

An Introduction to

Obstetric Fistula Surgery



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Author's Foreword

This book is a chapter from *A Textbook of Gynecology for Less-Resourced Locations* edited by Heleen van Beekhuisen and Regine Unkels, published by Sapiens Publishing.

Anyone working in maternal health care in low-resource countries will soon become aware of the tragic condition of obstetric fistula, in which a woman is made incontinent through complications of labor for which she was unable to access skilled help.

In the past decade there has been a much greater awareness of the magnitude of the problem and heartening efforts are being made to prevent the problem through education and better access to well staffed hospitals.

In every low-resource country there is a backlog of cases and many new cases. There is a great need to train more doctors to repair obstetric fistulae.

Fistula surgery can only really be learnt by hands-on experience, ideally in the presence of an experienced teacher. Unfortunately there are limited opportunities for training. With appropriate selection many fistulas can be repaired by well motivated surgeons without any special resources. This book aims to help the beginner to get started by identifying the simpler cases and gives a step by step guide as to how they should be repaired.

Team work is important; beginning with community education, finding and transporting patients, pre-operative counseling, and good postoperative care right through to support and follow-up at home. These topics are covered in this book, which should be of relevance to anyone working in fistula care and prevention.

While we strive to banish this condition to the history books, it is hard to think of any branch of surgery that, when successful, is so rewarding to the fistula team and patient alike. To give a woman back her life is a great privilege.

Acknowledgments

My deep gratitude is to Dr Catherine Hamlin and her late husband Reg Hamlin in Addis Ababa. They made me welcome many years ago, and I was assisted at many of my first operations by the legendary patient turned surgeon Mamitu Gashe. I was also helped by Dr Ambye and Dr Mulu the first full time Ethiopian fistula surgeons. Later I learnt from many other experienced surgeons, Drs Stephen Arrowsmith, John Kelly, Andrew Browning, Kees Waaldijk, Tom Raassen and Michael Breen, and Sr Maura Lynch.

I am grateful to them all for sharing and passing on their skills, as I would wish to do for others on the long and challenging, but rewarding, learning curve.

About the Author

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Brian Hancock is a retired colorectal surgeon from the University Hospital of South Manchester, UK. He first encountered obstetric fistulae whilst working as a general surgeon in Uganda 40 years ago and performed simple repairs helped by Chassar Moir's classic textbook. He has made several visits to Addis Ababa to learn and later to help with complex recto-vaginal fistulae. He is a trustee of Hamlin Fistula UK.

Since retirement in 2000, he has spent up to 3 months a year in Africa making visits to hospitals in Uganda, and has worked as fistula surgeon and trainer with Mercy Ships in several West African countries.





An Introduction to Obstetric Fistula Surgery

INTRODUCTION

The tragedy of obstetric fistula is that it is entirely preventable, if only there was ready access to quality obstetric services in all countries. Most are caused by ischemic necrosis to the genital tract and adjacent organs through prolonged obstructed labor. A significant number are also due to operative damage to the bladder or ureter at cesarean section, emergency hysterectomy for ruptured uterus and elective hysterectomy. A further small number are caused through sexual violence mainly in war conflict situations.

The reason it is so prevalent in Africa and other poor countries is that the majority of women live in poor rural areas with no access to skilled obstetric care and emergency cesarean section. Thus, most cases occur far from any hospitals and even if women reach a hospital most have limited facilities. The few doctors may have only basic knowledge let alone skill to repair any fistulas. Fistula patients are usually the poorest of the poor and cannot reach a specialized service even if one is available, and they return to their villages to live the life of an outcast.

Nobody knows how many fistula patients there are who have been forgotten and are without hope. Estimates are up to 2 million in Africa alone. In Ethiopia it is estimated that there are 9000 new cases a year. In the past decade there has been serious worldwide concern about the scale of the problem, both for the need of prevention and repair of the large backlog of cases. National governments are working with many international organizations to address the problem. These include the newly formed International Society of Obstetric Fistula Surgeons (ISOFS), the UNFPA 'End fistula program', the Addis Ababa Fistula Hospital,

Engender Health, Women and Health Alliance International (WAHA), the Worldwide Fistula Fund, the Fistula Foundation USA, Freedom from Fistula Foundation and a great many smaller initiatives and committed individuals (see Appendix 1).

As an example of increased activity, the number of fistula repairs in Uganda has increased four-fold in the past 10 years yet there is no evidence of a reduction in number of new cases. Prevention is the goal and it is necessary to understand in more detail why they occur. Three in a 100 pregnant women will develop obstruction in labor in tropical Africa. The causes are usually a fetopelvic disproportion which means that either the fetus is too large for a normally sized pelvis or the pelvis is too small for a normally sized fetus or abnormal lies of the fetal skull [a malpresentation like persistent occipitoposterior position (POP), brow presentation etc.].

In societies where underage marriage is common (e.g. Ethiopia), women may become pregnant before the pelvis has fully developed. This has given the impression that fistula is a condition affecting principally primipara but it is just as common in multiparous women. A few may reach hospital in time for a live baby to be delivered by cesarean section, but others will arrive too late to save the baby and yet others especially multipara may rupture their uterus. It is estimated that 1 in 10 women developing obstruction will end up with a fistula; thus, the best estimate is an incidence of 1 fistula for every 300 deliveries. This should be seen against a background of the appalling lifetime risk of death in pregnancy – 1 in 15 in sub-Saharan Africa.

In most of Africa more than half the women deliver at home without expert help. Fewer have access to good antenatal care where risks can be

assessed (e.g. small stature) and hospital care advised. There are three stages in delay in receiving appropriate care:

1. When complications in labor develop at home, they are recognized too late.
2. After a decision is made by the family or traditional birth attendant that help is needed, there is delay accessing transport. It may be costly and funds have not been set aside. A medical center may be remote and even several days' journey away.
3. Even when a hospital is reached there may be unacceptable charges or delays in performing a cesarean section. This could be because of volume of cases as at some teaching hospitals and lack of or inadequately trained staff at many rural hospitals.

In summary, fistulas will only be eliminated, as they have been in the developed world, when patients and their families are better educated on the advantages of antenatal care and skilled attendance at delivery and have access to them. Women need more empowerment to act in their own interests rather than have decisions made by members of the family. There must be better emergency transport infrastructure to well-equipped and well-staffed hospitals. While small steps are being made in the right direction there remains a large backlog of cases to repair and a steady stream of new cases.

It must be clearly understood that any attempt to repair obstetric fistula should not be undertaken lightly. It is perfectly possible to repair fistula with limited resources and one of the world's most experienced surgeons has largely taught himself and operated for over 30 years in Northern Nigeria with the absolute minimum of resources¹ and the author has operated successfully in several small hospitals where fistula repairs have never been done before. Fistula surgery has a justifiable reputation for being demanding, but it may not be sufficiently appreciated that up to 25% of cases are not difficult to cure. The first operation carries the best chance of success so unless one is fully conversant with the problem any temptation of 'have a go' at repair should be strongly resisted. A badly performed and failed repair makes a second attempt much more difficult.

In contrast to even 10 years ago almost all African countries have hospitals where experts are operating either as visiting surgeon or increasingly as national residents. It is essential that doctors working in de-

veloping countries find out where these centers are, either through local contacts or through contact with international organizations. It cannot be over-emphasized that a fistula patient is more than just a hole in the bladder. The whole person is damaged by the disastrous outcome of obstructed labor. A full understanding of what the patient has suffered, her social background and her future are just as important to healing as the surgery.

Patients are best treated in a center that is familiar with all aspects of care. Team work is essential; those who operate on large numbers undoubtedly get the best results. As an example, the Addis Ababa Fistula Hospital is well endowed and with its five satellite hospital cares for over 2500 patients a year and provides a holistic approach including the best possible care for the incurable cases. However, it is a fact that in rural areas women either cannot or will not consider being referred to a specialist far away, so there is a place for a well-motivated and informed surgeon to repair the less severe cases whilst making every attempt to refer the majority to an expert and to obtain further personal training.

The purpose of this chapter is to provide an introduction to obstetric fistula surgery, giving clear guidelines as to the cases a novice could consider repairing. A more comprehensive practical guide of the whole spectrum of fistula surgery has already been published by the author².

The complexity of cases varies enormously: 25% are reasonably simple, 50% present a variety of technical challenges, and the final 25% can be extremely challenging to cure. Even experts cannot cure every case; in about 1 in 50 cases there is too much damage to even attempt a repair. The most experienced surgeons claim that 95% of fistulae can be closed although they may have to operate on up to 10% a second or third time to achieve this figure. Closure of the fistula, is not the same as cure. Some 15–20% will have severe stress incontinence because the urethra and bladder have been so badly damaged. A few may improve in time, but, for those who do not, the operation has failed. Secondary operations for stress incontinence are possible, but have disappointing results. A reasonably experienced surgeon who takes on almost all cases seen can at best probably only make 65–75% really dry.

A novice surgeon should have the same closure rate as an expert, i.e. at least 90%. That is because he or she should only be operating on the

less-damaged cases. If below this figure there is a problem with selection or surgical skill.

Anyone who watches a master fistula surgeon at work will marvel at the ease with which he or she demonstrates the art of fistula surgery. Even experienced surgeons who come new to fistula surgery will be surprised at how demanding the operations are and how difficult they seem at the start. The distorted anatomy and rigidity of tissues come as a shock. One not only has to know what must be done but also have the skill to do it. Accurate dissection and suturing in a confined space is difficult and requires more than average manual dexterity. There is a long learning curve owing to the complexity of many cases, and experience can only be gained by hands-on work and regular visits to work with a more experienced surgeon.

The technical challenges of repairing fistulas have been largely worked out, the challenge remains to train more surgeons and co-workers and provide the facilities and where they may be safely repaired. A competency-based training manual has recently been published³.

Nursing care is equally important as the surgery, and can be made simple provided certain basic principles are observed. It is the surgeon's responsibility to be familiar with and to supervise all aspects of pre- and postoperative care.

THE CAUSE AND NATURE OF VESICO-VAGINAL FISTULAE

In a labor that is sufficiently prolonged to produce ischemic necrosis, the baby almost always dies. If the mother cannot reach help and have assistance the head collapses and she eventually delivers a still-born infant (if she survives that long). When the baby's head is stuck deep in the pelvis, the most common site for ischemic injury is the urethro-vesical junction (Figure 1), but injury can also occur in other positions, either in isolation or together as one massive defect.

The extent of the injury depends on the duration of labor and the strength of the mother to survive this ordeal. In the most severe cases, ischemia will affect the whole of the anterior wall of the vagina, the bladder base, much of the urethra and sometimes the rectum as well, leading to a recto-vaginal fistula. In the most extreme cases, the bladder is completely destroyed. Varying degrees of vaginal stenosis are common. The exact site, size

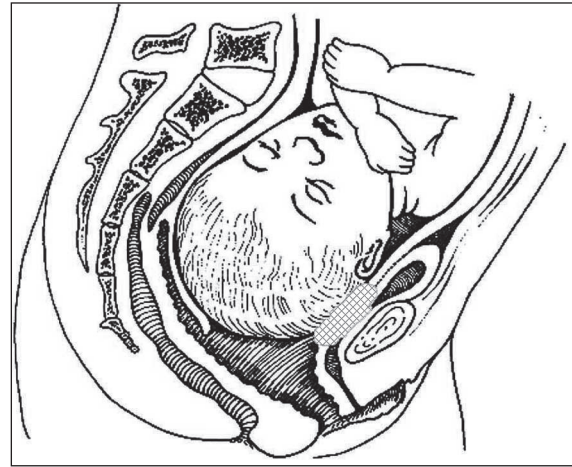


Figure 1 The hatched area is the site of maximum ischemia

and amount of scar are the result of the position of the baby's head when it becomes stuck, and the duration of the obstruction.

Many mothers in unrelieved obstruction die of exhaustion or especially if multiparous, a ruptured uterus – the fistula patients are the survivors.

THE OBSTRUCTED LABOR INJURY COMPLEX

A fistula patient suffers from much more than a hole in the bladder. Her whole person is damaged. It is important to understand the full impact of the damage to the physical and mental well-being of the patient. 'Obstructed labor injury complex'⁴ is a term for a broad range of injuries that the patient suffering from an obstetric fistula may encounter. These can be divided into primary conditions directly due to the ischemia from the obstructed labor and conditions that are secondary to this ischemic damage.

Primary conditions

The predominant lesion

This is a communication between the genital and urinary tract, always involving the bladder and often the urethra.

Recto-vaginal fistulae

Recto-vaginal fistulae may coexist with vesico-vaginal fistulae in more severe cases of ischemia. The incidence of combined fistulae ranges from 5% to 10%. Isolated recto-vaginal fistula are rare.

Ureteric fistulae

Ureteric fistulae can arise in two ways:

- They can result from involvement of the uretero-vesical junction in the ischemic process, so that the ureter then drains directly into the vagina outside the fistula margin.
- More often, they are caused by operative injury during cesarean section or an emergency hysterectomy for a ruptured uterus.

Renal damage

A few fistula patients develop a stricture of the lower ureter leading to hydronephrosis and loss of renal function.

Genital tract injuries

The ischemic process may destroy the tissues of the vagina, cervix and even the uterus. This leads to degrees of vaginal stenosis, loss of the anterior cervix and canal, and occasionally severe cervical stenosis leading to hematometra. Exceptionally, the whole uterus sloughs.

Nerve damage

Many fistula patients suffer compression damage to the lumbo-sacral plexus, resulting in foot drop from involvement of the L5 root. Minor degrees are easily overlooked. In some patients the foot drop does slowly recover, but this can take up to 2 years. In the most severe cases of pelvic ischemia, the patient may be paraplegic immediately after delivery, but this too recovers (apart from prolonged foot drop). There may also be saddle anesthesia with the loss of anal reflex and the risk of pressure sores.

Muscle and fascial damage

The levator muscles, especially the pubo-coccygeus and the important pelvic fascial support are subject to ischemic damage when they are crushed against the inferior pubic rami.

Secondary conditions

Social consequences

The social consequences of obstetric fistula can be just as devastating to the patient as the symptoms of incontinence. Many women will be ostracized by

their families and communities. Attitudes to fistula patients vary from region to region: in some areas the family can be very supportive; however, the longer a woman has had a fistula, the more likely it is that her husband will divorce her. Many patients will be unable to socialize or to go to market, church or community gatherings, and will live a life of exclusion.

Mental health

It is not surprising that many fistula patients are severely depressed. A prolonged labor with a still-birth followed by incontinence is too much to bear. One hundred per cent of fistula patients in Ethiopia test positive for psychological disorder when questioned on arrival at the hospital, with up to 40% thinking seriously of suicide. Unfortunately, 30% still test positive on leaving hospital, even though they are dry. Making the patient dry is not always the end to her problems.

Urine dermatitis

Many patients restrict their drinking and so have very concentrated urine. When the patient is incontinent, the phosphates and nitrates contained in the urine irritate the skin, causing local hyperkeratosis and secondary ulceration. The cure is to treat the incontinence, but in the meantime the condition will improve if the patient can drink more and dilute her urine. Barrier substances such as petroleum jelly may help. Also, dilute urine does not smell nearly so much.

Bladder stones

Concentrated urine will predispose to deposits in the bladder that may act as a nidus for the formation of stones. These can become large and can cause pain, hematuria and odor from chronic cystitis. Some women may have had a foreign body introduced into the bladder either by themselves or by a traditional healer in an effort to stop the flow of urine. Such objects include cloth, plant material and even small stones.

Contractures

Up to 2% of fistula patients in Ethiopia suffer severe lower limb contractures, although these are very rarely seen in other African countries. They occur after delivery, because the patient will often lie curled up in bed with her legs together, trying to

stop the flow of urine. Patients may remain in this position for months or even years, resulting in diffuse contractures.

Malnutrition

In Ethiopia, in particular, neglect and depression lead to malnutrition in some patients, with a fall in body mass index (BMI). In contrast, this appears to be a less common problem in other tropical African countries.

Infertility

Many fistula patients (up to 60%) have amenorrhea after delivery. This has a variety of causes, the main one being mental, e.g. the severe stress of losing a child and a husband, together with the shame of incontinence. Malnutrition may also be a factor. A small number of patients will have Sheehan's syndrome – anterior pituitary necrosis due to prolonged shock during labor. The resultant decrease in follicle-stimulating hormone (FSH) and luteinizing hormone (LH) leads to amenorrhea. Asherman's syndrome – scarring of the endometrium by either repeated infections or perhaps urine in the endometrial cavity – is another cause. These women may have normal hormone levels, but the endometrium will be unresponsive to them. Finally, there may be cryptomenorrhea, or hidden menses, if the cervical canal is stenosed leading to hematometra. In addition there may be damage from pelvic inflammatory disease sustained in the obstructed labor.

Reproductive outcomes

For the above reasons, the potential for successful pregnancy in women with obstetric fistulae is quite low. Only about 20% of post-repair patients will achieve a term pregnancy. If a patient does become pregnant, she has a high chance of a miscarriage or prematurity. This is because of an incompetent cervix. The anterior lip is frequently torn so badly that it will not be able to hold a pregnancy to term. Others have vaginal stenosis that is severe enough to preclude intercourse.

Other causes of urinary incontinence not directly related to obstructed labor

In war-torn countries sexual violence is a tragic cause of genital tract injuries. The principles of

management are the same as for obstetric fistulae. Anyone working in developing countries will encounter some patients with miscellaneous causes of incontinence. These include:

- Congenital abnormalities, including ectopia vesicae, epispadias and ectopic ureters (usually as part of a duplex system)
- Neurological causes, such as spina bifida
- Advanced carcinoma of the cervix
- Ureteric fistulae produced during elective gynecological operations
- Genital prolapse conditions.

Management of these (apart from ureteric injuries) is outside the scope of this chapter.

BASIS OF CLASSIFICATION OF OBSTETRIC FISTULAE

Despite much debate, there is no universally accepted system of classification. This is understandable, because so much of the assessment is subjective. For a classification to be worthwhile, it should enable surgeons to communicate with each other and even consider clinical trials. Most surgeons base their classification on simple descriptive terms involving three factors:

- Site
- Size
- Scarring.

Fistula site

Juxta-urethral

The female urethra is approximately 3.5 cm long. The commonest site of damage is at the urethro-vesical junction, about 3–4 cm from the external meatus (Figures 2a–c). In this situation they are often referred to as juxta-urethral fistulas. Mild ischemia will produce just a simple hole, but prolonged ischemia will cause circumferential tissue loss with the urethra and bladder becoming separated to a variable extent.

Mid-vaginal

Small defects 4 cm or more from the external urethral orifice are not very common, but are the simplest to repair. Larger defects may involve much of the urethra and extend back as far as the cervix and laterally to the pubic rami. In these cases the

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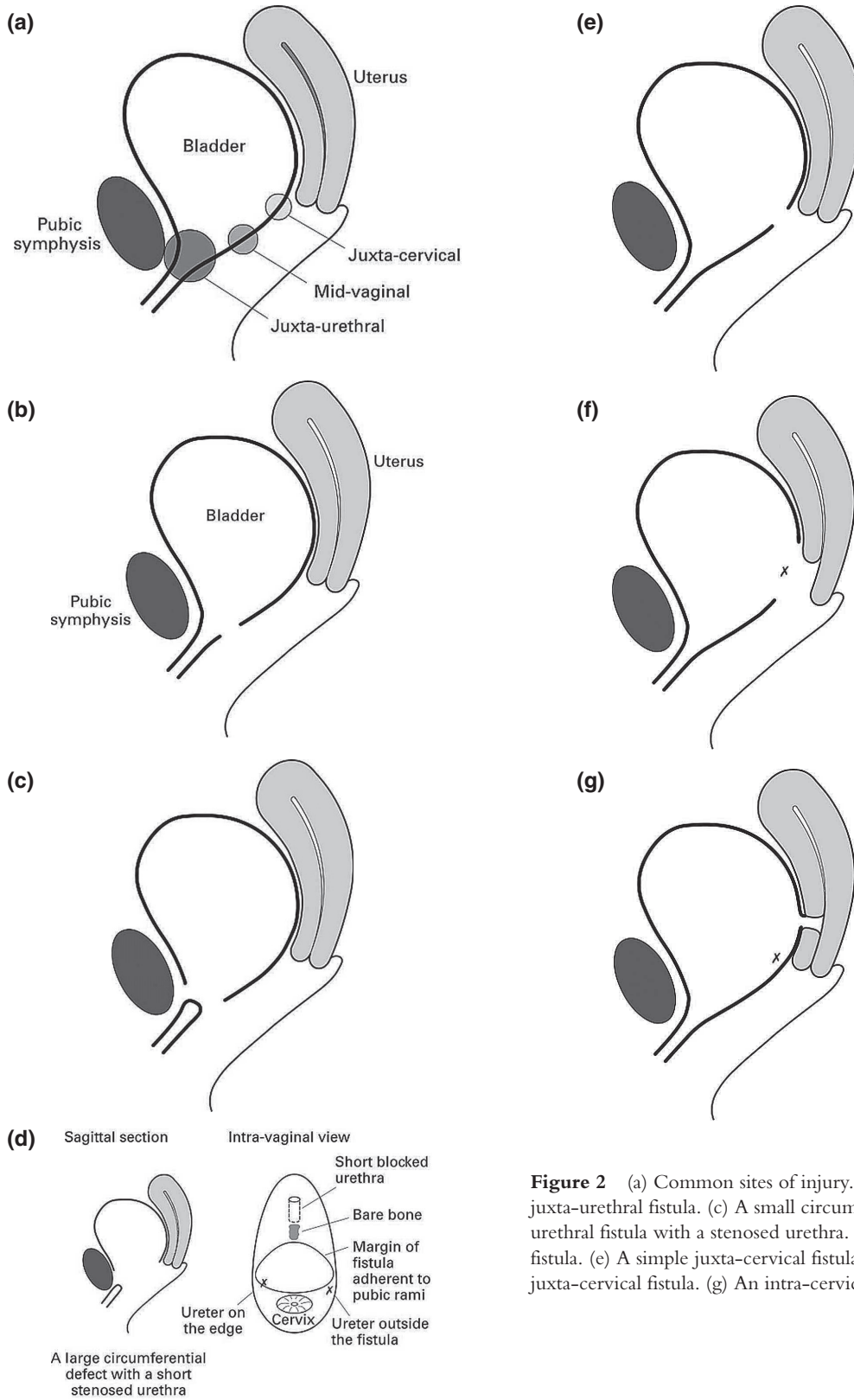


Figure 2 (a) Common sites of injury. (b) A simple juxta-urethral fistula. (c) A small circumferential juxta-urethral fistula with a stenosed urethra. (d) An extensive fistula. (e) A simple juxta-cervical fistula. (f) A complex juxta-cervical fistula. (g) An intra-cervical fistula

small urethral remnant will be completely detached from the residual bladder which may be greatly reduced in size. Bare bone is exposed at the back of the symphysis (Figure 2d).

Juxta-cervical

These are fistulae in the region of the cervix that are more frequent in multiparous patients and in those delivered by cesarean section. Sometimes, the defect extends into the cervical canal where the anterior cervical canal is completely missing or torn open. These fistulae may result from a vertical tear in the lower segment and an associated bladder injury during cesarean section (Figure 2e, f).

Intra-cervical

Intra-cervical fistulae, i.e. fistulae between the bladder and the cervical canal, are not very common. They almost always follow a cesarean section. There may be a history of a live baby, suggesting an iatrogenic cause (Figure 2g).

Miscellaneous fistulae

Fistulae can result from accidental damage to a ureter during cesarean section or hysterectomy, and vault fistulae can be produced during emergency hysterectomy for a ruptured uterus or elective hysterectomy. Locally advanced carcinoma of the cervix can cause a urinary fistula.

Fistula size

Fistulae may be:

- Tiny (admitting only a small probe)
- Small (0.5–1.5 cm)
- Medium (1.5–3 cm)
- Large (>3 cm), usually involving loss of most of the anterior vaginal wall and a circumferential loss of the urethro-vesical junction, i.e. involving major loss of bladder and urethra, with a large gap between the two.

Scarring

Scarring varies from minimal when the fistula margins are soft and mobile to extreme when the fistula margins are rigid and fixed. Scarring also affects the lateral and posterior wall of the vagina, causing complete stenosis in extreme cases. Vaginal stenosis can affect the proximal or distal canal or

can extend throughout. The most common site is mid-vagina. Scar is the big enemy – any fistula with significant scarring is not for a beginner.

Classification systems

There are two published systems that are commonly used, introduced by Judith Goh and Kees Waaldijk. Both have some limitations and though attempting to be as simple as possible may still be confusing to beginners. They are described in Appendix 2. For novices, the basic questions to ask when assessing a fistula are described in the operative section.

PROGNOSIS

The factors affecting the prognosis for closure and continence in order of importance are the extent of urethral destruction, amount of scar, capacity of the bladder and size of the fistula.

DIAGNOSIS

This can be quite easily made from history taking and examination without any investigations.

History taking

- Symptoms. Is she wet all the time? If dry at night then she probably does not have a fistula. Is there leakage of feces as well as urine? A small hole in the bladder leaks just as much as a large one, but some patients with a rectal fistula may only be aware of soiling when they have diarrhea.
- Age and marital status.
- Parity. If the patient is multiparous then which delivery caused the fistula?
- How long has she been wet?
- Mode of delivery. Was birth by vaginal delivery or cesarean section?
- How long was she in labor? The average is about 3 days.
- Where did the delivery take place? Home, maternity center or hospital?
- Did the child survive? Almost all vaginal deliveries result in a stillbirth, but a few delivered by cesarean section are alive. In the latter case an iatrogenic injury should be suspected.
- Neurological symptoms. Complete paralysis is rare, but minor degrees of foot drop are common.

- Does she still menstruate? Amenorrhea is quite common after such a traumatic childbirth, but if the patient had a cesarean section then one should suspect a hysterectomy for a ruptured uterus. Some patients do not know that they have lost their uterus.
- Have any attempts been made to repair the fistula? Patients sometimes hide this information for fear that they will be turned away.
- Social history. The majority of patients with a long-standing fistula are single and live a very restricted life. The longer that they have had the fistula, the more likely it is that they will be alone and live a subsistence existence supported by relatives.

Examination

Inspection

- Watch the patient walk for evidence of foot drop.
- The abdomen. Are cesarean or other scars present? Is any swelling visible? The patient could be pregnant! Repair should generally be avoided in pregnancy unless it is the patient's only real chance of finding a skilled surgeon. Bleeding can be very troublesome during the repair.
- The perineum. Look for obvious wetness and urine dermatitis. Can the urethral orifice be seen? In very bad fistulae, it can be completely destroyed. Is there any visible sign of stenosis? Are the anal sphincters intact?

Palpation

- Begin with the abdomen in order to exclude an unexpected pregnancy or other swellings. Follow this with a vaginal examination (see Chapter 1 on how to do this).
- Is the vagina of normal size and depth? Can the cervix be felt? Is there any vaginal narrowing? Smaller degrees are felt as a band of fibrous tissue around the lateral and posterior circumference at any depth in the vagina. In extreme cases, the whole vagina is stenosed. The anterior wall is frequently shortened in the presence of a fistula. Carefully palpate the posterior wall for a recto-vaginal fistula.
- Can a defect be felt in the anterior vaginal wall? This will range from a large defect where the finger immediately enters the bladder, to smaller

defects that just admit a finger, and to the smallest ones where no defect is felt at all. If a defect can be felt, where is it in relation to the urethra and the cervix? If a defect can be felt, consider the margins carefully. Are they soft and supple, somewhat rigid or (in the worst cases) stuck to the pubic rami?

- The anterior cervix is often torn in fistula patients. Defects in this region are often difficult to feel unless they are large. The cervix may be easily felt low down in the vagina when a large amount of anterior wall has been lost.
- Feel the posterior vaginal wall carefully for a rectal defect. Rectal fistulae are usually associated with severe vaginal scarring and a bad bladder fistula, but occasionally they are small, soft and easily overlooked or just hidden behind a posterior band of scar. If one is suspected, a rectal examination should also be performed. Look at the perineal body and anal sphincters for any tears.

Most relevant information can be obtained by digital examination, but it is always advisable to inspect the vagina with a Sim's speculum. This is best done with the patient in the lithotomy position (see Chapter 1 how to do this).

A patient may say she is wet but no fistula can be felt or seen. In this situation, the patient should be asked to drink plenty and then be re-examined. It should be remembered that many patients drink very little, especially if they know that they are going to be examined. If it is then confirmed that the patient is wet but the fistula cannot be felt, proceed as follows: with a Sim's speculum expose the anterior vaginal wall. Ask her to cough. A small fistula may be readily visible. If not then, perform a dye test. Dilute methylene blue (or Gentian violet) should be used – if it is too concentrated, it will stain everything, making interpretation of the test difficult.

1. Insert a catheter.
2. Fill the catheter balloon, put three moist swabs into the vagina.
3. Slowly instill about 60 cm³ of dye.
4. After 1 min, ask the patient to cough occluding the urethral orifice with finger pressure.
5. Remove the swabs one by one.
6. If any of the swabs are stained, a fistula is present (beware of urethral leakage staining the distal swab).

7. If none of the swabs is stained, there could still be a fistula. Repeat the test using up to 200 cm³ of dye. The patient should walk around for 20 min while the dye is in the bladder. Sometimes the hole is very small, especially if it is between the cervix and the bladder. It is easy to overlook a tiny fistula.
8. If this second test is negative but the swab is wet with urine, there is probably a ureteric fistula.

Ureteric fistulae

A ureter can be damaged accidentally during a cesarean section, but injury is more likely during an emergency hysterectomy for a ruptured uterus. The ureter may be ligated and included in the lower segment repair. Later, urine starts leaking through the cervix. After hysterectomy, urine may leak into the pelvis, and some days later finds a way out between the sutures in the vaginal vault. Although ureteric fistulae are uncommon, it is very important to recognize them, because they can be repaired by an abdominal operation.

A patient with a ureteric fistula has normal voiding as the other ureter is emptying normally into the bladder but she is wet all the time. To exclude a ureteric fistula in a patient with some normal bladder function, empty the bladder and insert a dry swab into the vagina. Ask the patient to drink and walk about. Re-examine her after half an hour. If the swab is wet then there is a ureteric fistula.

Postpartum stress and chronic retention

Postpartum stress is occasionally troublesome, and can be mistaken for a fistula. Following the negative dye test, take the catheter out, leaving the dye inside. Watch to see if it dribbles out of the urethra, and then ask the patient to cough. If there is significant stress, dye will come out. Then check her residual urine after voiding. Management is conservative with pelvic floor exercises but surgery is occasionally needed. This should only be considered after at least 6 months of conservative management.

Another uncommon cause of incontinence is the postpartum atonic bladder leading to overflow incontinence. Bladder function is disturbed by prolonged labor. This condition should be managed prophylactically by continuous bladder drainage post-delivery for at least 8–10 days after any prolonged labor. If this is not done, chronic retention

may result and be diagnosed much later when it is hard to treat. It may settle after a period of continuous catheter drainage, although a better option is to teach the patient intermittent self-catheterization.

INVESTIGATIONS

These include the following:

- Hemoglobin.
- Ultrasound scan. If available, should be used to examine the kidney and ureters, especially for bad cases. It is useful to be forewarned of a dilated renal tract.
- Intravenous urograms. These are rarely available, but can give useful information about the function of the kidneys when ureteric involvement is suspected.

TREATMENT OF FISTULA

Conservative management

After a cesarean section or a vaginal delivery for prolonged obstruction, keep a catheter in for at least 10 days. Earlier removal predisposes to chronic retention. The bladder is often atonic after a prolonged labor. If there is urinary leakage after removal of the catheter, it should be reinserted immediately.

Check that the catheter has not come into the vagina and then keep the patient on continuous drainage, provided that most of the urine is coming through the catheter. After 2 or 3 weeks, it should be possible to assess the size of the defect by palpation and inspection. Up to 20–40% of small defects (<2 cm) may still heal with another 2–3 weeks of bladder drainage. If this measure were adopted routinely in all patients wet after childbirth the incidence of fistula could be reduced by 20% at a stroke. At present it is extremely rare to find a patient with a small fistula who admits to having had a trial of catheter drainage.

After vaginal delivery, a leak of urine may indicate anything from a tiny hole to massive necrosis. The patient should be examined gently with a Sim's speculum. Slough should be seen; it must not be pulled or cut (Figure 3a). After some days it will become loose and it can be gently pulled out. This may require a couple of sessions. This should be followed by regular irrigation of the vagina. Palpation and inspection with a Sim's speculum will help to judge the size of the fistula. If less than 2 cm in

diameter, the catheter should be kept in at least another 4 weeks. It is difficult to keep the catheter in the bladder in the case of a larger fistula. Fistulae that have not healed spontaneously with 4 weeks of drainage are unlikely to do so. Note that antibiotics have no part to play in the healing of fistulae. The cause is ischemic necrosis, not infection.

Early repair

Naturally, the sooner a patient can be cured the better. The longer she is incontinent, the greater is the chance that she will be abandoned. This is almost inevitable when she perceives that there is no chance of cure.

Most doctors advise waiting at least 3 months from the injury before operating. In the early months, the surrounding tissues are edematous and hyperemic, making them friable and difficult to handle. By 3 months, they should be sufficiently mature. In spite of this, some doctors have been very successful in closing selected fistulae before 3 months and have strongly recommended this approach⁵. Excellent results have been published, but the method has not yet been well illustrated or widely understood. Others have not yet been able to reproduce such good results.

A flexible approach is recommended in which each case is judged on its merits. Some fistulae are perfectly clean and healthy at 2 months, and can be safely repaired (Figure 3b); on the other hand, some are distinctly friable even at 3 months. It is the appearance of the fistula that matters more than its age. If in doubt, wait.

Preoperative preparation

Most patients are in good general condition and ready for operation after a day's preparation, although in Ethiopia some are weak and malnourished and a few have contractures. It is dangerous to operate on a severely malnourished patient. The general condition should be improved by nutrition, iron and vitamin supplements, de-worming and treatment of malaria. Contractures should be treated before surgery if possible.

It is not surprising that a recent small study has confirmed that many patients suffer from severe depression. Sympathetic handling is called for but no amount of 'counseling' will improve their state until they have been cured of constant incontinence.

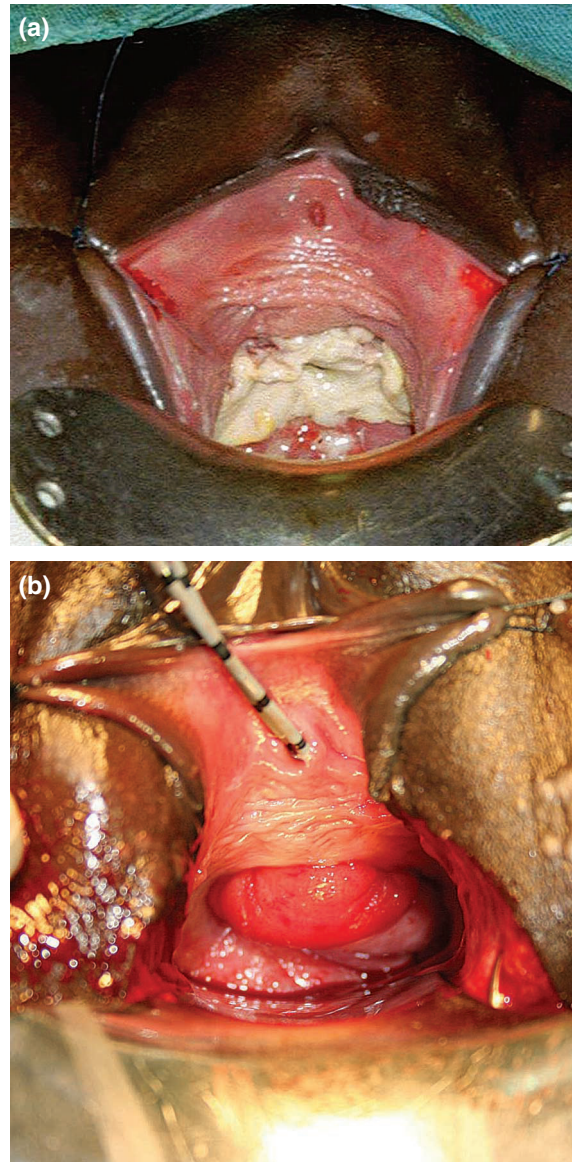


Figure 3 (a) Slough at the site of a fistula: not yet ready for removal (courtesy Heleen van Beekhuizen). (b) A 2-month-old fistula ready for repair

Hemoglobin should ideally be above 10 g/100 ml but lower levels can be accepted for simple cases where blood loss should be minimal.

Neurological damage and physiotherapy

Neurological damage is a marker for a severe injury. At the extreme, the patient may be unable to walk immediately after delivery due to ischemia to the lumbar-sacral plexus (Figure 4). Immobility may

lead to pressure sores compounded by the presence of saddle anesthesia.

With good nursing care the majority improve. With good nutrition, active and passive movements of all joints, motor power and sensory loss will improve, although foot drop (L5 root) will be the last to recover if it does at all. Splints prevent contractures in plantar flexion. These should not be a substitute for putting all affected joints through a full range of movement several times daily. Residual foot drop especially if a fixed plantar flexion develops, is a serious disability that will impair her ability in daily activities.

It is easy to understand how in the absence of any medical help contractures form, especially if the patient is rejected and lies in one position for days on end hoping the incontinence will stop. This is particularly prone to occur in Ethiopian society where many of the patients are child brides in remote areas. About 2% of patients presenting at the Addis Fistula Hospital have severe contractures. These require months of passive stretching exercises before they are fit for repair. A dedicated physiotherapy department enables severe contractures to be considerably improved with time.

Explanation and consent

The patient must have a clear explanation of what is going to happen in theater and must give her consent. It is vital that she and her attendant should understand that not every operation is successful, bearing in mind that if all cases are treated about 25% will still be wet to some extent. The possibility of a second operation must be accepted so that expectations are not raised too high.

She must be informed about the length of post-operative stay, the duration the catheter will be kept in and the restrictions on her activities. She must understand that she should not rush off home immediately the catheter is removed but carefully follow the team's instructions.

Bowel preparation

An enema is given only before recto-vaginal fistula or sphincter repair. In all cases the patient should be asked to open her bowels just before coming to theater. In the uncommon event of troublesome anal leakage one can clean up and insert a temporary anal purse string suture and carry on operating.

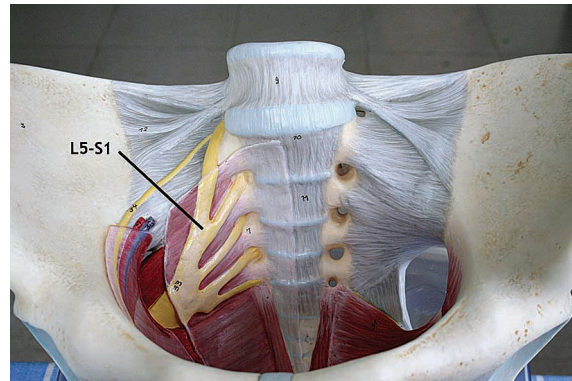


Figure 4 The L5–S1 roots are particularly at risk from ischemia at the pelvic inlet

Hydration

Left to her own devices the patient will come to theater dehydrated, as she will be trying to reduce the amount of wetness. This is a bad thing.

- She may be hypotensive under a spinal anesthetic.
- It increases the difficulty in identifying the ureteric orifices.
- The urine output will be poor after the operation, predisposing to catheter blockage. More intravenous (IV) fluids will be required during and after the operation. They are expensive.

So as soon as the decision is made to operate ask the patient to start drinking plenty of mixed fluids (at least 4 litres a day); it is not necessary to stop before the operation as she will only have a spinal anesthetic. Ideally set up an IV infusion of saline before she goes to theater.

In theater

The anesthetic

Spinal anesthesia is the preferred method for all fistula cases. Many doctors give their own spinal. Heavy Marcain® 0.5% is ideal as the longest acting anesthetic though heavy lignocaine 5% in dextrose 7.5% can have its duration extended by adding adrenaline. The technique favored by some is to draw up adrenaline 1:1000 into the syringe, expel it and then draw up the lignocaine. The wetting of the inside of the syringe provides enough adrenaline. The usual dose of lignocaine 5% or Marcain 0.5% is 2 cc. Some sit the patients up for 5 min, others lie the patient down and slightly head up for 5 min before putting the legs up. Yet others lie the

patient down and put the legs up in stirrups right away. The critical step is that there should be *no head down tilt for at least 10 min* until all the anesthetic has been fixed, otherwise paralysis of the respiratory center may be fatal (Figure 5).

Some very experienced surgeons through force of circumstances operate without any anesthetic back-up and can finish their operation before the spinal anesthetic wears off. However they are not able to perform any abdominal operations. Less-experienced surgeons would not feel comfortable operating without anesthetic help. Some patients require pethidine or occasionally ketamine to complete the operation and unexpected emergencies can arise at any time. It is good to have the option of occasionally changing to an abdominal approach after vaginal assessment under spinal. If the patient was lying flat initially for 5 min the spinal should be high enough for a lower abdominal approach but it is essential to have anesthetic back-up in case of difficulties during an abdominal operation.

Antibiotics

Some surgeons give no antibiotics, whilst others prescribe them only for specific postoperative indications. It is well known that infection usually results from contamination during the operation so a common practice is to give a single IV dose of gentamicin 160mg at the start of the surgery. If there has been accidental fecal contamination or a rectal or sphincter repair as well, gentamicin 80mg intramuscularly (IM) and metronidazole 500mg IV 8 hourly, for 48 h is recommended.

Instruments

- Auvard speculum
- Sim's speculum
- Good-quality dissecting scissors
- Toothed dissecting forceps
- Allis tissue forceps
- Artery forceps
- Metal catheter
- Small probe for ureters
- Scalpel and no. 15 blade
- Scissors (Figure 5d)

Sutures and needles

Non-absorbable sutures must never be used because a stone may later form in the bladder. The

choice of suture may be determined by what is available. Vicryl or Dexon, Zero, 2/0 and 3/0, would be most surgeons first choice if available. Newer monofilament absorbable sutures are very good to use. For closure of the bladder half-circle 25 mm strong round-bodied needles are best. For more advanced fistula work eyed J-needles are a great help (Figure 5e). A perfect suture is a 5/8 circle 25-mm needle ready-mounted but this is expensive. These are ideal for suturing in difficult corners and deep situations. A larger cutting needle is used for suturing vaginal mucosa.

Operating table

An operating table that tilts to at least 40° and has shoulder rests is essential for the full range of surgery. Simpler fistulas can be done with a more modest tilt and without shoulder rests.

Lighting and positioning

A simple spotlight is sufficient for easy cases. One master surgeon operates close to the window by daylight because the electricity supply is so erratic (Figure 5f). As theater lighting can be very unreliable in many hospitals most surgeons work with a portable headlight. One such example is shown in Figure 5g. The lamp can be clipped onto one's own spectacles or supplied attached to a neutral spectacle frame. The investment is worthwhile as the device is useful in many circumstances in theater and the labor room. The rechargeable battery can be switched on and off through a sterile gown and provides brilliant spot illumination for 4h (see Appendix 3 for suppliers).

Position on the table

The more head down the better but really good-quality shoulder rests are essential for steep Trendelenburg to prevent the patient sliding down the table (Figure 5h,i).

Basic operative principles

- Good exposure of the fistula using a generous episiotomy if necessary.
- Protection of the ureters when at risk.
- Separation of the vagina from the bladder around the fistula.



Figure 5 (a) The ideal position to give a spinal. (b) Slight head-up position with the head on a pillow, is maintained for 10 min after the injection (photos taken at Katsina courtesy Kees Waaldijk). (c) Basic instruments for a simple repair (Addis Ababa). (d) Most surgeons have their favorite scissors, e.g. Boyd–Stille tonsil scissors for fine dissection – a; Thorek scissors sharply curved at the tip – b; Stille–Matarasso fistula scissors for cutting through scar – c. (e) Some ideal needles: A, 3/0 Monocryl on a 5/8 circle 26-mm round-bodied needle; B, 2/0 Vicryl on a 5/8 circle 36-mm round-bodied needle; both the needles are very strong. Below are J–needles. (f) Kees Waaldijk operating by daylight in Katsina.



Figure 5 (cont) (g) Andrew Browning wearing a portable headlight. (h,i) Position on the table; (h) if there are no shoulder rests, make sure the buttocks are well over the end of the table and the thighs well flexed over the abdomen. The patient will not slip down with a good degree of head down tilt; (i) excellent positioning is illustrated in spite of lack of shoulder supports. There is modest head down tilt. The buttocks are over the end of the bed and the legs are well up out of the way giving clear access to the operating field which is at eye level

- Mobilization of enough bladder after excision of scar to allow tension-free closure of the defect that shows no leak on dye test.
- Support for the urethra when it is deficient.

Selection of cases for the beginner

To attempt a case beyond ones capabilities is not only demoralizing for the surgeon but a disaster for the patient, as the best chance of cure is always the first operation. Of all the new cases presenting only about one-quarter will be suitable for a beginner. History taking does not help that much in selecting the simpler cases. A small hole leaks just as much as a big one. Examination is the key to selection. The features to look for are:

- A vagina without shortening or stenosis.
- A fistula that is easily palpable and visible, that is small, soft and accessible but neither too close to the cervix nor the external urethral orifice (at least 4 cm for the external urethral orifice).
- The fistula is located in the midline.

There is no need to examine the patient under anesthesia. If the fistula cannot be easily seen in the conscious patient using a Sim's speculum then it is not a simple case. In summary, novice surgeons should confine themselves to:

- Small fistulae at least 4 cm from the external urethral orifice.
- Those with minimal scar.
- Those that are easily accessible.

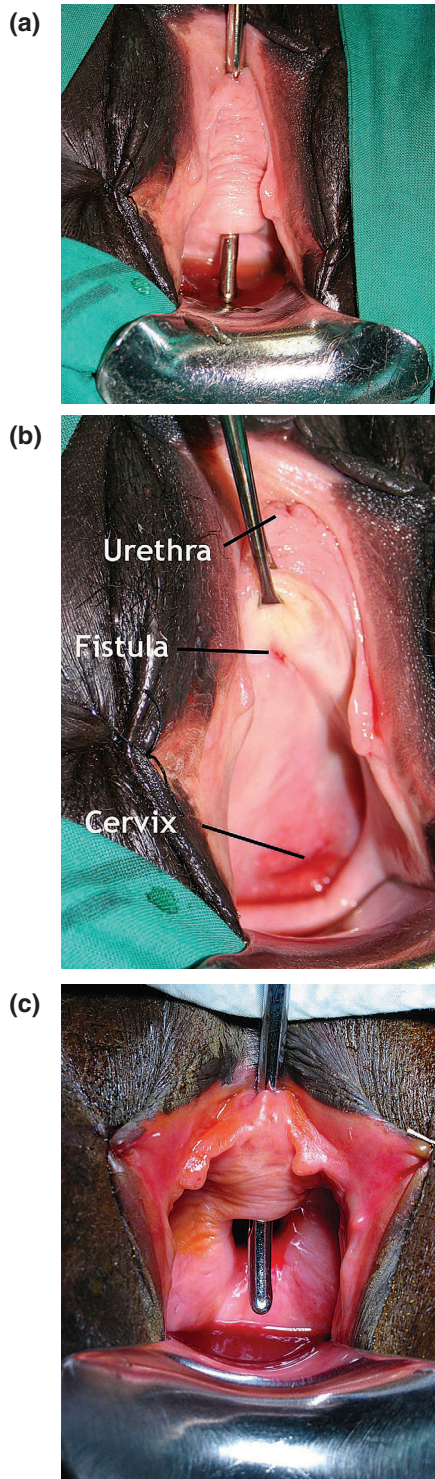


Figure 6 (a) A small mid-vaginal fistula more than 4 cm from the external meatus. (b) In the same case the distal wall of vagina is held up with Allis forceps to expose the fistula. It is seen well distal (below) to the cervix. (c) Larger but mobile and assessable fistula at the urethro-vesical junction

Some simpler cases illustrated

Some simpler cases are shown in Figures 6–8.

Cases not to attempt

Some cases not to attempt as a beginner are shown in Figures 9–12.

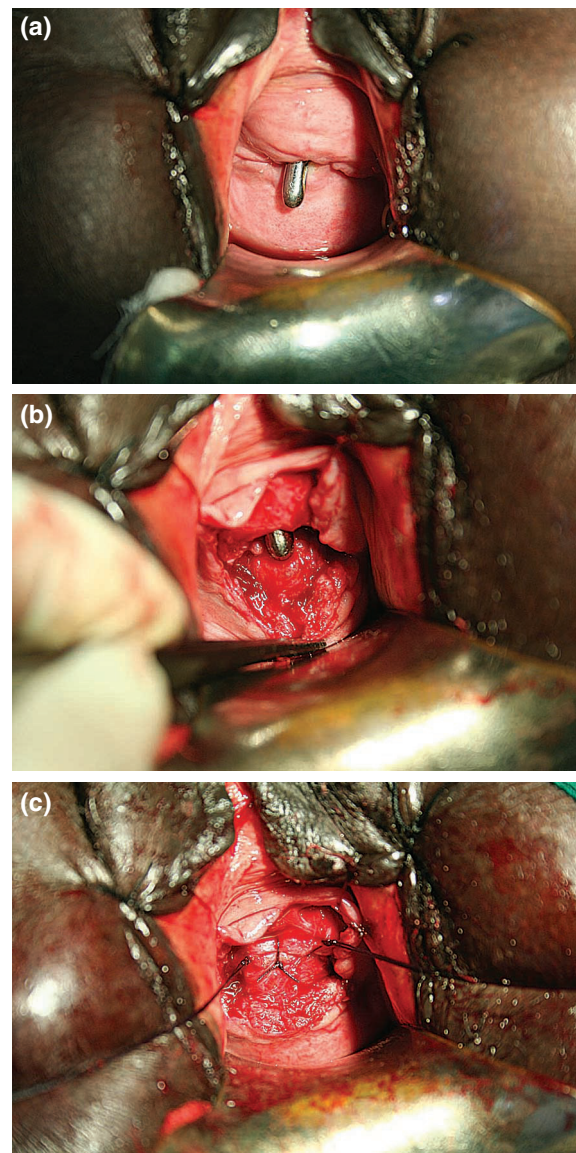


Figure 7 (a) A simple mid-vaginal fistula; (b) the extent of dissection; (c) closure in one layer

AN INTRODUCTION TO OBSTETRIC FISTULA SURGERY

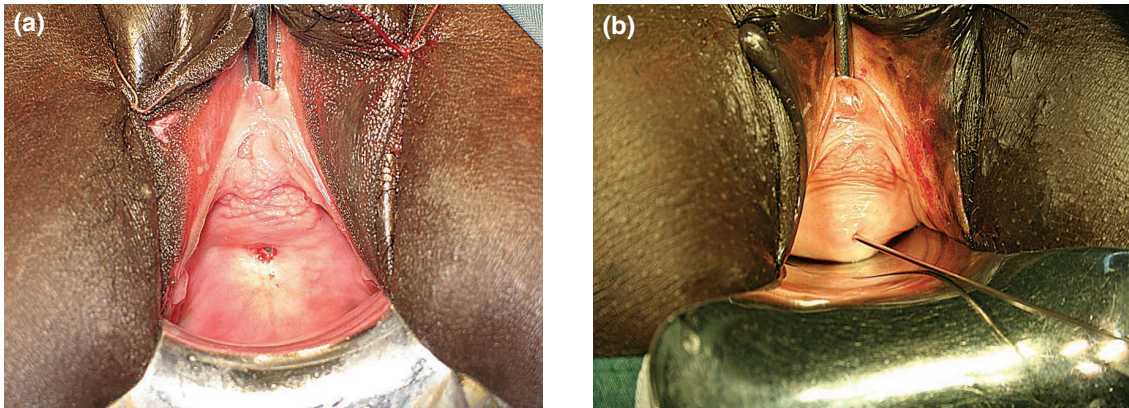


Figure 8 (a) The fistula appears tiny but note the vaginal rugae are missing indicating that there is considerable fibrosis around it. The scar tissue must be excised so a generous mobilization will be required to reach healthy bladder. (b) This pinhole fistula is easy to see but can be quite troublesome to close. The probe should be kept in the fistula during the dissection otherwise the track may be lost

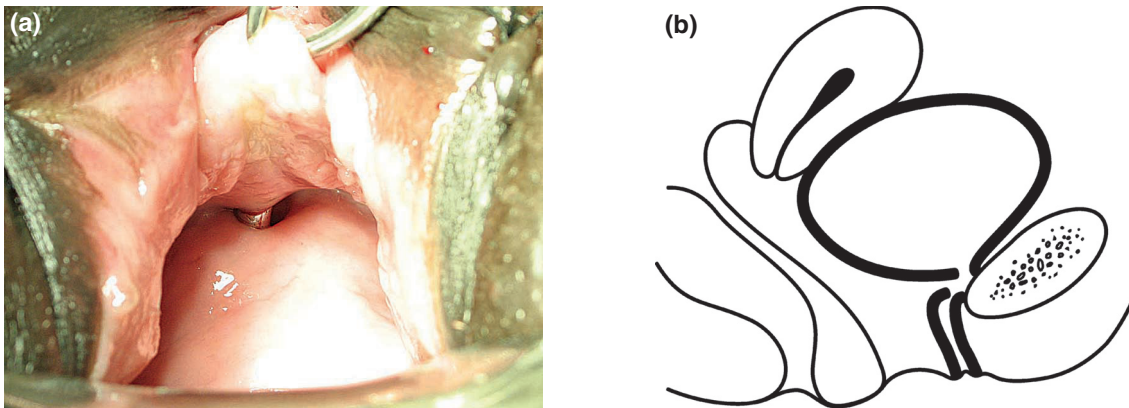


Figure 9 (a,b) This juxta-urethral fistula is pulled up behind the symphysis and adherent to bone, making access difficult. There is also complete separation of urethra and bladder (a small circumferential fistula). This requires an end-to-end anastomosis of bladder to urethra

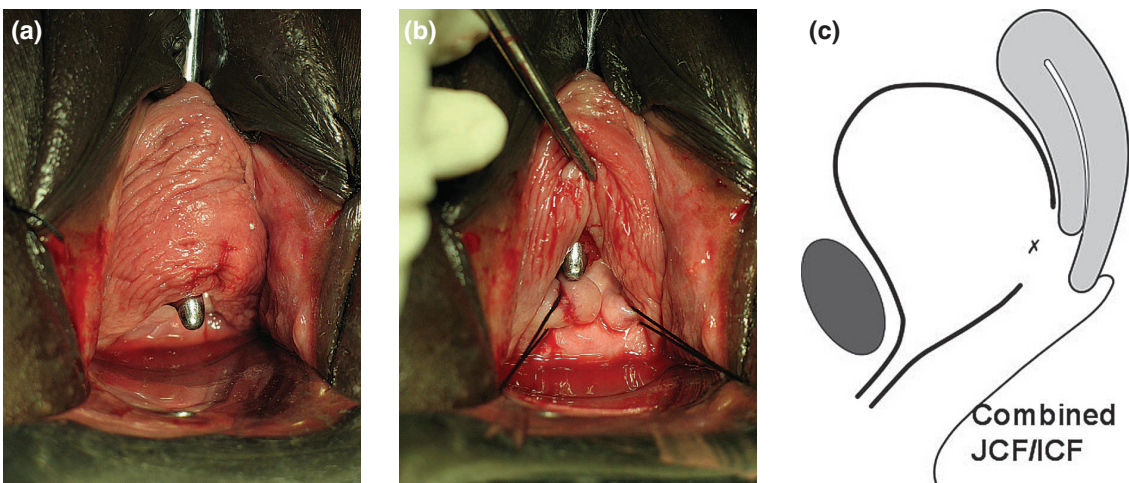


Figure 10 (a-c) This is a juxta-cervical fistula which opens high into an open cervical canal. It is a challenging one to repair but has an excellent prognosis because the urethro-vesical junction is undamaged

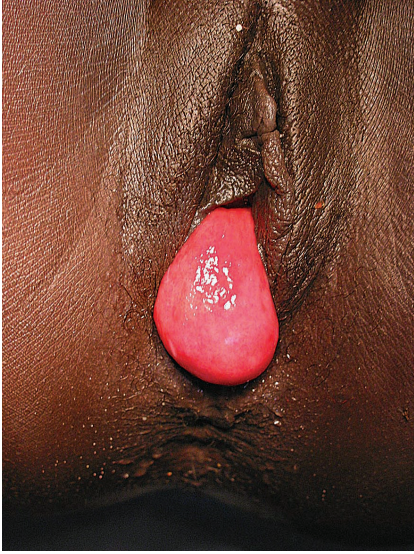


Figure 11 The defect in the vagina is so large that the bladder has prolapsed but this is perfectly curable by a regular fistula surgeon

A simple fistula repair, step by step

See Figure 13 for a simple fistula repair. Another larger but simple fistula is illustrated in Figure 14.

Bladder stones

These are uncommon but can occur with small simple fistulae. It is essential to detect a stone at the start as it should be removed and the repair postponed. Always use a metal catheter at the start to sound out the bladder. The feel and sound on tapping a stone is quite distinctive. Sometimes they can be suspected during the examination, as this may be uncomfortable. The patient often has painful micturition and hematuria. The stone may be palpable bimanually.

Unless the stone is small or actually coming through the fistula (unusual) it should be removed by a separate generous suprapubic incision of the bladder (Figure 15). The bladder wall will be inflamed and thickened and repair of the fistula should generally be delayed by at least 2 weeks.

Fistulae in the region of the cervix, often called juxta-cervical fistulae

Fistulae in this region can be divided into three main types:

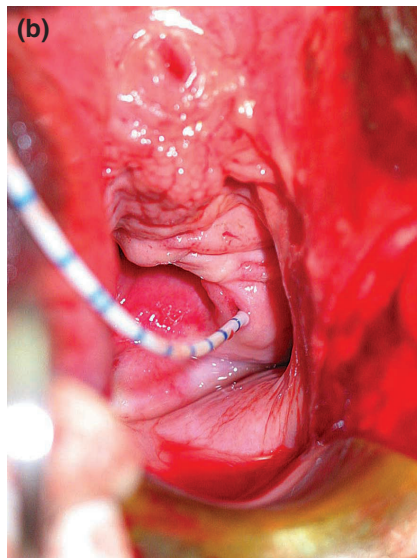


Figure 12 (a,b) This is a large fistula high in the vagina and involving the cervix. When fully exposed after an episiotomy, the ureteric orifice is seen on the margin of the fistula

1. The fistula is just distal to the cervix, and both distal and proximal margins are visible.
2. The distal margin can be visualized but the proximal margin is out of sight in the cervical canal (the anterior lip of which is often split open).
3. The fistula cannot be seen at all, i.e. is entirely intra-cervical.

Beginners should only attempt small juxta-cervical fistulae that can be easily exposed. The proximal

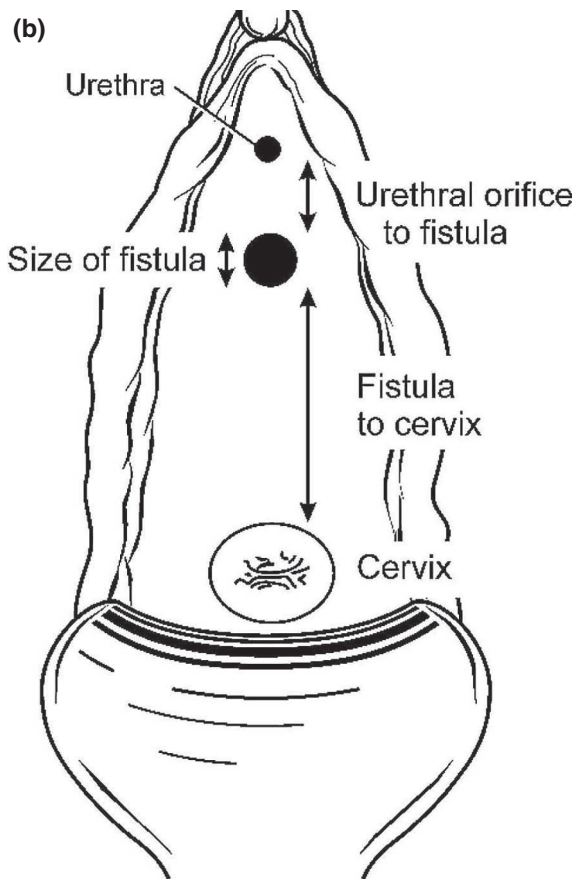
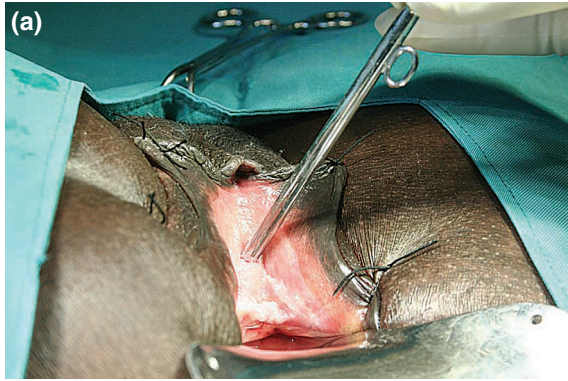


Figure 13 A simple fistula repair. (a) Always explore the interior of the bladder with a metal catheter or size 6 Hegar dilator. Record the bladder size and feel for stones now. Stones are uncommon but must not be missed. The sensation and sound when tapping a stone is distinctive. (b) Diagram showing measurements to be recorded

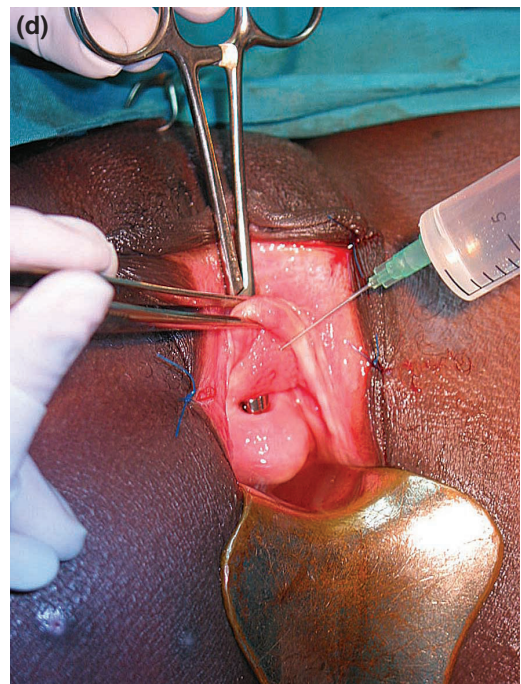
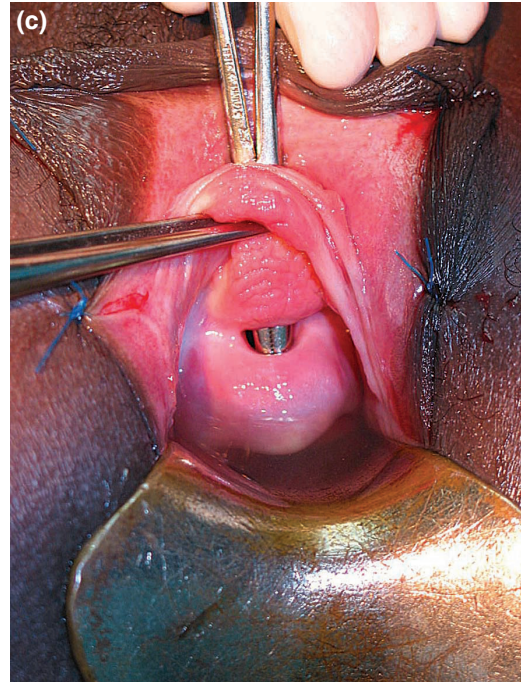


Figure 13 (cont) (c) Expose the fistula. Note in the absence of a metal catheter in this case an artery forceps has been inserted through the urethra and held towards the operator to expose the fistula clearly. (d) Infiltration of a dilute adrenaline solution (1 ml of 1:10,000 in 200 ml of saline) is optional. This may help in finding the right plane between the vagina and bladder and will reduce bleeding (there should be very little anyway)

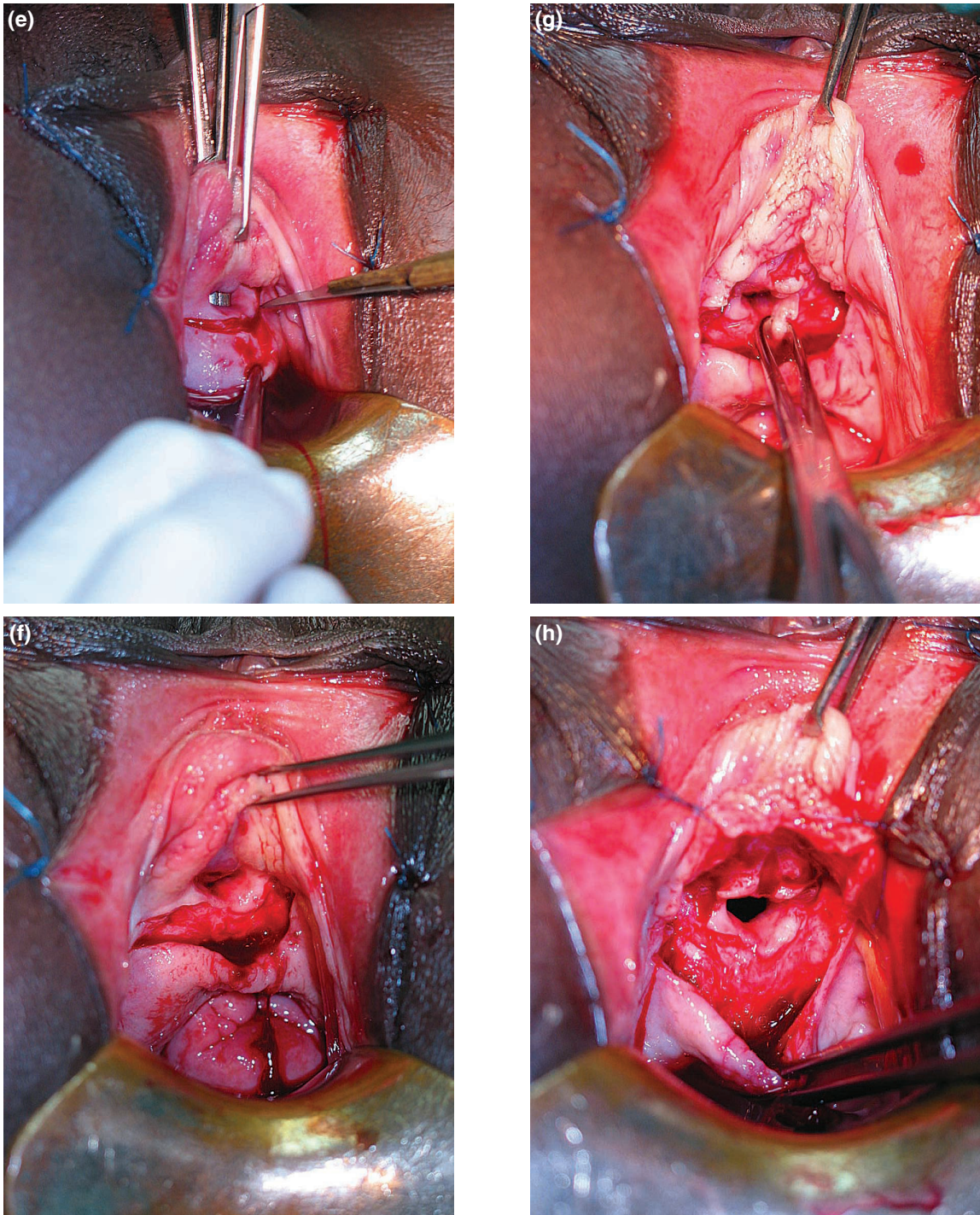


Figure 13 (cont) (e) The forceps that are through the urethra are held towards the surgeon to steady the anterior vaginal wall and an Allis forceps lifts up the mucosa over the urethra. The first incision is made on the proximal margin. (f) The correct plane between bladder and vagina is identified. (g) The proximal dissection has been continued round to the sides to mobilize at least 1 cm beyond the fistula. The distal incision has been commenced. It may help to make a little vertical extension towards the urethra. (h) The dissection is finished and the right and left antero-lateral flaps have been sutured to the labia well up out of the way

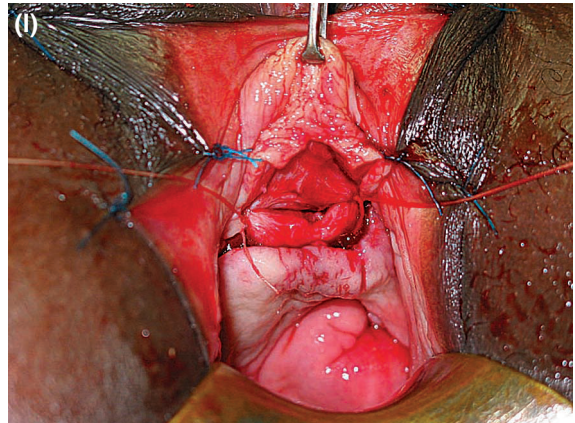
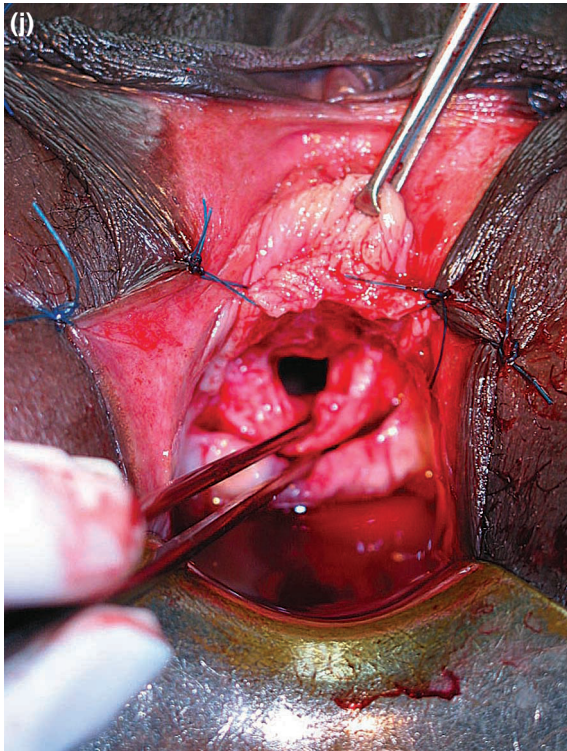
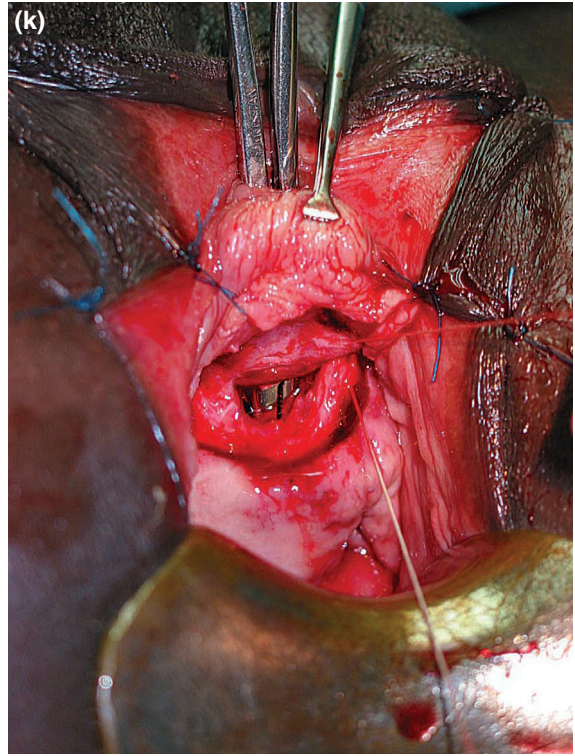
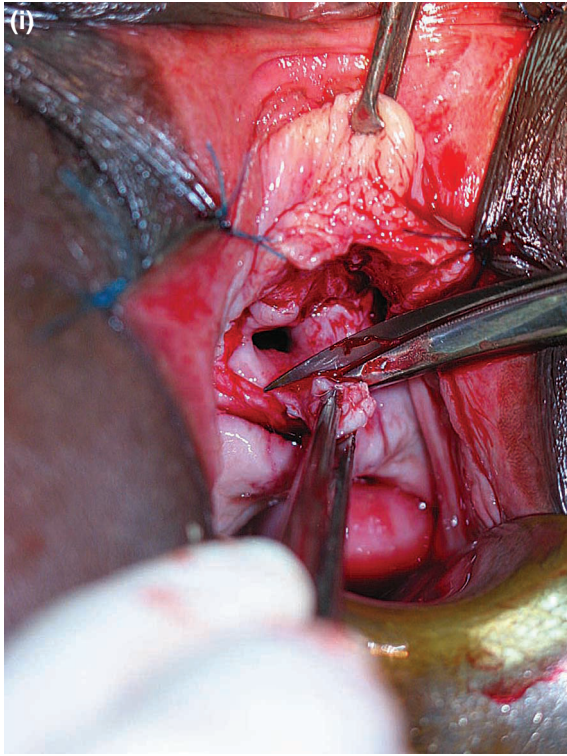


Figure 13 (cont) (i) Next the vaginal mucosa at the fistula margin and any scar (very little in this case) is trimmed away. (j) Now the freshened margins of the fistula are nicely exposed ready for suture. Start with the corners. (k) The first corner suture has been inserted beyond the margin of the fistula. (l) Both corner sutures have been inserted tied and clipped

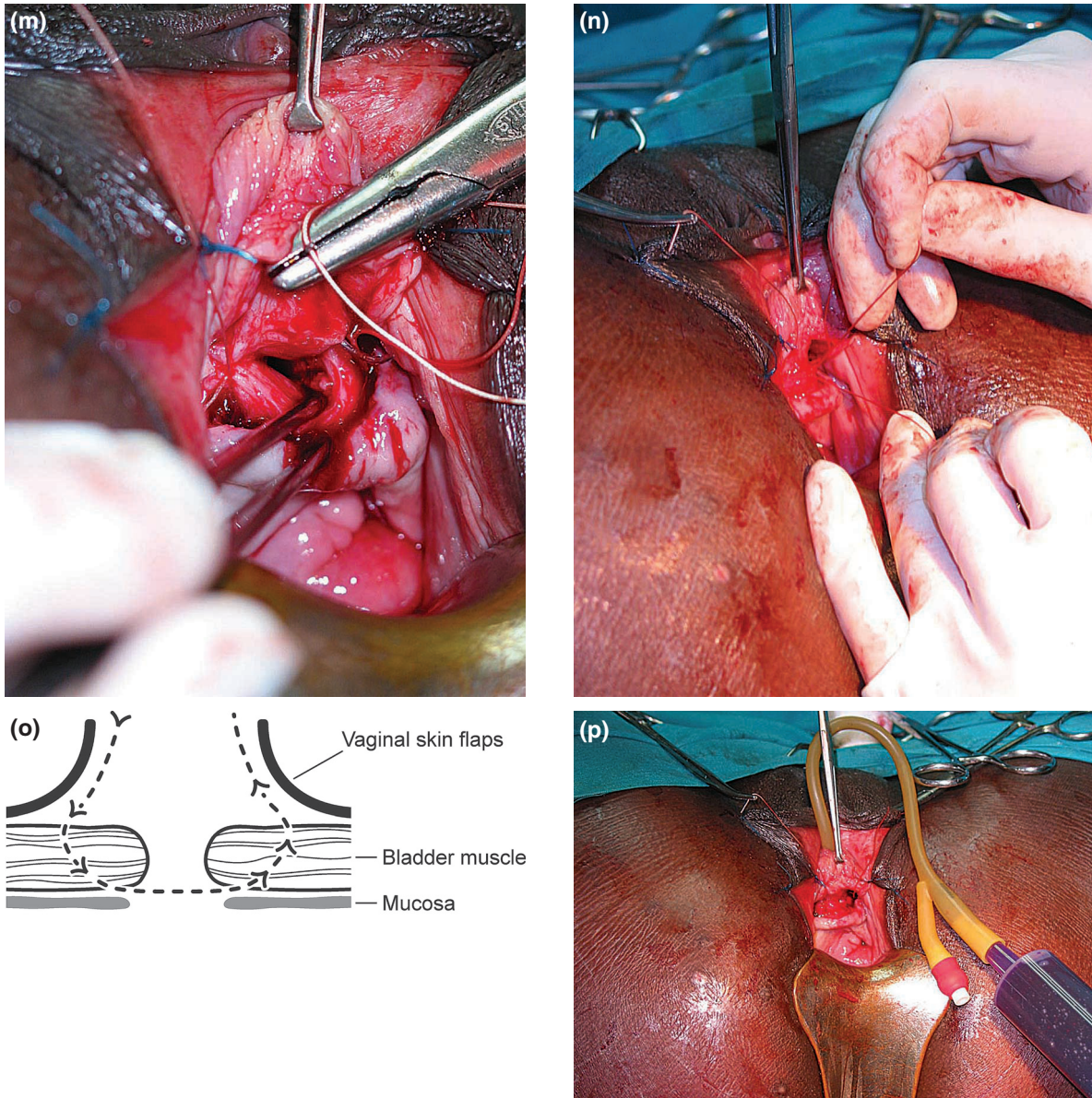


Figure 13 (cont) (m) Three more interrupted sutures will be required, placed about 4 mm apart. Note 'big bites' of bladder are taken traversing the full thickness of the bladder wall but barely picking up the mucosa. (n) Take good 'big bites' of bladder wall at least 0.5–1 cm from the edge. (o) The last suture is being tied. *Note: never hold any instruments in your hands while tying knots.* It is difficult to judge tension and tie accurately if you do. (p) The repair has been completed in one layer. This is quite sufficient provided you have taken 'big bites' and placed your sutures accurately. Now do a dye test to check your repair is watertight. Use 60 ml of dilute methylene blue (or Gentian violet) introduced through a Foley catheter

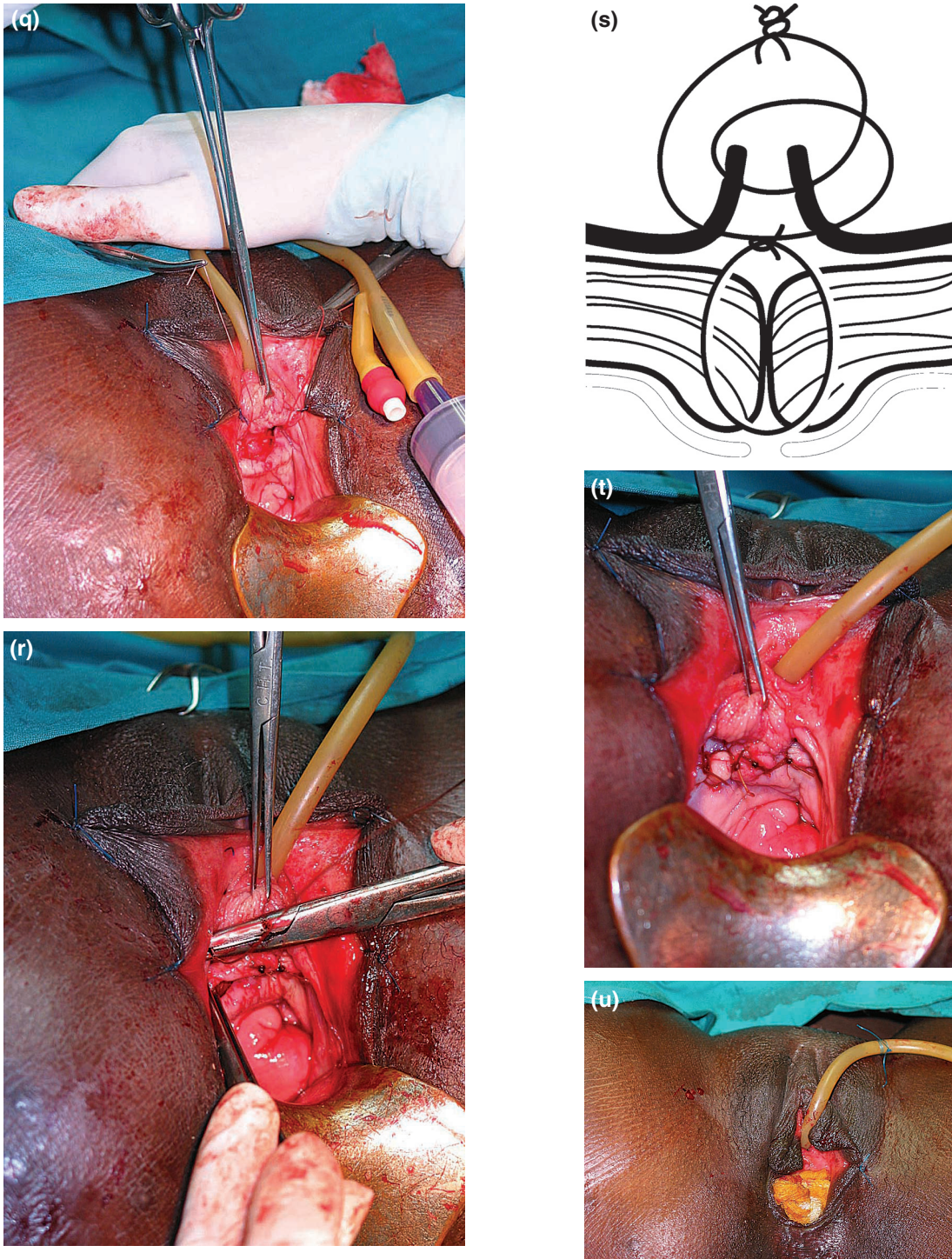


Figure 13 (cont) (q) Press over the bladder or ask the patient to cough. In the unlikely event of a leak through the suture line put in another suture. The main purpose of a dye test in a simple case is to *exclude a second unsuspected fistula*, especially an intra-cervical one if the patient has had a cesarean section. This is rare but important to detect. (r) Complete the vaginal closure with a layer of interrupted everting over and over mattress sutures. (s) Bladder closed and vagina closed with over and over everting suture. (t) The repair is completed. (u) An antiseptic pack is placed in the vagina (in this case Betadine®). The catheter has been sutured to the top of the labia

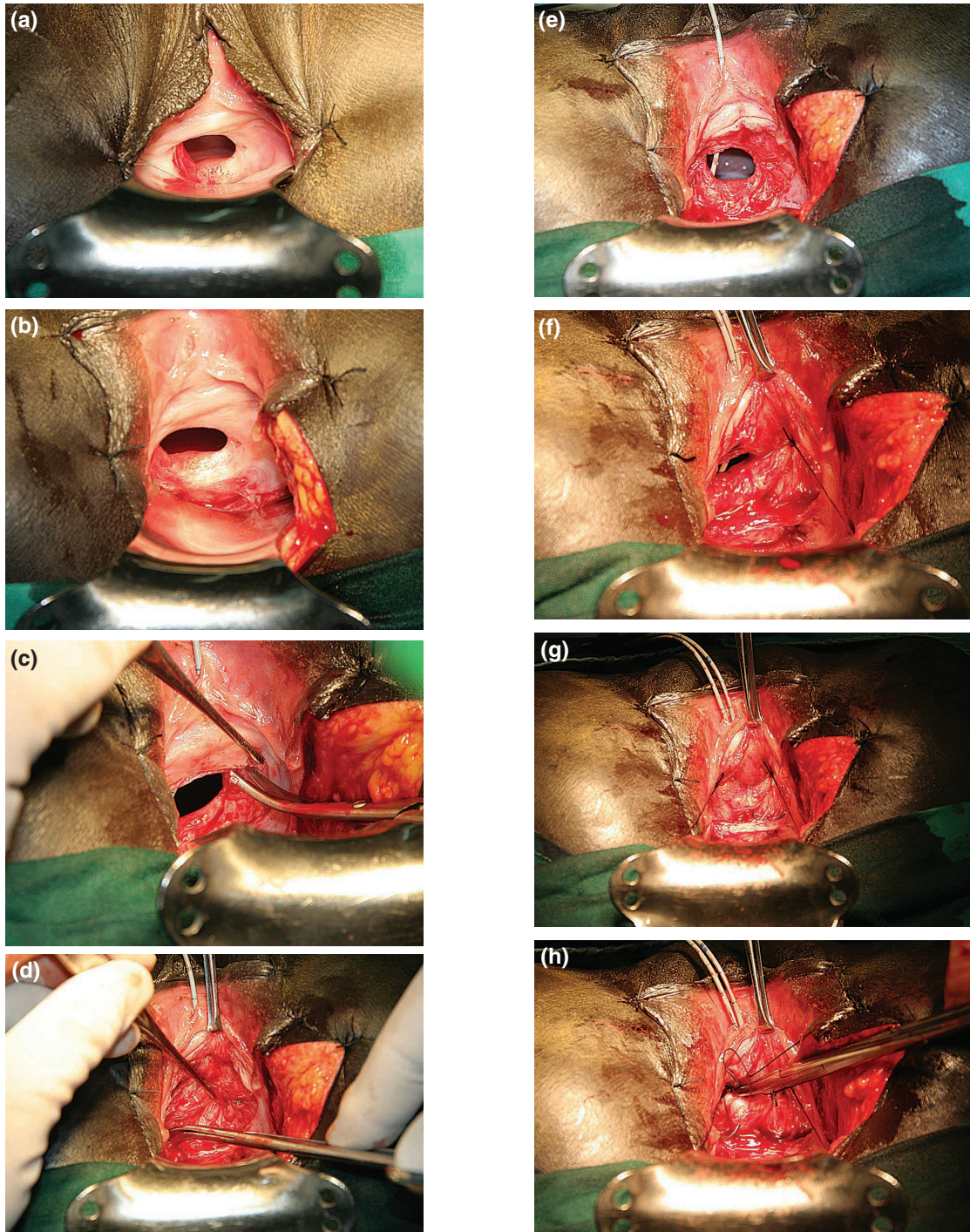


Figure 14 (a) A large soft mid-vaginal fistula. (b) Access has been improved by an episiotomy. (c) The proximal flap has been dissected and the distal vaginal mucosa is elevated starting at the corners. (d) Further dissection proximally in the corners to allow a tension-free closure. (e) The full extent of dissection shown. (f) The first corner suture has been inserted. If possible this should pick up the periosteum of the pubic arch for extra security. (g) Both corner sutures have been inserted. Note that the fistula margins fall together because mobilization has been so good. (h) The repair is completed with interrupted suture in one layer. Note the size of the bites

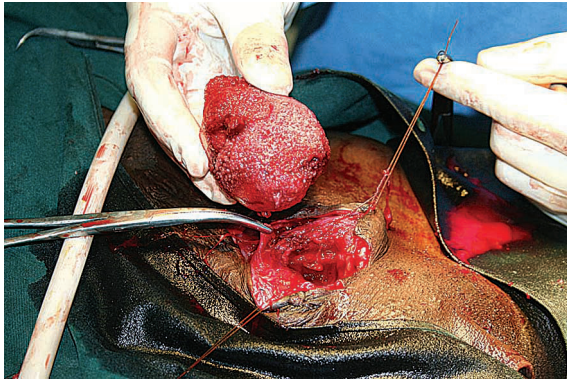


Figure 15 A large stone has been removed through a suprapubic incision

margin between the fistula and the cervix must be clearly seen. Those that extend into the cervical canal can be challenging to close. They should all be approached with caution because the ureters are at risk (Figure 16).

The experienced surgeon can find them quickly by eye with a probe, but the best way when starting is to ask the anesthetist to give furosemide 10 mg IV. In 5 min a brisk diuresis will make the orifices obvious if they are near the fistula margin. (This is another reason to make sure the patient is well hydrated before arriving in theater.) If they are near the fistula margin and ureteric catheters are not available they should be cannulated with a small metal probe. This can be held by an assistant during the mobilization and while the first inverting corner suture is inserted as illustrated in the case described below.

An easy, type 1 case

An example is shown in Figure 17. As a general rule if the fistula is very small (less than 0.5 cm) and in the midline the ureters should not be at risk. However if one can see into the bladder they should always be identified. Use a Babcock's forceps to evert the bladder (Figure 17b,c). Toothed forceps cause bleeding. Give furosemide 20 mg IV (Lasix®) if there is still difficulty.

Ureteric catheters are notoriously difficult to obtain in Africa and one must rely on outside donations. Some surgeons have recommended feeding tubes as an alternative but they are difficult to control being so soft and they easily fall out. One solution is to identify the ureteric orifice with a probe and after mobilization of the bladder, to place the corner suture while the probe is held *in*

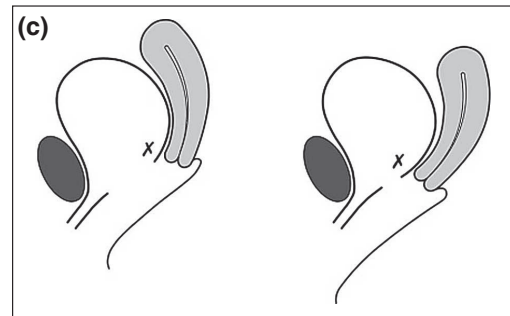
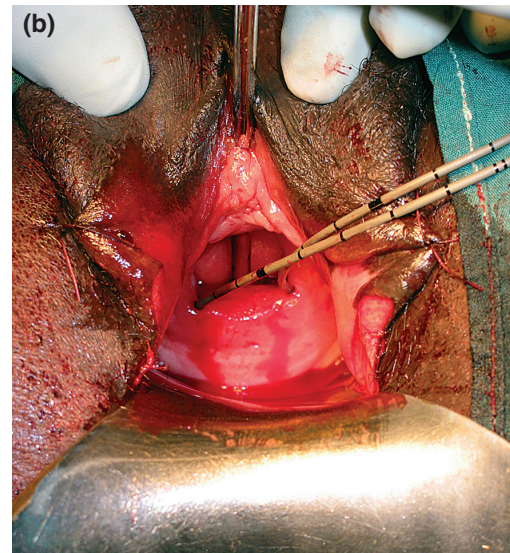
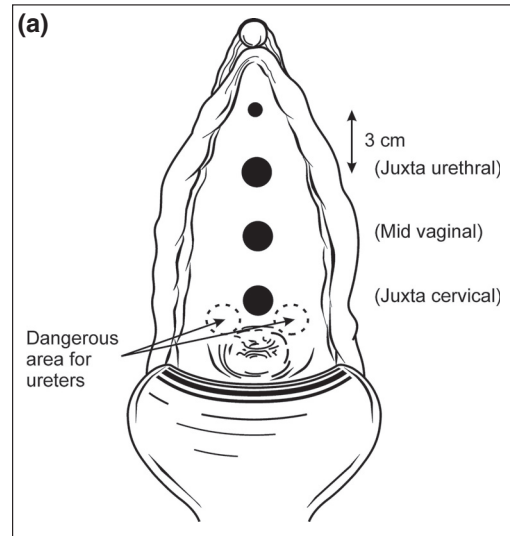


Figure 16 (a) Diagram illustrating danger area for ureters. (b) This fistula is 3 cm in diameter and the ureteric orifices are at the edge of the fistula so closure without ureteric catheters would be risky. (c) The size of a fistula reduces over the first 3 months, but if the ureters (marked with a cross) were close to the edge when the fistula was large, they still will be when it's small

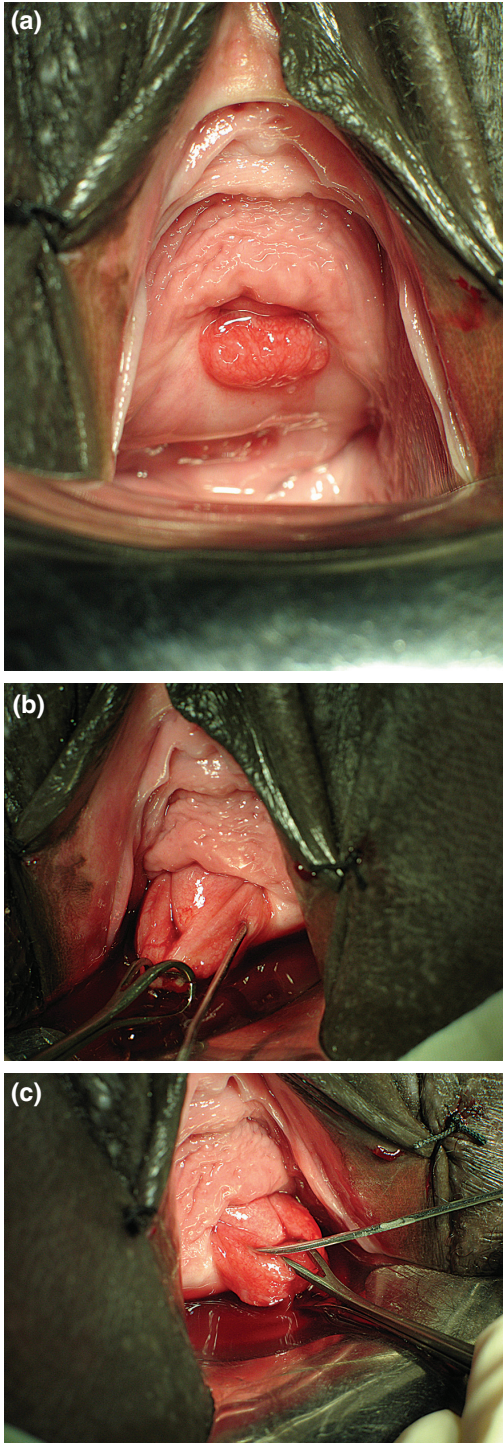


Figure 17 (a) There is a clear space between this fistula and the cervix. The external urethral orifice to distal fistula margin is 5 cm. (b,c) Both ureteric orifices have been found closer to the margin than might have been expected. Ideally these should be protected by passing a ureteric catheter up on each side

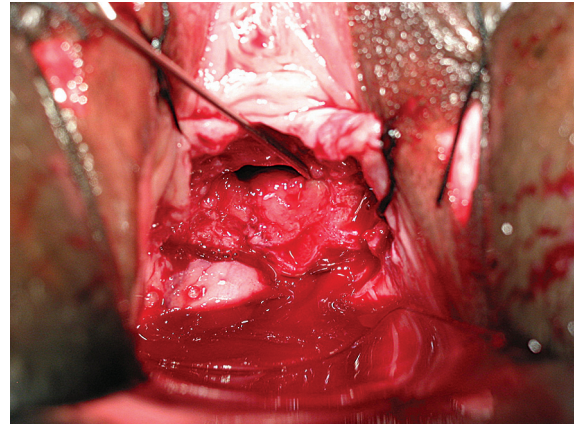


Figure 18 With a probe in the ureter the corner suture can be safely inserted. Beware: probes have been lost up a ureter

situ by an assistant, thus protecting it from harm (Figure 18). After repairing a fistula close to the cervix without using ureteric catheters, it is good practice to clamp the urethral catheter and wait to make quite sure that urine is produced. This is to exclude the very small chance that the ureteric orifices have been occluded in the repair.

When is an abdominal repair appropriate?

It is essential to realize that any fistula that is below or likely to be close to the ureteric orifices should not be attempted abdominally. An experienced urologist may be able to do it, but it needs full abdominal relaxation, proper retractors, good lighting, a functioning sucker and an ability to catheterize the ureters from inside the bladder.

The vault fistula after an emergency hysterectomy for ruptured uterus

Most of these are perfectly accessible from the vagina provided they will come down but an abdominal repair is an option for the inexperienced vaginal surgeon. Careful bimanual examination will give an indication as to how close the fistula will come to the anterior abdominal wall. If it does then it will be a good case to do from above, provided that of course good lighting, suction and a selection of instruments and retractors are available.

Expose and mobilize the bladder from above and open it in the midline to inspect the interior. The fistula should be visible. Continue the bladder incision down to the fistula and separate it from the

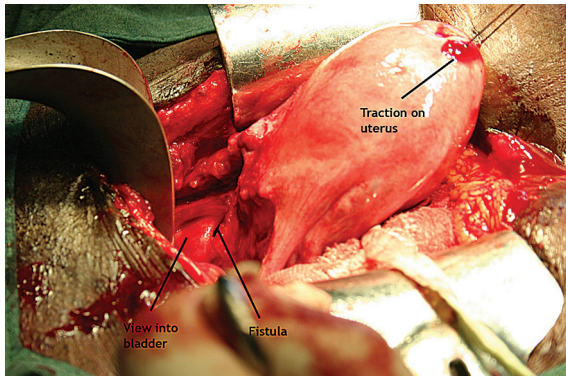


Figure 19 An iatrogenic intra-cervical fistula at the level of the old lower segment incision is seen. The bladder has been widely opened through the fundus and the interior is exposed with a Sim's speculum. Note the strong traction applied to the uterus to bring the fistula into view. The ureteric orifices are well below and can easily be demonstrated by giving furosemide IV. If at risk, they are catheterized

vagina before closing each in one layer. If the fistula is lower than expected identify the ureteric orifices if necessary with the help of furosemide. If the case has been wisely selected the fistula should be well above the ureteric openings.

The post-caesarean intra-cervical fistula

The regular fistula surgeon will learn to repair these from below by dissecting up between the cervix and bladder. There is just one situation where the repair can be quite easy from above, that is following an *iatrogenic* injury without any ischemic component. This can be suspected when patient gives the history that she was delivered of a live baby, and yet is shown to have a leak through the cervix. The cause of the fistula is almost always caused by accidental suture of the bladder into the lower uterine segment. In this case repair is quite possible from above by dissecting between the uterus, cervix and bladder. The hole is often tiny. Keep in the midline to avoid uterine vessels and the ureters and if the fistula does not come into view easily split the bladder vertically until the fistula is reached. It should be above the ureteric orifices: if there is any doubt give furosemide to identify and avoid them. A tiny hole in the cervix does not need to be closed (Figure 19).

If the delivery by caesarean was a stillbirth, do not attempt an abdominal repair even if vaginal exami-

nation suggests that the fistula is intra-cervical. Labor long enough to cause death of the baby will usually produce an ischemic injury. The fistula may turn out to be larger and lower than you expect and will be very difficult and unsafe to access from above (unless you are an experienced urologist).

Before selecting any patient for an abdominal repair make absolutely certain by dye test and vaginal inspection that the leak is only coming through the cervix or vault not through an occult hole in the vagina (double fistulae do occur).

Prevention at caesarean section

In Uganda, two-thirds of patients with fistulae have had their obstructed labor relieved by caesarean section – but clearly too late. The remaining one-third have eventually delivered vaginally. In Ethiopia, the situation is different; only 15% of fistula patients have had a caesarean section, because most people live in remote areas far from any hospital. The ischemic damage may already have occurred by the time of the caesarean section, but the doctor can take steps to minimize any further damage. The lower segment will be very stretched and unhealthy. Remember that the bladder should be dissected well down off the lower segment. The incision in the lower segment should be on the high side and the lateral ends curved upwards to minimize inaccessible tears (the left ureter is most at risk when repairing a lower segment).

When the baby's head is deeply impacted in the pelvis, it is better to get help to push up the head vaginally than to force a hand down between the head and the lower segment. This may produce vertical tears and increase the damage already done. The alternative is to extract the baby as a breech birth if possible. Tears in the lower segment can be difficult to suture, and sometimes fistulae are produced when the doctor inadvertently picks up the bladder. This produces an intra-cervical fistula that can be quite a challenge to close and is not for the beginner. Ureters are at risk in difficult operations.

Are too many caesarean sections being performed for dead babies? In Uganda, 88% of mothers who develop fistulae after a caesarean section have a still-birth. In the 12% with live babies, there is a strong suspicion of iatrogenic injury to the ureter or bladder. A generation ago, it was commonplace to recommend a craniotomy for a dead baby stuck in the pelvis, but this seems to have been abandoned. It is

rarely practiced in teaching hospitals; perhaps it is too difficult for many young doctors to develop the skill. A craniotomy performed badly may do more harm than good. Is it time to look again at this procedure? This is something that only obstetricians working in the developing world can answer.

Results of surgery

To be truly cured the patient must be totally continent and be able to re-marry and bear children (if she wishes) and be accepted back into her community. Of the 90–95% that an expert can close, up to 25% will have some residual stress incontinence and others may have significant vaginal stenosis or foot drop both of which impair her quality of life. Depression can continue after successful surgery often related to the loss of her child, husband and continuing infertility.

Failed repairs

Breakdown of a repair is a major disappointment. It may be because the operation was not well done, due to neglectful after care (catheter blockage) or occasionally because of postoperative infection. The usual cause is that damage was so severe as to preclude a really adequate repair. Identifiable risk factors for breakdown are previous operation, severe scar, destruction of the urethra, small bladder, ureteric orifices outside the bladder and concurrent recto-vaginal fistula and of course inexperience of the surgeon.

In most series between 10 and 20% of patients have had a previous repair elsewhere. Many are still quite easy to cure as they were simple ones inexpertly done but of course a surgeon will have to operate on some of his or her own failures. A patient who becomes wet in the first postoperative week is bad news but breakdowns occurring in the second or third week after repair have a better prognosis and some will close with prolonged bladder drainage (see section on nursing care below).

The principles of a re-repair are no different to those for a new case. There will however be less healthy tissue available, more scar and distorted anatomy. This is particularly so when a repair has been attempted by someone out of his depth. About 60% with a first time re-repair go home dry. With each successive repair the results get worse.

Missing urethras

It is possible to reconstruct a new urethra using local tissues but the functional results are poor. This operation should not be attempted by an inexperienced surgeon.

Post-repair incontinence

A major disappointment is to find that although the fistula has been successfully closed (as shown on postoperative dye test), the patient is still wet through urethral incompetence. It is not surprising when one considers that in many the urethra is shortened, crushed and denervated. In addition bladder size may be reduced and bladder function disturbed either by being underactive leading to chronic retention and overflow or more commonly overactive adding to stress incontinence.

The great number of surgical procedures that have been used testify to the fact there is no simple solution. Surgery aims to lengthen and narrow the urethra and/or compress the urethra against the pubic bone. This can be done by a variety of sub-pubic or supra-pubic slings. Even in the best hands only about 50% get any significant improvement and the long-term results are not known.

The inoperable cases

Most surgeons find that between 2 and 5% of new cases have damage so severe that they are beyond any prospect of cure. The main reasons being a combination of loss of urethra, bladder and dense scar tissue. A further small percentage fail after repeated attempts at repair and there are those who have total stress incontinence that has failed after sling-type operations. This latter group can sometimes be helped by using a urethral plug, the use and supply of this modality can only be provided at specialists centers.

The only other surgical option is some form of urinary diversion. It is not difficult to make an ileal bladder but the patient must have constant access to urostomy bags, something impossible in low-resource settings. The alternative is to divert the urine into the colon (Mainz II pouch). The ureters are anastomosed to a pouch made by anastomosing two limbs of sigmoid colon together. Anal sphincter and rectal compliance must be good and of course the procedure is irreversible. Although the operation can be done with a small operative

morbidity, there are serious long-term risks. Hyperchloremic acidosis, osteoporosis, colon cancer, urinary infections and renal failure. The few surgeons who do this operation report short-term patient satisfaction, there are no reported long-term follow-up studies.

One is undoubtedly trading off quality of life against reduced life expectancy. It is very difficult for a typical fistula patient to make an informed decision about accepting this form of surgery however sensitively the risks and benefits are explained.

THE URETERIC FISTULA

Iatrogenic injuries to the ureter are unfortunately quite common. In Uganda they account for 5% of patients with urinary incontinence following childbirth. About half follow a cesarean section. A history of a live birth increases suspicion of this type of injury. Most commonly the ureter is caught up while stitching the corners of the lower segment. Some must get a silent hydronephrosis, in others the ureter may slough and urine can escape into the cervical canal through the lower segment incision.

Others occur after an emergency hysterectomy for ruptured uterus. Considering the difficult conditions and the inexperience of many doctors called upon to treat a ruptured uterus in rural areas, these injuries are understandable. Any urine leaking into the pelvis will soon find its way out between the sutured vaginal vault or cervical remnant. The third cause is unrecognized injury to a ureter at the time of a vesico-vaginal fistula repair. In this situation it may be possible at a later date to catheterize the ureter and implant it into the bladder transvaginally.

If the patient has enough living children, and an abdominal operation is planned, do not forget to discuss the option of tubal ligation. It is so easy to do it at the same time. An ultrasound scan showing a distended ureter on one side is helpful confirmation. But it is essential to confirm again on the table that the dye test is really negative and that urine appears in the vagina after giving furosemide. In partial injuries the leak can be very small. The abdominal approach is usually quite easy and the results uniformly successful. The affected ureter must be identified in the pelvic side wall and traced down to the point of injury.

Which side? Four times out of five the affected ureter is found to be dilated and thickening can usually be felt at the site of injury. If the ureter is

draining very freely into the vagina, it will not be dilated. The most reliable method of confirming the site of injury is to open the bladder and look inside at the ureteric orifices. Furosemide 20 mg IV should be given and the non-functioning side identified. Exceptionally a partial ureteric injury (e.g. after a previous repair) may still produce urine into the bladder but not nearly as much as the uninjured side. The ureter must be divided as low down as possible and it helps to mobilize the contralateral side of the bladder. If the opening is made transverse in the dome of the bladder and repaired vertically it will help the ureter to reach the bladder. If the occasion occurs when the ureter will not reach, the possibilities in order of preference are:

1. To mobilize fully the contralateral side of the bladder and support the anastomosis with a psoas hitch stitch.
2. To make a tube out of the dome of the bladder (Boari flap).
3. Anastomose the cut ureter end to side to the uninjured ureter.

The steps of the operation are shown in Figure 20. There is no need to splint or drain the anastomosis as a routine when the ureter comes into the bladder without tension. If in doubt a ureteric catheter can be passed through the anastomosis. It will decompress the ureter should there be any hold up at the anastomosis. The distal end can be brought out alongside a urethral catheter or through a separate stab incision in the anterior bladder wall. The ureteric catheter if used can be removed on day 7 and the urinary catheter removed on day 10.

Labial fat grafts and fistula repair

For many years it was believed that a labial fat graft sutured between the bladder and vaginal repair improved the success rate, especially for the complex cases although there is no proof of this. Almost all experienced fistula surgeons have given up using fat grafts without apparently compromising their results.

REPAIR OF ANAL SPHINCTER INJURIES

Immediate repair

Tears seen within 24 h of delivery should be repaired at once. This is not a minor operation. The patient's future continence depends on the skill with which

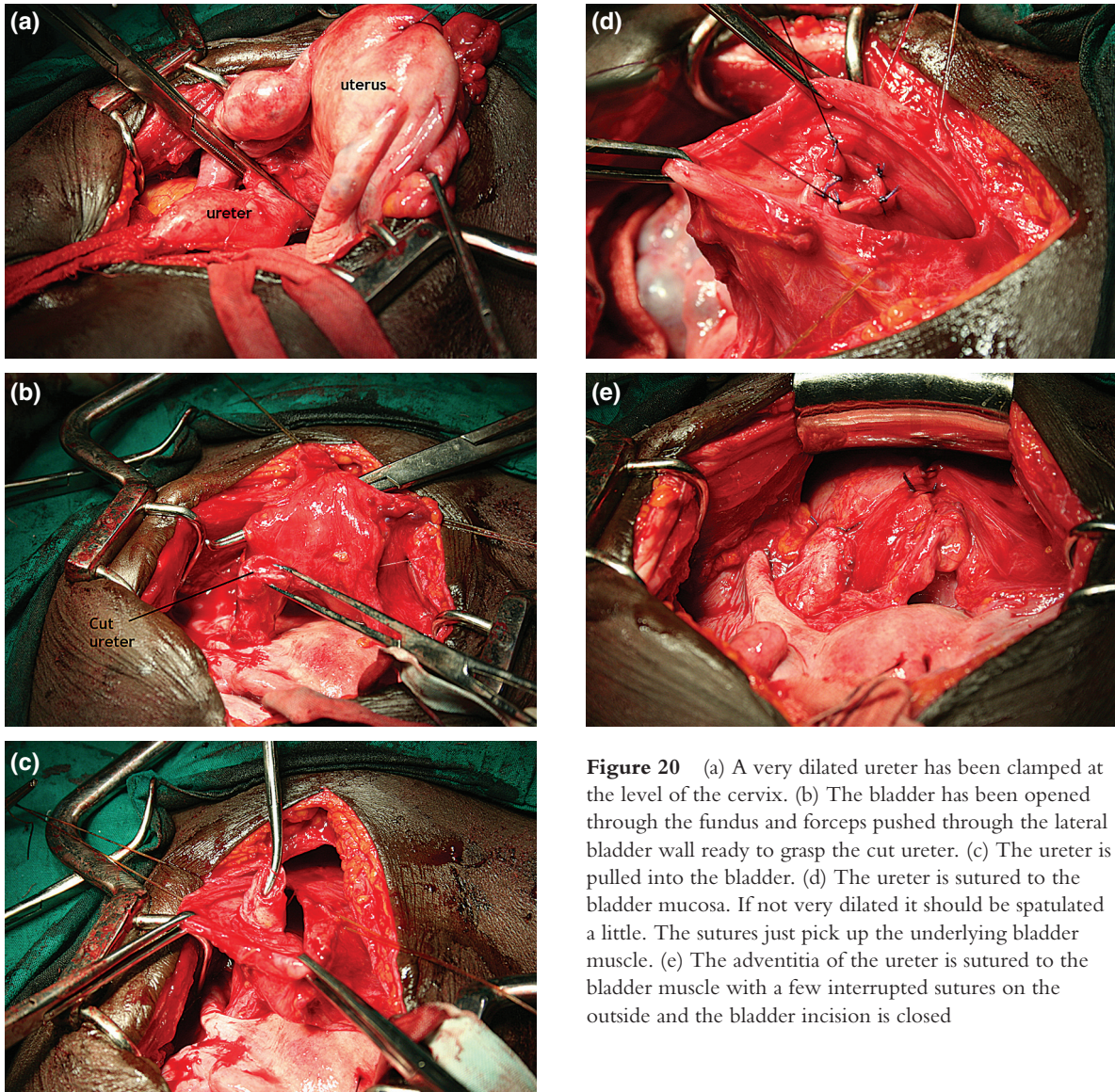


Figure 20 (a) A very dilated ureter has been clamped at the level of the cervix. (b) The bladder has been opened through the fundus and forceps pushed through the lateral bladder wall ready to grasp the cut ureter. (c) The ureter is pulled into the bladder. (d) The ureter is sutured to the bladder mucosa. If not very dilated it should be spatulated a little. The sutures just pick up the underlying bladder muscle. (e) The adventitia of the ureter is sutured to the bladder muscle with a few interrupted sutures on the outside and the bladder incision is closed

the repair is done. This must be done in a theater with good lighting, instruments and assistance. Repair under local anesthesia is possible but it is better to have the patient under a spinal or general anesthetic. It is important to realize that the torn anal sphincters retract to the 3 and 9 o'clock position. First, close the ano-rectal mucosa, then identify the torn ends of the external sphincter (the internal sphincter cannot be identified as a separate layer). Suture these accurately taking quite big 'bites' using Vicryl if possible. Experts would repair the sphincter by an overlapping technique but a novice would be best to stick to an accurate simple end-to-

end suture. Three to four sutures will be needed. Then close the vagina and perineal skin taking good mattress sutures to build up the perineal body.

Secondary repair

If the repair cannot be done within 24h it is best to wait several weeks. Sometimes patients with an old complete tear say they have no symptoms, so be sure that your patient really does have troublesome fecal leakage before you recommend repair. In the best hands, only 80% of repairs restore complete continence. Again it is important to realize that the

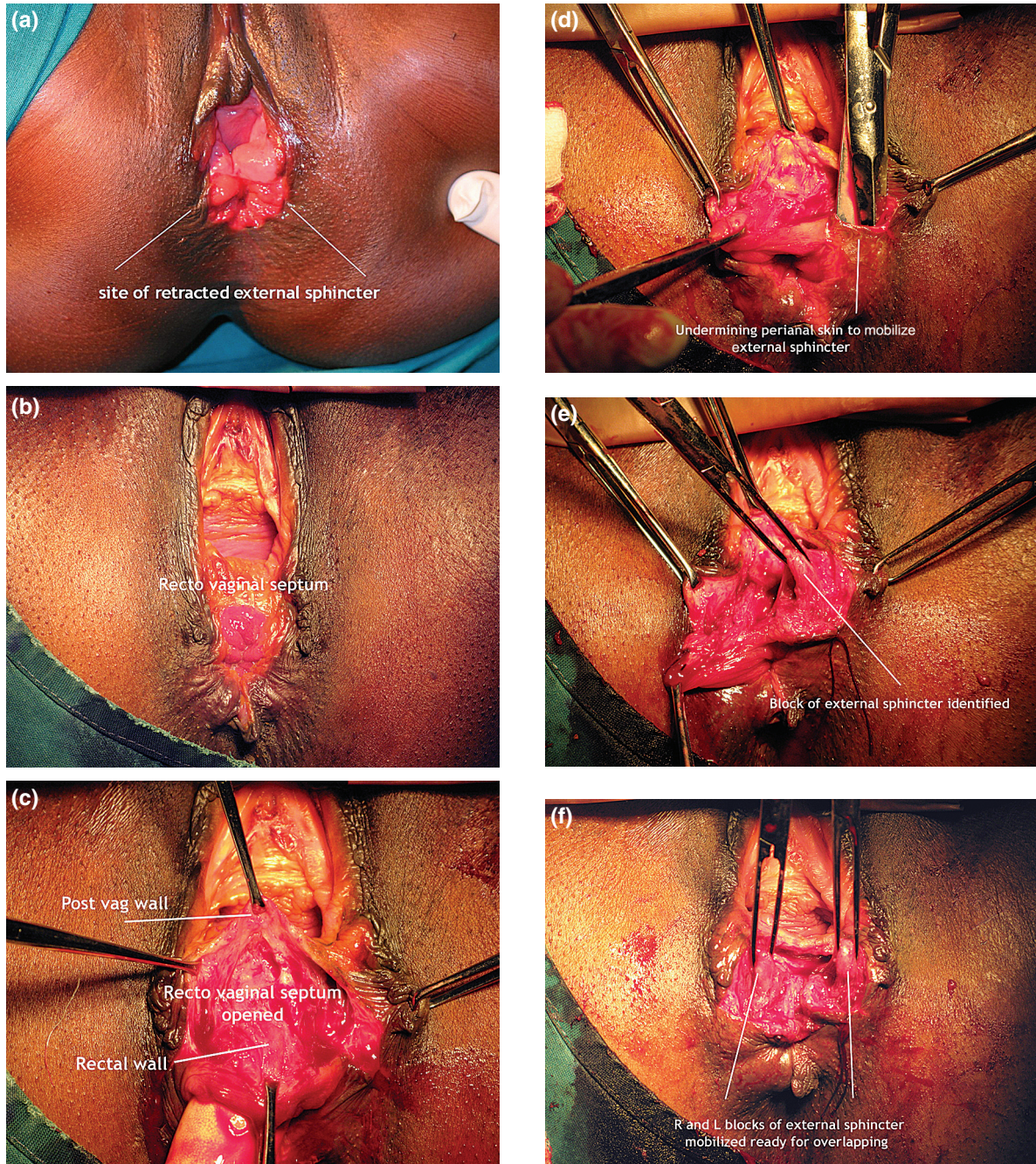


Figure 21 A typical fourth-degree tear. (a) The arrows mark the position of the external sphincter ends. (b) Recto-vaginal septum. (c) The recto-vaginal septum has been opened. (d) The perianal skin is undermined to mobilize the external sphincter. (e) External sphincter identified. (f) Right and left blocks of external sphincter mobilized ready for overlapping

torn ends of the sphincter have retracted round half the anal circumference and simply freshening the margins of the tear and suturing this will not to give a good result.

The steps in a double-breasting repair are illustrated in Figure 21. The external sphincter should not be dissected out to its muscle fibers alone. These will not hold sutures well, but rather a block

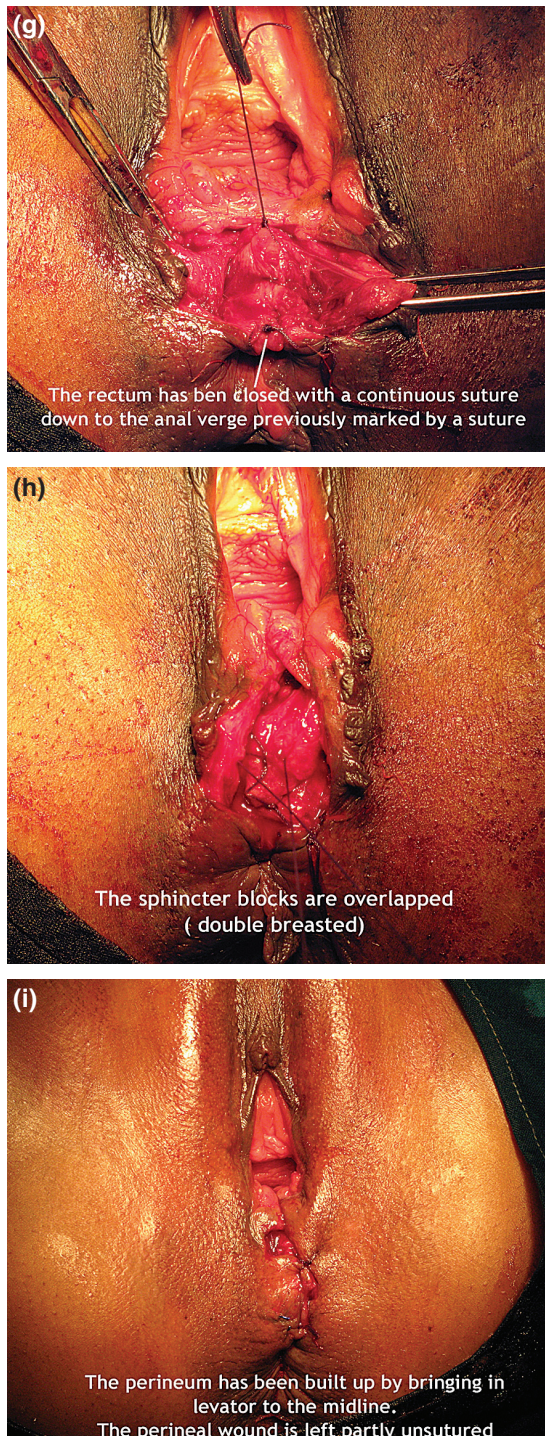


Figure 21 (cont) (g) The rectum is closed with a continuous suture down to the anal verge previously marked by a suture. (h) The sphincter blocks are overlapped (double-breasted). (i) The perineum has been built up by bringing in levator to the midline; the perineal wound is left partially unsutured

of tissue which contains the sphincter ends is mobilized and overlapped.

RECTO-VAGINAL FISTULA

A recto-vaginal fistula is only produced in the most prolonged episodes of obstruction and so is usually associated with a bad vesico-vaginal fistula and neurological damage. Isolated recto-vaginal fistulae due to obstructed labor are extremely rare but may be caused by sexual violence in war situations or in underage marriage.

Anal sphincter tears usually occur in isolation unrelated to obstructed labor and should not be classified as a recto-vaginal fistula unless there is significant extension into the rectum. Incompletely repaired sphincter tears are another source of low recto-vaginal fistulae. Classification is largely descriptive, based on the distance from the anal verge and the amount of scar. When scar is prominent the rectal lumen can be considerably narrowed. In extreme cases the rectum is completely stenosed and all the feces enter the top of the vagina. Surgery is demanding and except for the lowest and most mobile should be referred to fistula experts.

It has been tradition in some quarters to consider doing a colostomy for the bad cases before referring the patients. This does not make life any easier for the patient and experienced surgeons can repair the majority of rectal fistulae transvaginally without any preliminary colostomy. A more likely scenario is that a well-meaning surgeon does a colostomy but the patient never finds a surgeon who can repair her fistula (Figure 22a). When colostomies are inexpertly done a colostomy prolapse may develop to add to her misery. The only person who should consider performing a colostomy is the surgeon who is going to repair her fistula. The principles in repairing a recto-vaginal fistula are the same as for a vesico-vaginal fistula – good exposure, flap splitting of vagina from rectum, followed by closure of the rectum in two layers (Figure 22).

Most surgeons will repair the bladder and rectal fistula at the same time although for really bad cases the recto-vaginal fistula may be repaired alone as the first stage. It is unlikely that a beginner in fistula work would encounter a double fistula suitable for repair. For example in a consecutive series of 400 vesico-vaginal fistulae at one rural hospital in Uganda only seven combined fistulas were

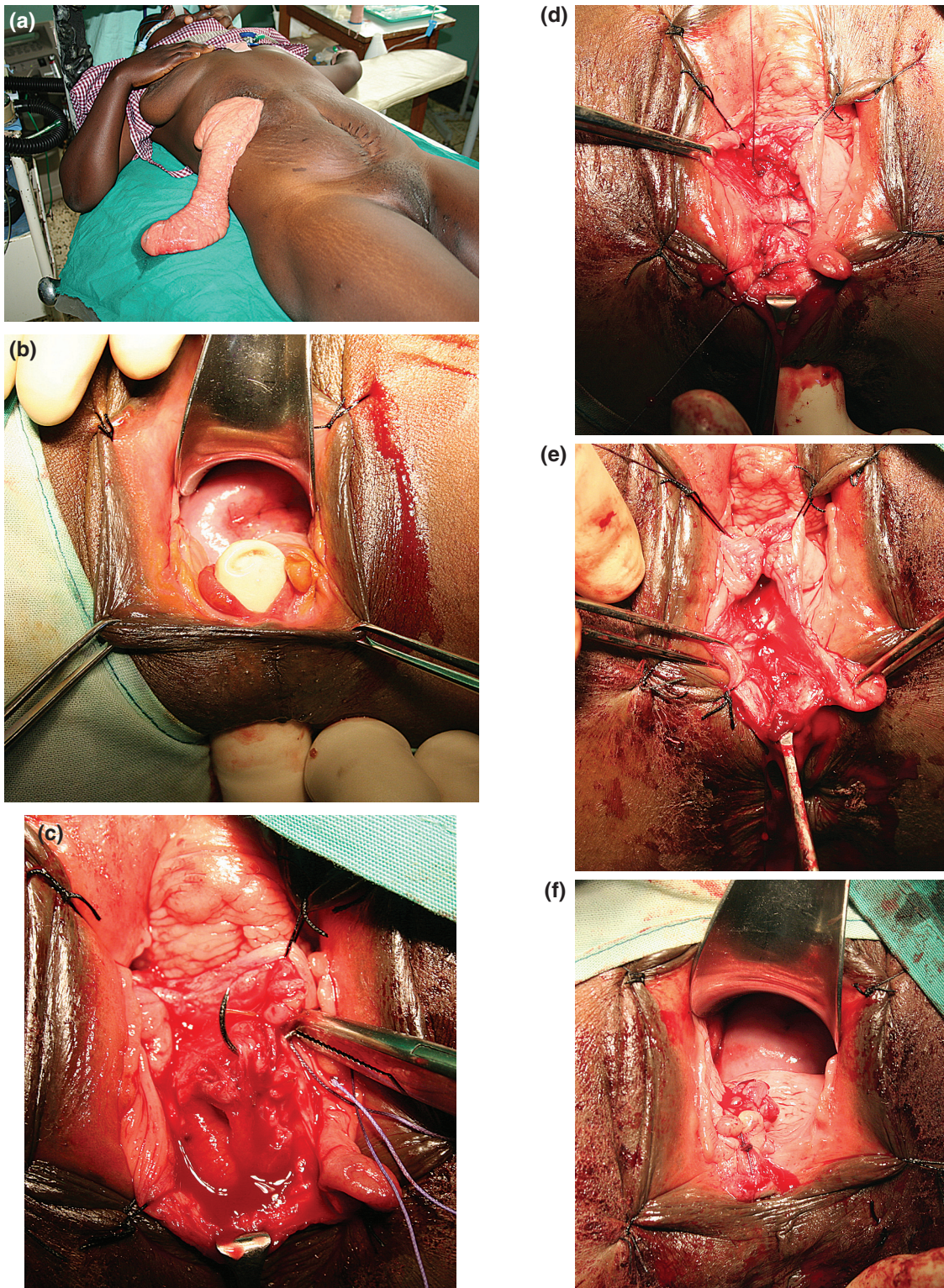


Figure 22 (a) A patient who has lived for years with a prolapsed colostomy and an unrepaired recto-vaginal fistula. (b) A small low mobile recto-vaginal fistula (post-coital injury). (c) After flap splitting, the rectum is closed with interrupted muscular sutures just missing the mucosa. (d) First layer complete. (e) Second rectal is layer complete. (f) Vagina closed

encountered and only one was considered easy to repair. In expert hands, 95% can be closed with restoration of continence but the severity of associated bladder injury results in a urinary continence rate of around 60% after repair.



Figure 23 A preferred method of securing the catheter

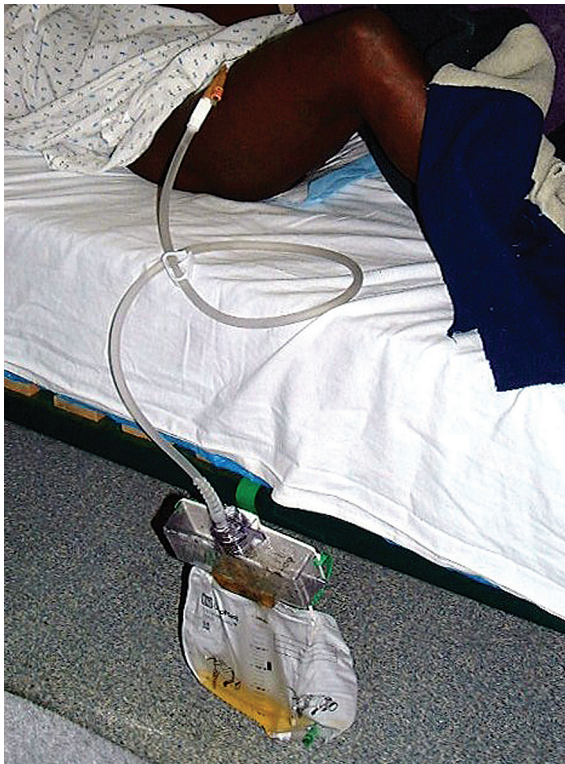


Figure 24 This high-quality system is ideal but is expensive and would rarely be available

POSTOPERATIVE NURSING CARE OF THE FISTULA PATIENT

A good operation can be ruined by neglectful after-care. It is the surgeon's responsibility to ensure that the nurses and carers know what is required. In reality, nurses will be in short supply and may be unfamiliar with fistula repair, so postoperative care must be made as simple as possible.

The patient must at all times be:

- Draining
- Drinking
- Dry

Drainage

Exceptionally, no urine may drain from the time of return from theater. Check the catheter is not twisted or blocked and if not give a challenge with IV fluids. If still no urine passes the ureters have



Figure 25 This bag has already become full and if further neglected will overflow and pull loose from the bed and pull the catheter out of the patient



Figure 26 Open drainage



Figure 27 Trouble-free nursing at night

been closed (see recommendation in the operative section on fistulae close to the cervix). In this case take the patient back to theater and undo the repair.

Free drainage of urine at all times depends on adequate catheter care. If a catheter blocks, urine may pass alongside it or *much worse find a way through the repair*. Then the scene is set for failure.

Principles of catheter care

- Nothing must pull on the catheter.
- The catheter must not become blocked or fall out.

The catheter is secured in theater with a suture to the labia (Figure 23). This prevents accidental traction on the catheter as the patient is moved from the theater to the ward and at other times. Strapping alone is not enough – it easily comes off.

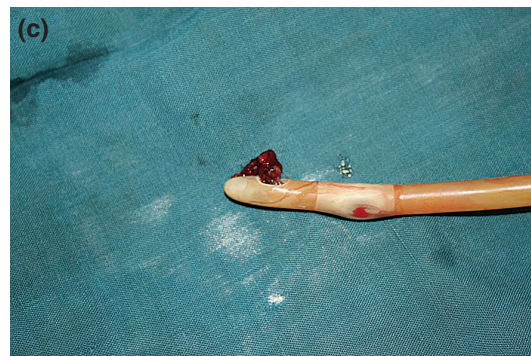


Figure 28 (a) A twisted catheter!! (b) A kinked catheter!! Note that the urine is concentrated and contains cloudy deposits. (c) Catheter blocked by clot. (d) Catheter irrigation

Drainage bags or not?

Closed drainage is ideal but does require vigilant nursing care and good-quality bags (Figure 24). These conditions cannot be met in some hospitals.

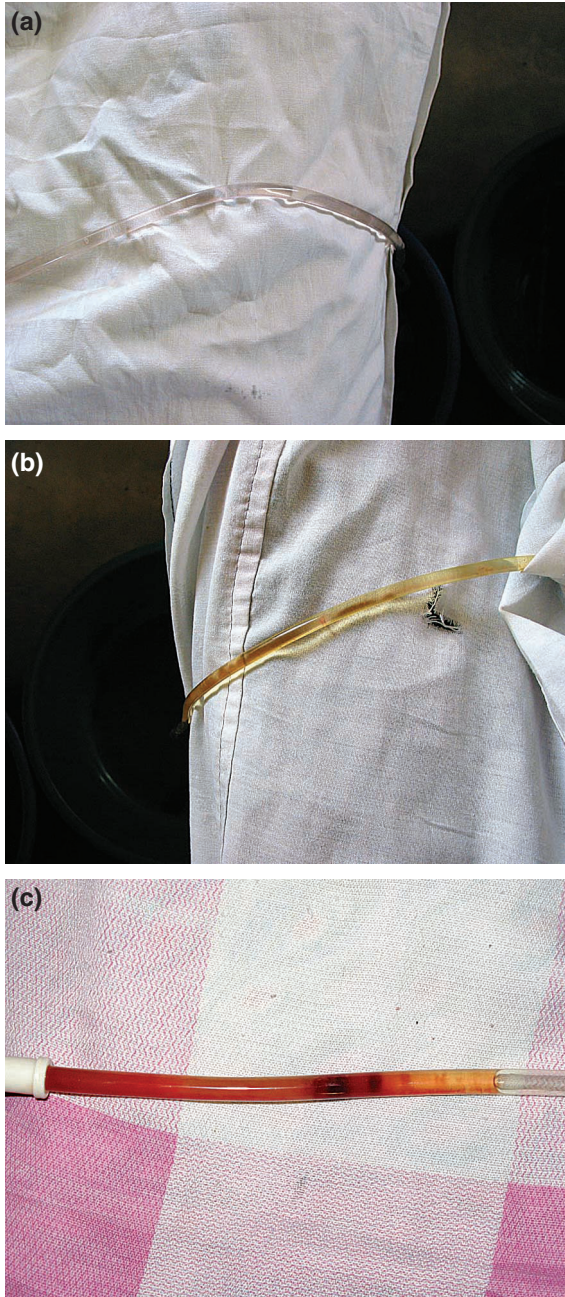


Figure 29 (a) The urine should be like water. (b) This urine is too concentrated. (c) Dirty concentrated urine

Problems with closed drainage

An example is shown in Figure 25. *Unless it is certain the staff can look after a drainable bag use a simple alternative of open catheter drainage.* The catheter is connected to plastic tubing and drains directly into a basin under the bed (Figure 26). The patient can move freely in the bed and nothing will pull on her catheter. It is easy to see that urine is draining by watching the drips and little can go wrong at night (Figure 27).

A blocked catheter is an emergency

- The patient feels a full bladder.
- The patient is wet (leaking round the catheter or through repair).
- Urine stops dripping into the basin. This would not be noticed for some time when closed drainage is used.

Action: examine the catheter See Figure 28a–c.

Action: examine the patient Is the bladder palpable? If so unblock the catheter at once by gentle irrigation with a bladder syringe (Figure 28d). If this does not



Figure 30 Make sure the patient has plentiful supply of water and look for the urine dripping into the basin



Figure 33 (a) Essential perineal care. (b) Optional perineal care (courtesy Heleen van Breekhuisen)

Mobilization

The patient is allowed out of bed after removal of the vaginal pack. A small bucket carried around is used to collect urine (Figure 32). This works perfectly well, but the patient must continue drinking lots of fluid. Clinical urinary infections will not be a problem if this is followed.

Perineal toilet

Twice-daily perineal washing is essential, paying particular attention to the catheter as it comes out of urethra (Figure 33).

Removal of the catheter

Many surgeons leave the catheter in for 14 days after all fistula repairs, but for simple ones 12 days should be sufficient as long as the patient does not leave hospital immediately. Just before the catheter is due out it is advisable to do a simple dye test



Figure 34 Nurse the patient prone if she has a secondary breakdown

preferably in theater. Provided there is no leakage simply remove the catheter in the morning and encourage her to pass urine at least every 2 h. Later, as her bladder becomes accustomed to distention she will be able to hold on longer.

The repair has failed?

A leak requires a dye test unless gentle irrigation demonstrates leak around the catheter. A leak from the vagina on dye test indicates a failure but all is not lost.

Early leak In the first week. This is bad news and usually means the repair has failed. It should be rare after easy repairs described here but will be more of a problem as the difficult ones are tackled. If more urine is draining through the catheter than the vagina it is worth keeping the catheter as long as this is the case in the small hope that healing might occur.

Late leak In the second week or later. Occasionally even the simple repairs develop a leak during the second week. This may be a secondary breakdown due to infection. In these cases as the fistula margins are not under tension and have good blood supply, there is every chance the defect will close with prolonged bladder drainage. Keep the catheter in up to 3–4 weeks in total as long as the leak is diminishing.

The later the leak, the better the prognosis. It may help to keep the patient in bed lying and sleeping face down (Figure 34). In this position the hole in the base of the bladder will be uppermost and the catheter tip will be below it, i.e. sump drainage.

Timing of discharge home

Although in most cases the catheter will be removed on day 14 it is strongly recommend that the patient does not leave the hospital for a least another week. Some patients have a degree of stress incontinence and need to be taught pelvic floor exercises. A few develop occult retention with overflow. Failure to recognize this is probably the main cause of early breakdown after discharge. Several patients have been seen who were said to be dry after catheter removal, have gone home the next day and become wet within days. If only they had been able to return immediately and have further catheter drainage they would probably be healed. They were subsequently found to have very localized breakdown easily amenable to a second repair.

It is therefore essential to check that the bladder is emptying before discharge, by questioning the patient carefully, by palpation of the abdomen and ideally by ultrasound scan. If there is any suspicion of retention then the residual urine must be measured and if greater than 100 cc the catheter should be reinserted for another week at least. If the retention fails to resolve she should be taught intermittent self-catheterization.

Other causes of early breakdown may be related to an arduous journey home. Is it advisable to let patients who have had major surgery go home over long distances in a crowded taxi, the back of a bike or long walks? A few may be due to a late infection or too early resumption of sexual activity. She should be given a card describing her treatment and giving the operation date to aid later identification and to advise cesarean section should she present pregnant to another hospital.

A cautionary tale

A lady set off on a 200 mile journey home 3 days after removal of a catheter. She claimed to be voiding well. She had a 5 h journey in a crowded taxi which did not stop on its way to the capital. She felt a full bladder but was too embarrassed to ask the taxi driver to stop. She became wet and hoping it was a temporary problem continued home. Finding herself wet all the time she was too far to return immediately and anyway had no money. She later returned. A small high very difficult intra-cervical fistula was repaired successfully. If only she could have delayed setting off home or returned immediately for further catheter drainage this could have been prevented.



Figure 35 A cured patient returns to show her new child

Pre-discharge advice

Useful advice is that the patient should go home as they came, i.e. wet. They should pad up before the journey and pass urine as they travel if necessary. They should return at once if wetness recurs soon after discharge. A small breakdown will heal with a further period of catheter drainage, up to at least 4 weeks.

Abstinence from sexual relationships for 3 months

A strategy that sometimes works is to forbid sex until she has been for a follow-up examination.

Cesarean section for all future pregnancies

Family planning issues should be discussed where relevant. The best way to avoid a second fistula is not to become pregnant. The prolonged hospital stay of the patients is a good opportunity to start them on long-term contraceptive measures such as injectables or Norplant or even conduct tubal ligation via mini laparotomy.

Future pregnancies must be delivered by cesarean section. If the obstructed labor was due to a mal-presentation the patient could possibly deliver vaginally in future, but only if highly skilled obstetric care is available, so it is best to recommend a cesarean section for all subsequent deliveries. From time to time patients are seen with a recurrent fistula because they have not been able to get to hospital in time. Cesarean section must be done electively and not after a trial of labor⁶.



Figure 36 (a) Community education by a former patient. (b) The most important message

Return for follow-up consultation

The final outcome can never be known unless the patient is seen again. For the patient's benefit and for personal audit encourage a return visit.

The final objective is a happy patient with child (Figure 35).

COMMUNITY SENSITIZATION AND MOBILIZATION

Many fistula patients are not able to find their way to the hospital for repair of their fistulas. Several reasons are given:

1. They do not have the knowledge about the disease and where they should go for repair.
2. They do not have the funds for transport and to stay in the hospital for longer.
3. They are not able to reach the hospital by public transport because they are sent off the bus because of their smell.

4. They have been to hospitals but the healthcare providers were not able to do the repair or to refer her effectively.
5. They do not get permission from their family.
6. They are afraid of 'hidden costs' in the hospital.

So prevention and cure of vesico/recto-vaginal fistulae is a social issue. Include the community to solve this. In order to help as many as possible, community sensitization is important. The patient and her family should know where and when to go for a chance of cure. The whole community should be aware of the causes of vesico-vaginal fistulae, especially teenage pregnancy and unskilled birth attendance. Community sensitization can be done in several ways:

1. Former vesico-vaginal fistulae patients who are cured are the best ambassadors (Figure 36). Make sure that during their admission they are sensitized to counsel vesico-vaginal fistulae patients in their villages and help new patients to find the road to cure!
2. Via religious leaders and other influential persons from the community, women and youth groups.
3. Health workers in remote places: inform them about the possibilities in your area. Make sure they help the patients to obtain (free?) transport to the hospital.
4. Traditional healers should know about the first signs and symptoms of vesico-vaginal fistulae and for the need for early referral and treatment at the appropriate health facility in their area.
5. Via radio or television programs.
6. Via traditional drama groups (theater for development), that are popular in some areas.
7. Try to cooperate with non-governmental organizations (NGOs). Find out who are going to the villages and sensitize them. Ask them to facilitate transport.
8. Talk with political leaders about the problem, they might be able to facilitate in transport as well.

Most patients with vesico-vaginal fistulae do not have funds. In many hospitals they may be treated for free using funds from NGOs who are involved in fistula care. Try to liaise with one of these NGOs if you can offer fistula surgery in order to let as many women profit as possible. Remember that indirect costs of fistula repair are high: patients and

a helper stay in hospital for weeks, sometimes months. They have to eat, and they lose income as both cannot work at home.

PREVENTION OF FISTULA

It cannot be stressed enough that primary prevention of fistula is the most important step in fighting fistula: good-quality comprehensive emergency obstetric care including routine use of a partograph for all patients should be available for all pregnant women and emergency transport facilities for early referral of cases of obstructed labor should be in place.

Secondary prevention of vesico-vaginal fistulae is keeping indwelling catheters in place for a long duration after obstructed labor or in case of a fresh vesico-vaginal fistulae. Health personnel from hospitals and remote healthcare facilities should receive training on primary and secondary prevention. Don't forget the providers of the informal sector. In many regions of the world less than 50% of women deliver in a health facility. Traditional birth attendants must be aware of the causes, early signs and prevention of vesico-vaginal fistulae.

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APPENDIX 1: USEFUL WEBSITES

International Society of Obstetric Fistula surgeons. www.isofs.org – A new journal the *International Journal of Obstetric Trauma* can be accessed through this site.

Addis Ababa Fistula Hospital. www.hamlinfistula.org

United Nations End Fistula Campaign. www.end-fistula.org

Engender Health. www.engenderhealth.org

USAID. www.fistulacare.org

WAHA. www.waha-international.org

Freedom from Fistula. www.freedomfromfistula.org

International Federation of Gynaecologists (FIGO). www.igo.org – the *Global Competency-Based Fistula Surgery Training Manual* can be accessed under publications, miscellaneous, on this site.

Teaching Aids at Low Cost. www.talcuk.org – A site for all medical books specifically for resource-poor countries.

The Fistula Foundation. www.fistulafoundation.org

Worldwide fistula fund. www.worldwidefistulafund.org

Global Library of Women's Medicine. www.glowm.com – In the safe motherhood section of this website there is a link to the complete contents of the books *Practical Obstetric Fistula Surgery* and *First steps in Vesico-Vaginal Fistula Repair*, and also a film of four operations performed at the Addis Ababa Fistula Hospital in 1999.

APPENDIX 2: CLASSIFICATION

Goh's classification

This is based on three variables:

- The length of the urethra (types 1–4)
- The size of the fistula (a–c)
- The degree of scarring (I–III).

Urethral length

Type 1: Distal edge of fistula >3.5 cm from the external urethral orifice (EUO), i.e. the urethra is not involved

Type 2: Distal edge 2.5–3.5 cm from the EUO

Type 3: Distal edge 1.5 to <2.5 cm from the EUO

Type 4: Distal edge <1.5 cm from the EUO.

Fistula size

- (a) Size <1.5 cm
- (b) Size 1.5–3 cm
- (c) Size >3 cm.

Scarring

- I. No or mild fibrosis around fistula/vagina, and/or vaginal length >6 cm or normal capacity.
- II. Moderate or severe fibrosis around fistula and/or vagina, and/or reduced vaginal length and/or capacity.
- III. Special considerations, e.g. circumferential fistula, involvement of ureteric orifices.

This is a popular system and used by many fistula surgeons; however, there are still problems with the system:

- The urethral length is often only estimated, but is important in predicting prognosis and management.
- Assessment of the degree of scarring and shortening of the vagina is inevitably subjective.
- There may be lack of agreement as to what constitutes a circumferential fistula. Even small juxta-urethral fistulae may be slightly detached from the bladder, although some surgeons reserve the term 'circumferential' for cases where there is a clearly palpable gap with bare bone between the urethra and the bladder.
- The ureteric orifices may be just inside, at the edge of or outside the fistula, so ureteric involvement is open to subjective interpretation.

Thus, there may be considerable interobserver variation; however, if a surgeon applies the same criteria in all cases, this will enable a meaningful audit to be done. For example, this classification has been used to confirm the suspicion that the worst fistulae occur in primiparous patients and those having a vaginal delivery.

This system of grading from type 1aI to type 4cIII does indicate an increasingly poor prognosis, although it is not always an indication of difficulty of repair. Type 1aI cases have the best prognosis and are often the easiest to repair, but a small inaccessible fistula high in the vagina or cervical canal would have the same classification but might be a greater challenge to close. In addition, the surgeon should make an estimate of bladder size. This is done with a calibrated sound at the beginning of the operation. An additional refinement is to measure functional bladder capacity during dye testing.

Waldijk's system

Type 1

Fistulae not involving the closing mechanism (5 cm or more from the external urethral orifice).

Type II

Fistulae involving the closing mechanism.

- A. Without (sub) total involvement of the urethra.
 - a. Without a circumferential defect.
 - b. With a circumferential defect.
- B. With (sub) total involvement of the urethra.
 - a. Without circumferential defect.
 - b. With a circumferential defect.

The classification proposed in Waldijk's book¹ has been valuable in predicting outcome and planning treatment, and has been vital for his own analysis of outcomes. It is based on the variables of involvement of the closing mechanism, circumferential extent and urethral involvement. It is used by the many surgeons whom he has trained, although others find it difficult to understand the cut-off between A and B fistulas.

In reality, each fistula case is unique, but a serious attempt should be made to use a classification outlined above as well as a description, so that personal audit can be done and communications made with other professionals.

APPENDIX 3: SUPPLIERS

Clip on headlight

Vorosscopes. www.vorosscopes.co.uk

Nuview, Unit 21 Daniels Industrial Estate, Bath Rd, Stroud, Gloucestershire GL5 3TJ, UK.

In other countries similar headlights may often be found in resources for dental surgeons.

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