeur Général

Pr Ntone Enyama Félicien

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