Diagnosis and management of vesicovaginal fistulae

A fistula is defined as an abnormal communication between two or more epithelial surfaces. In the context of gynaecology, urinary tract fistulae connect the genital tract (vagina, uterus or perineum) and the urinary tract (bladder, ureters or urethra). This review concentrates on vesicovaginal fistulae.

CAUSES
Urogenital fistulae can be congenital or acquired. Acquired urogenital fistulae can be divided, according to aetiology, into obstetric, surgical, radiation, malignant and miscellaneous groups (Table 1). In most developing countries, over 90% of fistulae are of obstetric aetiology, whereas in the UK over 70% follow pelvic surgery. Congenital fistulae are not considered in this article and readers are referred to alternative texts for further information.

Obstetric
Obstetric fistulae most commonly arise as a result of obstructed labour (Figure 1), although they are also seen following accidental injury at caesarean section, forceps delivery, fetal craniotomy or symphysiotomy. Other causes include traditional surgical practices (e.g. circumcision and gishiri) and complications of criminal abortion. Tahzib reported on the epidemiological determinants of vesicovaginal fistulae in northern Nigeria. In 84% of cases obstructed labour was thought to be the main aetiological factor; 33% had undergone gishiri (traditional cut made into the vaginal introitus with a razor blade or knife to treat numerous gynaecological conditions) and in 15% this was felt to be the main factor. Over 50% of patients were under 20 years of age, more than 50% were in their first pregnancy and only 1 in 500 had received any formal education.

Surgical
Urogenital fistulae following surgery within the pelvis can result from direct injury at the time of surgery or, more commonly, as a delayed event. In a series of 135 genital fistulae referred to the senior author over a period of ten years, 97 have been associated with pelvic surgery, including 73 following hysterectomy (Figure 2). Of these, only five presented with leakage of urine on the first postoperative day. If the fistula is a delayed event, it is presumed that the fistula occurs as a result of compromised blood supply to part of the urinary tract, leading to tissue necrosis and the formation of a fistula. Alternatively, a small pelvic haematoma associated with the vaginal vault and/or

Figure 1. Obstetric fistula involving urethra, bladder neck and bladder base, up to the level of the ureteric orifices
Others

Invasive malignancy, such as carcinoma of the cervix, vagina and rectum, can lead to the formation of urogenital fistulae. The series of 135 fistulae referred to above included 18 caused by radiotherapy. Other miscellaneous causes include infection, penetrating trauma, neglected pessaries, catheter-related injuries and coital injury.

Table 1. Aetiology of urogenital fistulae in two series, from the north-east of Englanda and from south-east Nigeria1

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>NE England (n = 135)</th>
<th>SE Nigeria (n = 2389)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstructed labour</td>
<td>1</td>
<td>1918</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>2</td>
<td>165</td>
</tr>
<tr>
<td>Ruptured uterus</td>
<td>5</td>
<td>119</td>
</tr>
<tr>
<td>Forceps/ventouse</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Breech extraction</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Placental abruption</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Obstetric subtotal (% of total)</td>
<td>14 (10.4%)</td>
<td>2202 (92.2%)</td>
</tr>
<tr>
<td>Surgical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal hysterectomy</td>
<td>55</td>
<td>33</td>
</tr>
<tr>
<td>Radical hysterectomy</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Urethral diverticulectomy</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Colporrhaphy</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>Vaginal hysterectomy</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Total abdominal hysterectomy and colporrhaphy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total abdominal hysterectomy and colposuspension</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Laparoscopy-assisted vaginal hysterectomy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Laparoscopic oophorectomy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cystoplasty and colposuspension</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Colposuspension</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sling</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Needle suspension</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cervical stumpectomy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Suburethral resection (tuberculosis)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lithodact</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Panproctocolectomy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Unknown surgery in childhood</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Suture to vaginal laceration</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Surgical subtotal (% of total)</td>
<td>97 (71.8%)</td>
<td>105 (4.4%)</td>
</tr>
<tr>
<td>Radiation (% of total)</td>
<td>18 (13.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Malignancy (% of total)</td>
<td>0 (0.0%)</td>
<td>(1.8%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catheter-induced</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Foreign body</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Infection</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Coital injury</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Miscellaneous subtotal (% of total)</td>
<td>6 (4.4%)</td>
<td>40 (1.7%)</td>
</tr>
</tbody>
</table>

* Hilton, unpublished

urinary tract may become infected and discharges, causing the abnormal communication to form.

PREVALENCE

The true prevalence of urogenital fistulae in the developing world is unknown because of the difficulties of obtaining accurate data, but particularly high rates are found in Nigeria, Ethiopia, Sudan and Chad. The estimated prevalence in the developing world is 1–2 per 1000 deliveries, with perhaps 50 000–100 000 new cases each year.5 The incidence of fistulae clearly relates to the level of maternity care provision, those areas with high maternal mortality tending also to have high fistula rates. Danso et al8 suggested that a more realistic estimate of the incidence of fistulae in any community might be that it approaches the maternal mortality rate. This might indicate an annual incidence worldwide of up to 500 000.

Recent data from regional health authority information units in England and Wales suggest a national incidence of 120–150 cases per year.78 The rate of urogenital fistulae following hysterectomy has been estimated at 1 per 1300 operations.

PRESENTATION

Urogenital fistulae are said to present characteristically with continuous urinary incontinence. When there is extensive tissue loss, the clinical findings are often gross and the
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**DIAGNOSIS AND INVESTIGATIONS**

In order to diagnose a urogenital fistula, the leaking fluid needs to be confirmed as urine, the leakage needs to be definitely extra-urethral and the site of the leakage has to be identified.

**Imaging**

Although radiology and ultrasound techniques undoubtedly have a role, carefully conducted dye studies remain the investigation of first choice. Phenazopyridine is an oral formulation of an orange dye which is excreted in urine. It has traditionally been used to stain the urine and hence confirm the presence of a fistula; unfortunately, it is becoming increasing difficult to obtain in the UK. Indigo carmine may be used intravenously as an alternative.

Identification of the site of a fistula is best carried out by the instillation of coloured dye (usually methylene blue) into the bladder, with the patient in the lithotomy position, so that any leakage can be directly visualised. The traditional ‘three-swab test’ gives a less clear distinction between urethral and extra-urethral leakage and precludes the identification of multiple fistulae; it is not therefore recommended. If leakage of clear fluid continues after instillation of the dye, a ureteric fistula is likely; this is most easily confirmed by a ‘two-dye test’ using phenazopyridine to stain the renal urine and methylene blue to stain the bladder contents. Although intravenous urography is a particularly insensitive investigation in the diagnosis of vesicovaginal fistula, knowledge of upper urinary tract status may have a significant influence on the treatment measures used and should therefore be looked upon as an essential investigation for any suspected or confirmed urinary fistula. Compromise to ureteric function is a particularly common finding when a fistula occurs in relation to malignant disease or its treatment.

**Examination under anaesthesia**

Careful examination, usually necessitating an anaesthetic, may be required to identify the fistulae in the first place, although it is considered by many to be an essential preliminary to definitive surgical treatment. A malleable silver probe is invaluable for exploration of the vaginal walls, and tissue forceps or plastic surgical skin hooks are helpful in creating tension to identify the smallest fistulae. Vaginal access can be assessed at the same time to enable a choice to be made between vaginal and abdominal approaches for the repair surgery.

**Cystoscopy**

It is the authors’ practice to perform cystourethroscopy for all but the largest defects. This allows determination of the exact level and position of the fistula with relation to the ureteric orifices and bladder neck. This will be important in determining the appropriate surgical technique and the likelihood of subsequent urethral incompetence. The condition of the tissues must be carefully assessed, as the persistence of slough should defer definitive repair surgery. Malignant change has been reported in long-standing benign fistulae; thus, if there is any doubt about the nature of the tissue, biopsy should be undertaken.

**IMMEDIATE MANAGEMENT**

**Catheterisation**

Spontaneous closure of a urogenital fistula can occur if the outflow from the bladder is unobstructed. Consequently, catheterisation can result in spontaneous resolution and is worth a prolonged trial of at least six to eight weeks prior to embarking on surgical repair.

**Counselling**

In cases where urogenital fistulae have arisen following surgery, patients are often previously healthy individuals who expected their initial operation to be a routine procedure. The fistula represents a distressing and unforeseen complication, causing symptoms much worse than those arising from the initial complaint. It is vital that these patients are helped to understand the nature of the problem, why it has arisen and the plan for management at all stages. Confident but realistic counselling by the surgeon is essential and the involvement of nursing staff or...
counsellors with appropriate experience is also highly desirable.

**Palliation and skin care**
Incontinence pads should be provided in generous quantities for the interval between diagnosis and repair. The vulval skin may be at considerable risk from ammoniacal dermatitis and liberal use of silicone barrier cream should be encouraged.

**SURGICAL MANAGEMENT**

**Timing and location of repair operation**
The timing of the fistula repair operation is one of the contentious aspects of fistula management. Surgical success must not be compromised by operating too early, despite the fact that the waiting period is distressing for the patient. In the rare situation of a surgical fistula where leakage is evident within the first 24 hours after surgery, immediate re-operation and repair might be appropriate. In other cases,
delay allows slough to separate and inflammatory changes
to resolve. In obstetric cases, most surgeons suggest that a
minimum of three months should be allowed, although
Waaldijk has advocated surgery as soon as slough has
separated.17 It is the authors' view that 10–12 weeks
postoperatively is the earliest appropriate time for repair of
surgical vesicovaginal fistulae.

Surgery for urogenital fistulae should only be undertaken
by surgeons with appropriate training and experience,
particularly since many fistulae are iatrogenic in origin.8

Route of repair
Many urologists advocate an abdominal approach for all
fistula repairs, claiming the possibility of earlier inter-
vention and higher success rates in justification. Others
suggest that all fistulae can be successfully closed by the
vaginal route. Surgeons involved in fistula management
must be capable of both approaches and should be
prevented to modify their technique to select the most
appropriate for the individual case. Where access is good
and the vaginal tissues are sufficiently mobile, the vaginal
route is usually most appropriate (Figure 3). If access is
poor and the fistula cannot be brought down, the abdom-
inal approach should be used. Occasionally, it may be
appropriate with a vaginal approach to have the patient
prone with head-up tilt (reverse lithotomy). Overall, more
surgical fistulae than obstetric fistulae are likely to require
an abdominal repair although, in the senior author's series
of cases from the UK and those reviewed from Nigeria,
two-thirds were satisfactorily treated by the vaginal route,
regardless of aetiology.

Instruments and sutures
All operators have their own favoured instruments, those
described by Lawson18 are suitable for repair by any route.
A range of opinion still exists about suture materials;
however, the authors' view is that absorbable sutures
should be used throughout all urinary fistula repair pro-
cedures. Polyglactin (Vicryl™) 2/0 suture on a 25-mm
heavy taper-cut needle is preferred for bladder and vagina.

Interposition grafting
Fistula repairs may require additional tissue to provide
support and create an extra layer to the repair. This tissue
can be provided by way of an interposed graft of muscle,
peritoneum or omentum, which can help to fill dead space
and bring new blood supply into the area. The Martius
graft, consisting of labial fat and bulbocavernous muscle,
is most commonly used to cover vaginal repair of urethral
and bladder neck fistulae.19

POSTOPERATIVE MANAGEMENT
Bladder drainage
Continuous bladder drainage in the postoperative period is
crucial to success; nursing staff should check catheters
hourly throughout the postoperative period to confirm free
drainage and to check output. Where failure occurs after a
straightforward repair, it is almost always possible to identify
a period during which free drainage was interrupted.

The catheter must be of sufficient diameter to prevent
blockage but whether the suprapubic or urethral route is
used is contentious. It is the authors' practice to use both
urethral and suprapubic catheters as a 'belt and braces'
approach. This also allows the suprapubic catheter to be
used once the patient is voiding to assess residual vol-
umes.20 The duration of free drainage depends on the
of fistula repaired; following repair of a surgical uro-
genital fistula 12 days should be adequate. Some advocate
routine cystography to check the integrity of repair prior
to catheter removal; this is not the authors' practice if sur-
urgery and postoperative course have been straightforward.

Mobility and thromboprophylaxis
Restricting patient mobility in the postoperative period may
help prevent kinking of the urinary catheters, which can
obstruct free drainage and endanger the repair. Conse-
quently, some advocate continuous bed rest during this
period. This approach renders the patient at a moderate to
high risk of thromboembolism and so it is the authors' prac-
tice to use both graduated compression stockings and low-
dose subcutaneous heparin until the patient is fully mobile.

OUTCOME
It is difficult to compare the results of treatment in different
series because the lesions involved and the techniques of
repair vary so greatly. Cure rates (closure at first operation)
range from 60% to 98%.21 On average, 80% cures and 10%
failures might be expected and, in the case of obstetric
fistulae at least, 10% with residual functional problems.
Stress incontinence has long been recognised as a complica-
tion of vesicovaginal fistulae.18 It is most likely to occur in
patients with an obstetric fistula when the injury involves the
sphincter mechanism, particularly if there is tissue loss,17
although it has also been reported in a large proportion of
surgical fistulae involving the urethra or bladder neck.22
Stress incontinence affects at least 10% of all fistula patients.

In the series of UK patients referred to above, nine of 135
(7%) healed without operation, eight (6%) declined surgery,
one (with co-existent detrusor instability) was asymptomatic
on medical treatment and three (2%) underwent primary
urinary diversion. Of the remaining 114 who underwent
repair surgery, 109 (96%) were cured by the first operation.

In the developing world, where most urogenital fistulae
are obstetric in origin, the results of surgical correction can
be equally good. In a review of 2979 procedures in 2484
patients from south-east Nigeria,11 87% were cured by first
operation and 99% were eventually successfully anatomically
repaired with less than 1% undergoing urinary diversion.
However, the successful management of fistulae in this
setting involves improving access to medical treatment,
patient education and tackling the social exclusion to which
women suffering this condition are frequently exposed.
PREVENTION

It is estimated by the World Health Organization (WHO) that there are approximately 500,000 maternal deaths per year worldwide and it is clear that the prevalence of obstetric fistulae and maternal mortality rates are closely related. In 1989, the WHO established a Technical Working Group to investigate the problems of prevention and management of obstetric fistulae. Their recommendations included:

- the extension of antenatal and intrapartum care
- the transfer of women in prolonged labour for delivery by skilled personnel
- the identification of areas where fistulae are still prevalent, so that resources could be mobilised to deal with fistulae more effectively
- the creation of specialised centres for management, training and research, with a specific aim of treating existing cases within five years.23

It is clear, however, that, in addition to these factors, major social change is required in endemic areas. Improvement in the status of women in society, the extension of primary education, deferment of marriage and pregnancy, improved nutritional status and contraceptive services are all vital to the prevention of obstetric fistulae.

As surgeons, we need to be aware of those factors increasing the likelihood of lower urinary tract injury and must recognise the limits of our surgical skills and, perhaps more importantly, those of our trainees. We should be equally aware of the signs of injury in the postoperative period. We should have standard regimens for the management of patients with voiding difficulties in the postoperative period if bladder overdistension and the risk of late bladder damage are to be avoided.

CONCLUSIONS

In developing countries, over 90% of the urogenital fistulae are obstetric in origin, resulting from pressure necrosis during obstructed labour. This is very different to the pattern in the developed world, where 75% follow pelvic surgery. The best estimate of the incidence of urogenital fistulae following hysterectomy is 1 per 1300 operations.

When a fistula is suspected, catheterisation should be undertaken because spontaneous resolution can occur up to eight weeks after the initiating event.

Surgery for urogenital fistulae should only be undertaken by surgeons with the appropriate training and experience and with the versatility to undertake the most appropriate operation by the most appropriate route, be it abdominal or vaginal. The current rarity of vesicovaginal fistulae in the UK makes a strong argument for their management on a supraregional basis. Prompt diagnosis and efficient management go a long way towards limiting the medical, social and legal implications of what can otherwise be a devastating situation for the patient and her family.

AUTHOR DETAILS

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References

8 Hilton P. Post-operative urogenital fistulæ are best managed by gynaecologists in specialist centres. Br J Urol 1997;80 Suppl 1:35-42
10 Ramkutahat N. Double-dye test to diagnose various types of vaginal fistulas. J Urol 1974;112:811-12
15 Waaldijk K. The immediate surgical management of fresh obstetric fistulas with catheter and/or early closure. Int J Gynaecol Obstet 1994;45:11-6