Urinary incontinence following gynaecological surgery

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Abstract
The proximity of the urinary tract to the reproductive organs puts it at risk of injury and incontinence as a consequence of gynaecological surgery. Incontinence to urine after gynaecological surgery is distressing to both the patient and the surgeon; in particular, formation of a urinary fistula after surgery is seen as a disaster by both. It also has long-term medicolegal implications. In this review, the main emphasis is on the prevention, evaluation, diagnosis and management of urinary tract injury. Other causes of postoperative incontinence are addressed briefly.

Keywords evaluation counseling; gynaecological surgery; injury to urinary tract; urinary incontinence; vesicovaginal fistulae

Introduction
Urinary incontinence following gynaecological surgery may occur in patients who were incontinent before surgery, or in patients who were not previously incontinent and developed this complaint after vaginal or abdominal surgery.

In the former group, the surgery was undertaken to address this problem. Reasons for failure could be:

• inadequate evaluation and counselling before surgery
• inappropriate procedure or operative technique
• development of de novo detrusor instability
• unrecognized injury to the lower urinary tract.

In the latter group, incontinence develops as an undesired outcome of surgery. This may be due to:

• retention with overflow in the immediate postoperative period
• inadequate evaluation before vaginal surgery, which unmasks occult incontinence
• unrecognized injury to the lower urinary tract.

Effects of gynaecological surgery on the urinary tract
Prospective longitudinal studies have revealed the effect of simple abdominal or vaginal surgery, radical hysterectomy, laparoscopic hysterectomy and oophorectomy on lower urinary tract symptoms and incontinence. Problems occur not just because of anatomical damage to the urinary tract but also because of interruption of the autonomic nerve supply to the urinary bladder (L4, L5, S1–4) and due to disruption of mid-urethral support. In patients undergoing radical hysterectomy, 21–30% tend to have more prolonged and severe lower urinary tract symptoms than in those undergoing simple hysterectomy. This is attributed to aggressive disruption of the vesical autonomic plexus mechanism. In oophorectomy, though the evidence is not convincing, oestrogen deficiency could be a trigger factor. Laparoscopy-assisted vaginal hysterectomy and total laparoscopic hysterectomy are associated with four times more urinary tract injuries than other modes of hysterectomy.

Patients who had incontinence before surgery

Evaluation and counselling
Cystometrography remains the key investigation in the evaluation of patients who present with urinary incontinence. It not only helps in making a diagnosis but is also helpful in deciding the type of procedure required and future management. The value of this investigation is now well established in developed countries, though in many developing countries where this test is not available consultants usually make decisions to operate on the basis of the history and examination alone. Many still follow the dictum “do a vaginal procedure first and if it fails, go to the top”.

In the absence of urodynamic studies, surgery can be justified if there is a ‘clean’ history of stress incontinence alone without any additional symptoms of nocturia, urgency or urge incontinence. However, this policy has shortfalls. On the basis of the history alone, the risk of making the wrong diagnosis is around 30%. In incontinence surgery, the law of diminishing returns operates, meaning that the best chance of cure is with the primary procedure, the chances of success diminishing with each successive operation. There is general agreement that the observation of detrusor instability suggests that the results of incontinence surgery will be poor. Surgery may be offered to a
Failed incontinence surgery
Surgery for incontinence may fail to give the desired results due to inadequate evaluation, previous bladder neck surgery, the presence of detrusor instability, greater patient age, an incorrect choice of operation or failure to elevate/support the bladder neck. Although making the correct diagnosis is essential, the surgical skill and experience of the operator also plays a vital role.

Development of de novo detrusor instability
Few patients develop this problem after successful surgery for genuine stress incontinence. Studies have revealed that de novo detrusor instability occurs in 18% of patients undergoing a TVT vaginal tape procedure, in 8–16% following Burch colposuspension and in 3–11% following sling procedures. Patients undergoing these procedures should be appropriately counselled. It is likely that a small number of cases reflect pre-existing detrusor instability that was not detected at preoperative cystometry.

Patients who did not have incontinence but developed this complaint after surgery
Retention with overflow
The effect of regional anaesthesia or pain, whether abdominal, vaginal or perineal, in the postoperative period can cause retention of urine. If this goes undetected, the bladder over-distends and the patient starts dribbling urine, complaining of continuous wetness or of passing small amounts of urine frequently. The diagnosis is not difficult; an over-distended bladder can be felt in the lower abdomen, which is tender on compression, and leakage of small amounts of urine can be demonstrated. A pelvic examination should be performed to exclude perineal, vaginal or vault haematoma.

Retention with overflow can be managed by giving adequate analgesia and leaving an indwelling catheter in place for 48 hours. It can be prevented by catheterizing the patient before surgery and leaving the catheter in situ for 24 hours or by ensuring that the patient voids urine 6–8 h after surgery.

Occult incontinence
Patients presenting with urogenital prolapse may not complain of urinary incontinence. Some develop stress and urge incontinence after operative correction of the prolapse. It therefore seems prudent that, at the time of examination, the prolapse should be reduced before provocative tests are undertaken to demonstrate urinary incontinence. At the time of urodynamic studies, a vaginal pessary is inserted to correct the anatomical defect. This helps to guide the surgeon as to whether a continent procedure is required at the time of pelvic floor repair.

In women with uterovaginal prolapse, surgical options such as vaginal hysterectomy with pelvic floor repair, abdominal sacrocolpopexy and sacrohysteropexy are available. Studies have shown better urinary control and less urge incontinence following vaginal hysterectomy than following abdominal sacrocolpopexy.

It was recently suggested that practitioners should discuss the possibility of an increased likelihood of urinary incontinence with women who are scheduled for hysterectomy. Meta-analysis has revealed that hysterectomy increases the odds ratio of having urinary incontinence by 30%; this is mostly in the form of urge urinary incontinence. A possible reason is super-sensitivity of detrusor muscles as a result of partial denervation. During hysterectomy, blunt dissection of the bladder from the uterus and cervix may damage the detrusor innervation, and division of cardinal ligaments may interrupt the main branches of the sensory vesical plexus. Stress incontinence may be due to changes in structures such as the pubourethral ligament, the pubococcygeous muscle and the suburethral vaginal wall support.

Various trials have compared the effectiveness of total abdominal hysterectomy with that of sub-total abdominal hysterectomy and found no significant effect on sexual and urinary dysfunction at 12 and 24 months’ follow-up.

Urinary tract injuries
Injury to the urethra
Urethral injury during gynaecological surgery is uncommon, because the urethra is partly protected by the pubic symphysis and is not as firmly anchored as the male urethra.

Injury to the urethra may occur at during anterior colporrhaphy or dissection of the urethra and bladder neck in operations for urinary incontinence such as sling and TVT procedures. Such injuries may lead to almost total incontinence. Diagnosis of these injuries is not difficult and is usually made by cystourethroscopy. If the defect is fresh, prompt repair is needed. If the injury shows signs of inflammation, diversion of bladder urine with a suprapubic catheter may be needed before repair.

Most urethral injuries require suturing. Because of the rich blood supply in this area, the lacerations tend to bleed freely. Fine polyglycolic acid sutures are used. Urethral loss (sloughing of the entire urethra) occasionally follows colporrhaphy or a suburethral sling procedure. In these cases, a strip of anterior vaginal wall is made into a tube over a catheter. It is important to insert plication sutures behind the bladder neck if continence is to be achieved. The interposition of a graft between the new urethra and the vaginal wall closure fills the potential dead space and improves continence by ensuring mobility of the bladder neck. If continence is still not achieved, an artificial urinary sphincter may be needed.

Injury to the urinary bladder
The urinary bladder is the most common site of injury during gynaecological surgery. It is relatively resistant to injury when collapsed, so the first line of defence is drainage by a catheter. This procedure should be performed in all cases before abdominal, vaginal or laparoscopic surgery. When inflammation, endometriosis or cancer is present in the region, the bladder becomes fixed and injury is more common. Loss of normal tissue planes, as occurs in patients who have undergone previous surgery, or injudicious surgical dissection that proceed despite haemorrhage may cause trauma to the bladder.

Hysterectomy-associated injuries may occur during abdominal or vaginal procedures. Such injuries are usually recognized immediately, but this may be delayed in certain cases. The injury is typically located just above the trigone, but may involve the tract.
ureter and may be extensive. Injuries recognized during the initial surgical procedure can be repaired adequately.

The incidence of bladder injury during laparoscopic procedures ranges from 0.02% to 8.3%, which is high compared with the reported rates of some classical pelvic operations. The bladder dome has been reported to be the most common location of bladder injury during laparoscopic surgery. Laparoscopic injury to the bladder occurs due to fixation of the bladder following previous surgical procedures or inadequate emptying of the bladder before the introduction of the laparoscope. Injury is most common with instruments connected to an electrocautery unit followed by blunt dissection.

**Early recognition of injury**

Since 1990, the use of intraoperative cystoscopy to detect occult urinary tract injuries has increased. Gilmour et al. have reviewed the literature and concluded that the prevalence of urinary tract injury was 1.6/1000 without cystoscopy and 6.2/1000 with cystoscopy. An analysis of 13 prospective studies revealed that 5.8/1000 ureteric injuries and 10.9/1000 urinary bladder injuries might be missed without the use of intraoperative cystoscopy. However, there have been cases in which bladder or ureteric injuries were missed despite cystoscopic examination. Recent prospective studies have recommended intraoperative cystoscopy, but there is no consensus on whether it should be performed during every major gynaecological procedure.

Injury to the bladder during laparoscopic, vaginal or abdominal procedures can take the form of a clean cut into the bladder lumen due to distorted anatomy, or laceration and tearing of bladder due to difficult dissection.

**During abdominal surgery**

Closure of bladder injury should be performed in a watertight manner, in two layers. The usual material for repairing bladder injuries is 2/0 or 3/0 polyglycolic acid sutures. Non-absorbable sutures should not be used as they may cause local irritation and subsequently become a nidus for stone formation. The bladder mucosa should be closed separately from the muscular layer; this minimizes bleeding into the bladder. An interrupted layer is used to close the mucosa and a continuous second layer can repair the muscular layer.

If the bladder has been opened and there is any question of injury to the ureter, the incision in the bladder should be enlarged. A catheter should then be passed up the ureteric orifice and the course of the ureter visualized to ensure that no injury to the ureter has occurred.

**During vaginal surgery**

If the bladder is opened during vaginal surgery, cystoscopy after plugging of the injury is helpful in delineating the extent of the bladder injury and demonstrating the ureteral orifices and their relationship to the injury. Passage of a catheter up the ureters before closure of the bladder reassures the surgeon that no portion of the ureter is included in the repair. If required, retrograde urethrogramraphy can be performed before closure.

Filling the bladder with dilute methylene blue solution or sterile milk may be helpful in demonstrating suspected injuries. Following completion of bladder repair, the bladder should be tested for watertightness. This can be achieved by installing 200–300 ml of dye-stained saline solution. If a leak occurs, it should be closed immediately with interrupted figure-of-eight sutures. The bladder should then be drained continuously using a transurethral Foley catheter, which should be left in situ for 10–14 days. If there is significant infection or the patient has undergone radiotherapy, drainage of the bladder may need to be prolonged for 2–3 weeks.

Sometimes, a surgical laceration may escape detection and is discovered in the immediate postoperative period. If the patient is found to have haematuria, two possible courses of action are available to the surgeon. Most minor lacerations close spontaneously if the bladder is kept on continuous free drainage, and the bleeding usually stops. A three-way Foley catheter is used so that the bladder can be irrigated to avoid clot retention. Only small amounts (30–50 ml) of irrigating fluid should be used. The indwelling catheter should remain for at least 2 weeks to allow good healing. The second option is to perform cystoscopy.

Occasionally, a non-absorbable suture penetrates the bladder. Non-absorbable sutures are used for suprapubic bladder neck suspensions, as in the Stamey and Marshall–Marchetti–Krantz procedures and Burch’s modification. A non-absorbable suture that is penetrating the bladder or urethra should be cut transvesically and removed. Sometimes, the stitch retracts out of the lumen once it is cut. Failing this, a retroperitoneal suprapubic cystostomy may be necessary to remove the ligature. Leaving such foreign bodies in situ leads to intractable cystitis and eventual stone formation.

If a large laceration is found at the time of cystoscopy, as sometimes occurs after a difficult vaginal hysterectomy when an enlarged uterus is removed vaginally, this should be repaired immediately using a suprapubic transvesical approach. Whenever there is doubt about the possibility of bladder injury during surgery, continuous urinary drainage should be instituted and continued for 4–10 days. There is no harm in explaining to the patient that this is a safety precaution.

**During laparoscopic surgery**

Bladder repair can be performed via a laparoscope by adapting a classic gynaecological surgery technique with fine absorbable polyglycolic acid sutures tied with a two-turn flat knot. This can be done in one layer or in two layers. Laparoscopic staples can also be used to repair bladder defects.

**Late recognition of injury**

Vesicovaginal fistulae may occur as late as 15 days postoperatively, but are most commonly discovered 4–8 days after surgery. Total urinary incontinence after surgical trauma suggests that a fistula has formed between the bladder and the vagina. If the patient is incontinent after surgery, but is also able to empty her bladder at regular intervals, a ureteric fistula is more likely.

Other cases of delayed trauma may result from formation of a haematoma under the bladder, which may become infected. If it cannot escape through the vaginal vault, tension builds up in the cavity and the neighbouring bladder wall undergoes necrosis. Ultimately, a urinary fistula may form between the bladder base and the vaginal vault. This sometimes occurs after a straightforward, uncomplicated operation.

When a patient starts leaking urine in the postoperative period, it is usually unwise to make a detailed examination per vaginum...
to localize the fistula. Cystoscopic evaluation should be avoided, and more simple efforts should be made to determine the nature of the fistula. A vaginal tampon is inserted in the vagina and a solution of methylene blue dye is installed into the bladder via a transurethral catheter. Leakage of urine can be confirmed by the presence of dye on the vaginal tampon; this finding suggests that a vesicovaginal fistula is present. If the methylene blue fails to stain the tampon but the tampon becomes wet with clear urine, a ureteric fistula should be suspected. Intravenous urography is a useful investigation to exclude upper urinary tract abnormalities and ureteral involvement.

Vesicovaginal fistulae should initially be treated conservatively. Natural healing reduces their size and some close spontaneously. This may be encouraged by continuous drainage through a urethral catheter for up to 6 weeks. During catheterization, the patient can be ambulant and even discharged from the hospital. Rest in bed or assuming the prone position usually does not promote healing of the fistula. If most of the urine drains through the fistula rather than through the catheter, or the fistula tract fails to heal within 4–6 weeks, further catheter drainage is unlikely to help. Catheter drainage is annoying to the patient and is a constant reminder to her of the undesirable outcome of the procedure.

If the patient continues to leak urine after the catheter has been removed, the catheter should not be re-inserted, to allow any irritation or infection that has occurred to subside. Any consideration of surgical correction of the fistula should be deferred for 4–6 weeks, though this concept has recently been challenged; Waaldijk has published his experience of early closure of fistulae with a 95% success rate.

The skin of the vulva and thighs must be protected from excoriation. A silicon barrier cream, zinc and castor oil cream or paraffin gel is suggested. During this waiting period, oedema and infection have subsided and the tissues become soft, pliable and workable. Use of cortisone does not significantly accelerate the process. In post-menopausal patients, a short course of oestrogen improves the condition of the vaginal skin and its blood supply.

Fistula repair

The presence of vaginal scarring appears to be important in determining the likelihood of both successful fistula closure and the development of debilitating urinary stress incontinence after successful repair. For extensive repair, vaginal flaps and tissue grafts are often used to close the fistula. The route of repair, whether abdominal or vaginal, depends on the site of the fistula. A suprapubic abdominal approach does not necessarily improve success rates, but it does however increase morbidity. A vaginal approach is therefore preferred.

Every operator develops his or her own techniques for repairing fistulae based on well-established general principles:

- maintenance of free postoperative urinary drainage with a transurethral or suprapubic catheter.
- examination under anaesthesia to evaluate the site and nature of the fistula
- adequate exposure of the fistula surgically before closure
- protection of the ureter with ureteral stents
- a watertight closure, which should be confirmed at the end of the operation

Postoperative residual incontinence following urinary fistula repair

Stress incontinence after fistula repair is almost as frustrating to the fistula surgeon as surgical failure. There is little in the literature about this issue, but the reported prevalence in different series is 8–16% and some authors have published figures as high as 33% based on urodynamic investigations. This sign or symptom is likely to occur when there has been damage and/or tissue loss in the region of bladder neck and the urethra.

The management of post-fistula stress incontinence is extremely difficult. Waaldijk has advocated a modified Martius procedure, securing the graft retropubically. Hudson and Hendrickse advocated a vaginal urethral suspensory procedure. Conventional bladder neck elevation procedures have limited value. Recently, Browing described the use of a fibromuscular sling during fistula repair to prevent residual stress incontinence.

Injury to the ureters

Role of imaging in the prevention of urinary tract injuries

Preoperative imaging is not necessary for every case, but intravenous urography (IVU) or contrast-enhanced CT might be considered if distorted anatomy is anticipated or previous urinary compromise is suspected. A review of the experience of a university-based gynaecology service, where IVU was performed routinely as a preventive preoperative measure, showed that previous pelvic surgery, uterine size equivalent to more than 12 weeks’ gestation and adnexal masses of more than 4 cm were most likely to be associated with abnormal IVU. A decision analysis was formulated; using a baseline prevalence of ureteric injury of 0.5%, the authors predicted an extra cost of $166,600 in preventing a single ureteric injury if prophylactic IVU were used in all patients. Estimating a real dollar charge of $200 per IVU to the patient suggested that $166,600 would be spent to avoid one ureteric injury. The marginal cost-effectiveness of a IVU strategy over a no IVU strategy is that 833 pyelograms must be obtained to avoid one ureteric injury. Hence, routine use of IVU is questionable. Normal IVU does not remove the surgeon’s responsibility to identify the ureters in all pelvic operations.

Role of ureteric catheterization in the prevention of ureteric injuries

The decision to place ureteric catheters before gynaecological surgery should be made on an individual basis. Their routine use to prevent ureteric injury is a controversial issue. Proponents of prophylactic ureteric stenting say that they improve prevention and recognition of injury. Detractors cite no advantage in terms of prevention of injury and list possible complications such as urinary tract infection, ureteral spasm, reflex anuria, injury during catheterization and haematuria. A review of ureteric catheterization has shown no statistical significant difference in the incidence of operative ureteric injury, but an added cost of $1465 per case.

In gynaecological surgery, the ureters are usually injured at a relatively high level near the pelvic brim, where they lie adjacent...
to the ovarian vessels, or low down beside the cervix, where they are crossed by the uterine vessels. The ureters may be included in ligatures that are used to tie off these vessels, may be crushed in clamps and subsequently undergo necrosis, or may be partially or completely divided. These complications are most likely to occur in the presence of dense adhesions, pelvic inflammatory disease or endometriosis, or when the normal anatomy of the pelvis is distorted; for example, by fibroids or ovarian tumours growing into the broad ligament, which may displace the ureter from its normal position. Occasionally, the ureter becomes devitalized and sloughs after extensive pelvic dissection, as in Wertheim’s hysterectomy, due to interference with its blood supply, particularly after previous pelvic irradiation. Rarely, the extreme lower end of the ureter is caught in high stitches inserted beside the cervix during pelvic floor repair or vaginal hysterectomy.

Early recognition of injury

If the ureter is injured during surgery, or there are grounds for suspecting that it may have been crushed, divided or included in a ligature, an adequate length of the ureter is exposed above and below the injury to define its nature and extent. If injury to the extreme lower end of the ureter is suspected, the bladder should be opened without hesitation by anterior cystotomy and the appropriate ureteric orifice catheterized. If the catheter ascends easily and no injury is found, the bladder is simply closed in two layers as described previously. A urethral catheter is left in situ for 7–10 days. If the ureter is partially damaged or obstructed, a ureteric stent is left in situ for 6 weeks. Complete transection of the ureter requires reconstruction or re-implantation, which can proceed without delay. The lower end of the ureter is dissected out and may be re-implanted directly in the nearest part of the bladder or, preferably, the is opened and the ureter is re-implanted with a reflux-preventing procedure into the posterior or lateral wall. When high ureteric injury is found, direct end-to-end anastomosis is performed. The circumference of the cut ends of the ureter is increased by a 1 cm vertical incision and they are joined using fine polyglycolic acid sutures. The anastomosis is best performed over a ureteric splint. A double J stent or a fine (8 FG) infant’s oesophageal feeding tube passed up from the bladder is ideal for this purpose. The most important technical point is to ensure that there is no tension at the site of the anastomosis. A suction or corrugated drain is left near the site of anastomosis and removed after 4 or 5 days. The ureteric stent is usually removed after 4–6 weeks.

Late recognition of injury

Ureteral damage is usually recognized postoperatively. Early signs and symptoms of injury in the postoperative period are non-specific and comprise fever, ileus, flank or abdominal pain, persistent hematuria or the appearance of a mass that is usually suspected to be hematoma by the surgeon. Often, the injury is not suspected until an obvious urinary fistula occurs. When evidence of ureteric injury becomes apparent in the postoperative period, the precise nature of the injury should be defined before deciding on the best approach to repair. A catheter specimen of urine should be sent for bacteriological culture and a sensitivity study. Blood urea and electrolytes should be checked routinely and dehydration or electrolyte imbalances should be corrected. Since there is often some obstruction at the site of ureteric injury, IVU usually shows dilatation of the ureter and often of the calyces on the side of the lesion. If there is no obstruction above the fistula, the ureter and kidney may look normal.

The injured side is identified by cystoscopy and observation of the presence of efflux from the ureteric orifice of the intact side and the absence of efflux on the injured side. This test is facilitated by adequate hydration, achieved by giving intravenous fluids and then intravenous diuretic with or without indigo carmine. The site of the lesion may be further confirmed by attempting to pass a ureteric catheter up the non-effluxing side.

The level of the site of the injury can be recognized on high-dose IVU with screening or delayed films, which usually show the lower limit of the intact ureter and sometimes the exact site of the leakage, and may show filling of the vagina. If the site of injury is not clear on IVU, percutaneous nephrostomy under ultrasound control, descending ureterography or cystoscopy and ascending ureterography will show it more exactly.

Once the nature of the lesion has been defined, a decision on the best form of management can be made. In some early cases, simple ureteric drainage with a double J stent may allow a small fistula to heal. If it does not dry up quickly, operative intervention is necessary and there is little point in further delay. If the ureter is completely obstructed, reconstruction or re-implantation should be undertaken as soon as possible if worthwhile kidney function is to be preserved.

The operative approach to the repair of ureteric injuries proceeds in a manner similar to that described earlier. The ureter is generally approached extraperitoneally and repaired or re-implanted, with or without Boari’s flap. If a considerable defect must be bridged, it is occasionally necessary to perform a high transuretero-ureterostomy.

Medicolegal aspects of urinary tract injuries

The medicolegal aspects of urinary tract injuries are an increasing area of concern. An individual who sustains a urinary tract injury is 91-fold more likely to undertake medical litigation. Patients may start litigation against a surgeon for various reasons, including physical and psychological suffering due to the unexpected surgical outcome. A literature search reveals a litigation rate of 3% in gynaecological surgery with urological injuries compared with 0.03% without injuries.

Conclusion

There are three levels of prevention of urinary tract injuries in gynaecological surgery. Primary prevention comprises avoiding lower urinary tract injuries by careful surgical technique, including identifying the ureters and bladder during major gynaecological surgery. Secondary prevention is the intraoperative recognition and repair of injury. Tertiary prevention, or minimizing the morbidity and sequelae once urinary tract injuries become symptomatic in the postoperative period, usually involves further diagnostic and surgical intervention to confirm and manage the injuries. Compared with tertiary prevention, primary and secondary prevention are often easier and more successful and cause less morbidity.
Postoperative urinary incontinence is an undesirable outcome of gynaecological surgery. Patients undergoing surgery for urinary incontinence or urogenital prolapse should be appropriately evaluated and counselled. The bladder should be emptied before surgery and left on continuous drainage for 12–24 hours postoperatively. If an injury to the bladder or the ureter is recognized at the time of surgery, primary repair gives the best results. When the damage becomes evident later, extreme care must be exercised to locate the injury accurately and then to choose the optimal timing and technique for repair.

Injury to the urinary tract is a recognized complication of gynaecological surgery and therefore appropriate training of pelvic surgeons is of prime importance. Adherence to standard surgical principles and knowledge of techniques of repair and palliative procedures gives confidence to the surgeon and minimizes the occurrence of this morbidity.

**FURTHER READING**


**Practice points**

- Postoperative urinary incontinence is a undesirable outcome of gynaecological surgery
- Patients undergoing surgery for urinary incontinence must be appropriately evaluated and counselled
- Patients requiring surgery for urogenital prolapse should be evaluated for urinary incontinence after reduction of the prolapse
- The urinary bladder should be emptied and preferably the catheter left on continuous drainage during any major pelvic surgery
- If an injury to the urinary tract is recognized during surgery, it should be rectified, if necessary with help from a urologist
- The first-line treatment of urinary leakage in the postoperative period is to catheterize the bladder and leave an indwelling catheter in situ
- Repair of a vesicovaginal fistula should be undertaken 4–6 weeks later by a skilled urogynaecological surgeon, but individual experience is important in decision making regarding appropriate timings
- At all stages, communication with the patient should be clear and precise