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Diagnosis and Management of Enterovesical Fistula

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Enterovesical fistula (EVF) is an abnormal communication between the intestine and the bladder. Based on the bowel segment involved, it can be divided into four main categories including colovesical (the commons form, usually between the sigmoid colon and the dome of the bladder), rectovesical, ileovesical and appendicovesical (accounting for less than 5% of cases).
The first description was by Rufus of Ephesus in AD 200 of a patient who presented with discharge of urine through the rectum. In the modern literature Cripps first reported the condition in 1888[1]. EVF occurs mainly in the sixth and seventh decades of life usually in association with malignancy or diverticular disease[2-9]. There is a male-to-female ratio of 3:1[2-4,6-8]. The lower incidence in females is due to the interposition of the uterus between the bladder and sigmoid colon[10] and many women with EVF have had a previous hysterectomy[2,11].

Aetiology

EVF can be caused by inflammatory or neoplastic disease or by trauma which may be iatrogenic.
Diverticulitis is the commonest aetiology[2-9,12] and accounts for approximately 50-70% of cases. These are almost entirely colovesical. Although the relative risk of developing EVF in the presence of diverticular disease is uncertain, most studies report a risk of 2% to 4%. The primary mechanism is rupture of a diverticulum or a peri-diverticular abscess into the bladder[3,4,6,13].
Crohn's disease accounts for approximately 10% of EVF and is the commonest cause of ileovesical fistulae. It is relatively rare condition in Crohn's disease with a reported incidence of 2% to 5%[14-17]. Less-common inflammatory causes of colovesical fistulae include appendicitis[18], Meckel's diverticulum[19], genitourinary coccidioidomycosis, pelvic actinomycosis, tuberculosis, and syphilis.
Malignancy accounts for approximately 20% of cases and is the second most common cause of EVF[2-9] with colorectal cancer being the commonest associated tumour although only 0.5% of carcinomas of the colon lead to fistula formation. Fistula secondary to primary bladder carcinoma is extremely rare. There are few cases of urological enterovesical fistulas described in the literature, most as case reports. Occasionally, carcinomas of the cervix, prostate and ovary are the cause, and case reports involving small-bowel non-Hodgkin's lymphoma[20] have been reported.
Iatrogenic fistulae are usually induced by surgical procedures, including augmentation cystoplasty[21], prostatectomy, rectal resections for benign or malignant lesions and laparoscopic inguinal hernia repair[3] which are well-documented causes of rectovesical and rectourethral fistulae. Another iatrogenic cause is colorectal stenting for colonic obstruction[22]. EVF is also a rare but severe complication of pelvic radiation and it can occur years after radiation therapy in the absence of tumour recurrence[23]. Abdominal trauma can result in fistula formation, most commonly penetrating trauma involving the rectum and bladder, such as shotgun injury[24]. Other rare traumatic causes include foreign bodies in the pelvic organs (eg, Foley catheters in the bladder, fish or chicken bones in the bowel) and peritoneum (e.g., lost gallstones during laparoscopic cholecystectomy[25]).

Clinical features

Although the underlying pathology is usually of intestinal origin, the majority of patients are referred because of urological symptoms. Urologic symptoms are predominant because the high compliance of the bladder and the low intravesical pressure favour flow from the bowel to the bladder. Pneumaturia and fecaluria are therefore more common (50% to 90%) than flow of urine into the rectum (15%)[2-9,26]. Over 75% of affected patients describe pathognomonic features of pneumaturia, faecaluria and recurrent urinary tract infections due to Escherichia coli, coliform, mixed growth or enterococci[2-9]. Pneumaturia is more likely to occur in patients with diverticulitis or Crohn's disease than in those with cancer; it occurs in approximately 60% of patients but is a non-specific symptom and other causes should be excluded. These include recent bladder instrumentation, emphysematous cystitis[27], and rare urinary tract infections caused by gas-forming organisms such as strains of E. coli in chronic pyelonephritis, pseudomonas species and fermentation by yeast in diabetic urine[3]. Fecaluria is a pathognomonic sign of EVF and occurs in approximately 40% of cases. Urinary tract infection is observed in 70–80% of cases[2-9]. Other less specific symptoms, such as dysuria, urinary frequency, hematuria, alteration of bowel habit[7], hematochezia, urinary flow via the rectum[2], diarrhoea[3], abdominal pain[4], orchitis[6] or a combination of these, may be the initial presentation, resulting in delayed diagnosis. Physical signs include abnormal urinalysis, malodorous urine and debris in the urine. Fever is less common, and a fistula manifesting as sepsis is uncommon, although it can do in patients with urinary outlet obstruction. There have been a few case reports of life-threatening metabolic acidosis as a complication attributable to EVF[28-30].

Diagnosis

Diagnostic investigations aim to confirm the fistula, exclude any stricture of the bowel, and assess, if possible, the underlying pathology and the anatomic region of the colon involved to guide subsequent surgery. However, it is more important to establish whether the aetiology is benign or malignant than trying to delineate the exact site of the fistula[7].
Numerous methods have been used to confirm the presence of a fistula, but the reliability of these is variable. This variability may also be the result of the particular limitations of each of these diagnostic tools. At present debate exists about the choice of the initial investigation[3].

1. Laboratory Studies
Blood investigations are seldom helpful for diagnosis, because they are usually within the normal range[4]. Urinalysis and urine culture from a mid-stream sample give no specific clue but are positive in over 85% of cases. Urinalysis usually shows a full field of leucocytes and reveals the presence of bowel organisms (coliform and anaerobes)[7] and debris. Urine culture usually shows mixed fecal flora, the predominant organism being E coli. Although cytoscopic examination of urine for detection of vegetable matter is rarely mentioned in the literature, the addition of centrifugation of a urine sample can be positive for faecal debris/vegetable matter and increases the yield of positive results[3]. Urine cytology can also reveal smooth muscle fibres derived from the gastrointestinal track[31]. Various colouring agents e.g. charcoal have been assessed, which if seen in the urine after instillation into the rectum would be considered diagnostic. Methylene blue with or without hydrogen peroxide instilled rectally has also been used, and the appearance of "blue-urine" is considered diagnostic[7]. However, this test is inaccurate since methylene blue is absorbed from the rectal mucosa and excreted by the kidney. More recently the use of indocyanine green has been reported to be highly specific. Sou et al reported a 92% ability to diagnose EVF or enterourethral fistula by the oral or rectal administrated indocyanine green solution in 12 patients with EVF complicating Crohn's disease[32].
Colouring agents can also been administered orally. A positive oral charcoal test is defined as the presence of charcoaluria within 24 hours, characterised by characteristic blackened urine. The charcoal test is up to 100% sensitive for the presence of a fistula, although it provides no information on its location or nature. The advantages of activated charcoal are that it is inexpensive