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ANAL FISSURE Definition

ANAL FISSURE Definition

An anal fissure (synonym: fissure- in - ano) is a longitudinal ulcer in the anoderm of the distal anal canal (Figure 80.17), which extends from the anal verge proximally towards, but not beyond, the dentate line.

ANAL INTRAEPITHELIAL NEOPLASIA

ANAL INTRAEPITHELIAL NEOPLASIA

AIN is a multifocal virally induced dysplasia of the perianal or intra-anal epidermis associated with HPV . Subtypes 6 and 11 are most often associated with warts and early AIN, whereas subtypes 16 and 18 account for more than 75% of anal cancers. The prevalence is <1% of the population with a rising incidence, especially in those areas where ano-receptive inter course and HIV are prevalent. At-risk groups include patients with HIV as well as immunocompromised patients, women with a history of other genital intraepithelial neoplasia (VIN and CIN) and pa tients with extensive anogenital condylomata. Patients may be asymptomatic and the diagnosis is often a histological surprise, although increasing numbers in high-risk groups are picked up on anal cytology . It is classified according to the degree of dysplasia on biopsy into AIN /uni00A0 I, AIN /uni00A0 II and AIN /uni00A0 III, according to the lack of keratocyte maturation and extension of the proliferative zone from the lower third (AIN /uni00A0 I) to the full thickness of the epithelium (AIN /uni00A0 III), in the same manner as cervical or vulval dysplasia. The natural history is uncertain but progression from AIN /uni00A0 II to AIN /uni00A0 III to invasive carcinoma has been observed, notably in the immunocompro mised. The term Bowen’s disease is no longer used.

ANATOMY AND PHYSIOLOGY OF THE ANAL CANAL Surgical

ANATOMY AND PHYSIOLOGY OF THE ANAL CANAL Surgical anatomy

The anal canal starts at the level where the rectum passes through the pelvic diaphragm, where the rectal ampulla suddenly narrows, and ends at the anal verge. The muscu lar junction between the rectum and anal canal can be felt with the ï¬nger as a thickened ridge called the anorectal ring (Figure 80.1).

ANORECTAL ABSCESSES Aetiology

ANORECTAL ABSCESSES Aetiology

Acute sepsis in the region of the anus is common, more in men than women, although perianal infections with skin-type organisms (and thus unrelated to fistula) are evenly distributed. The cryptoglandular theory of intersphincteric anal gland infection (Parks) holds that pus, which travels along the path of least resistance, may spread caudally to present as a peri anal abscess, laterally across the external sphincter to form an ischiorectal abscess or, rarely , superiorly above the anorectal junction to form a supralevator intermuscular or pararectal abscess (depending on its relation to the longitudinal muscle) (Figure 80.27), as well as circumferentially in any of the three planes: intersphincteric/intermuscular, ischiorectal or pararec tal supralevator (Figure 80.28). Sepsis unrelated to anal gland infection may occur at other sites, including submucosal abscess (following haemorrhoidal sclerotherapy , which usually resolves spontaneously), mucocutaneous or marginal abscess (infected haematoma), isc hiorectal abscess (foreign body , trauma, deep skin-related infection) and pelvirectal supralevator sepsis orig inating from pelvic disease. Underlying rectal disease, such as neoplasm and particularly Crohn’s disease, may be the cause. Immunosuppressed patients or those with diabetes or acquired immunodeficiency syndrome (AIDS) may present with peri anal or pelvirectal se psis that may run an aggressive course.

Advancement flaps

Advancement flaps

When the sphincter complex is not too indurated and adequate intra-anal access can be obtained, an advancement flap tech nique can be employed; this aims to preserve both anatomy and function. Ideally sepsis and secondary tracks have healed, leaving a direct track that can be cored. The internal opening is then closed with a broad-based, well-vascularised flap of anorectal mucosa and the internal sphincter is sutured without tension to the anoderm below the dentate line. Patrick H Hanley , 1909–1994, surgeon, Ochsner Clinic, New Orleans, LA, USA. Achille Etienne Malecot , 1852–?, urologist, Paris, France, described a self-retaining catheter in 1895. - - - -

Figure 80.37 Complex horseshoe /f_i stula- in-ano in Crohn’s disease with healed ischiorectal sepsis, a loose seton in the residual tract and a draining 12 FG Malecot catheter to the deep postanal space.

Aetiology

Aetiology

The cause of an anal fissure, and particularly the reason why the posterior midline is so frequently a ff ected, is not completely understood. The location in the posterior midline may relate to the shearing forces acting at that site at defecation, combined with a less elastic anoderm endowed with an increased density of longitudinal muscle extensions in that region of the anal circumference. Anterior anal fissure is more common in women and may arise following vaginal delivery . A ff ected tonia, which, in turn, enhances the traumatic e ff ect of the hard stool and perpetuates relative tissue ischaemia with a decrease in blood supply to the anal mucosa. After the initial tear, a vicious cycle of non-healing and repeated trauma leads to the dev elopment of chronic deep fissures. Local pain increases sphincter hypertonia, which worsens hard stool and local tissue ischaemia.

Anal advancement flap

Anal advancement flap

An anal advancement flap to cover the anal fissure should be considered in those with an increased risk of altered conti nence following lateral internal sphincterotomy , especially in postpartum women and those with normal or low resting anal pressures. After fissurectomy an inverted house-shaped flap of perianal skin is carefully mobilised on its blood supply Summary box 80.4 Treatment of an anal fissure /uni25CF /uni25CF sutured with interrupted absorbable sutures (Figure 80.19). The patient is maintained on stool softeners and bulking agents postoperatively . Minor breakdown of one anastomotic edge does not herald ultimate failure.

Conservative initially, consisting of stool-bulking agents and softeners, and chemical agents in the form of ointments that are designed to relax the anal sphincter and improve blood /f_l ow Surgery if above fails, consisting of lateral internal sphincterotomy or anal advancement /f_l ap

Anal canal anatomy

Anal canal anatomy

The anus is 3–4 /uni00A0 cm long in adults, being longer in the adult male than in the female. Posterior is the anococcygeal ligament, which separates it from the tip of the coccyx, while anteriorly it is separated by the perineal body from the membranous urethra and penile bulb or the lower vagina. Laterally are the ischiorectal fossae. The anal canal is lined by mucosa and the sphincter muscles constitute the muscular wall. The anorectal ring is formed by fusion of the puborectalis muscle and the deep external anal sphincter. It can be clearly felt on a digital rectal examination, particularly posteriorly and laterally . The puborectalis muscle The puborectalis muscle maintains the angle between the anal canal and rectum (the anorectal angle) and is an important component in the continence mechanism (Figure 80.2 muscle derives its nerve supply from the sacral somatic nerves. The position and length of the anal canal, as well as the angle of the anorectal junction, depend to a major extent on the integrity and strength of the puborectalis muscle sling. The external anal sphincter The external sphincter forms the bulk of the anal sphincter complex and, although traditionally it has been subdivided -). The

Anal disease is common and treatment is often • conservative Aggressive or inappropriate surgery may render the • patient disabled 15 1 14 2 13 3 12 11 4 10 5 7 8 9 6 1 Levator ani muscle (iliococcygeal muscle) 2 Levator ani muscle (puborectal muscle) 3–5 External anal sphincter (deep, super /f_i cial, subcutaneous) 6 Inferior haemorrhoidal plexus 7 Perianal skin 8 Anoderm 9 Anal columns and crypts 10 Conjoined longitudinal muscle (corrugator ani muscle) 11 Internal anal sphincter 12 Superior haemorrhoidal plexus 13 Anorectal junction 14 Circular rectal muscle layer 15 Longitudinal rectal muscle Figure 80.1 Anatomy of the anal canal. (Adapted from Anatomy of the colon, rectum, anus, and pelvic /f_l oor. In Herold A, Lehur PA, Matzel KE, O'Connell PR (eds). Coloproctology . Heidelberg: Springer-Verlag, 2008.)

into deep, superficial and subcutaneous portions, it is a single muscle (Goligher), which is variably divided by lateral exten sions from the longitudinal muscle layer. Some of the fibres are attached to the coccyx posteriorly , whereas anteriorly they fuse with the perineal muscles. Being a somatic voluntary muscle, the external sphincter is r ed in colour. It is innervated by the pudendal nerve. The internal sphincter The internal sphincter is the thickened (2–5 /uni00A0 mm) distal continuation of the circular muscle layer of the rectum. This involuntary muscle commences where the rectum passes through the pelvic diaphragm and ends above the anal orifice, its lower border palpable at the intersphincteric groove, below which lie the most medial fibres of the subcutaneous external sphincter, and separated from it by the anal intermuscular septum. When exposed during life, it is pearly-white in colour and its circumferentially placed fibres can be seen clearly . Although innervated by the autonomic nervous system, it receives intrinsic non-adrenergic and non-cholinergic fibres, stimulation of which causes release of the neurotransmitter nitric oxide, which induces internal sphincter relaxation. The longitudinal muscle The longitudinal muscle is a direct continuation of the smooth muscle of the outer muscle coat of the rectum, augmented in its upper

part by striated muscle fibres originating from the medial components of the pelvic floor. The muscle passes caudally between the external and internal sphincters before splitting into multiple terminal septa that surround the muscle bundles of the subcutaneous portion of the external sphincter, to insert into the skin of the lowermost part of the anal canal and adjacent perianal skin. The most medial of these septa, passing around the inferior border of the internal sphincter, have been termed the ‘anal intermuscular septum’. Distally John Cedric Goligher , 1912–1998, Professor of Surgery , University of Leeds, Leeds, UK. Giovani Battista Morgagni , 1682–1771, Professor of Anatomy , Padua, Italy , regarded as the founder of morbid anatomy . Thilo Wedel , contemporary , anatomist, University of Kiel, Germany . sphincter to reach the submucosal space and laterally across the external sphincter and ischiorectal space to reach the fascia of the pelvic side walls. As well as providing support for the anal canal the se pta created provide potential pathways for the spread of infection. During defecation, contraction of the longitudinal muscle widens the anal lumen, flattens the anal cushions, shortens the anal canal and everts the anal margin; subsequent relaxation allows the anal cushions to distend and thus contribute to an airtight seal. The intersphincteric plane Between the external sphincter muscle laterally and the longitu - dinal muscle medially exists a potential space, the intersphinc - teric plane. This is important as it contains intersphincteric anal glands (see The epithelium and subepithelial structures) and is also a route for the spread of infection, which occurs along the extensions from the longitudinal muscle layer . This plane can be surgically explored to gain access to sphincter muscles. -

Figure 80.2 The puborectalis muscle. Note how it maintains the rectoanal angle.

Anal sphincter surgery

Anal sphincter surgery

In situations where conservative treatment has failed, and where a discrete disruption of the sphincters exists, the ends of the divided muscle are found and reunited by an overlap repair (Parks) (Figure 80.12). Short-term results are good, with reports of 75–80% improvement in symptoms at first follow-up. This reduces with time to 50% or less 5–10 years after surgery . Pelvic floor repairs (postanal, preanal or total) are of historical interest only . Sphincter reconstruction (non-stimulated or stimulated) with muscle transposition has been devised to replace the anal sphincter when local repair has failed. ‘Gluteoplasty’ or ‘graciloplasty’, especially stimulated muscle transposition, has been performed; however, initial positive results were not maintained in the medium to long term. Artificial sphincters - have been implanted to replace or reinforce native sphincters but devices are no longer commercially available.

(b) Figure 80.12 Direct sphincter repair in which (a) the sphincter defect is excised and (b) the remaining muscle is overlapped. (Redrawn with permission from Mann CV, Glass RE. Surgical treatment of anal incontinence . New York: Springer, 1991.)

Biological agents

Biological agents

The functional consequences of fistulotomy have led to a search for agents that seal the fistula track and allow ingrowth of healthy tissue to replace it. Intuitively , success must depend on the biomaterial itself and the environment into which it is - placed. Many agents have been tried with moderate success. These include fibrin glue, cross-linked porcine dermal collagen and more recently mesenchymal stem cells. Antibiotics, partic - in ularly metronidazole and ciprofloxacin, are of value in treating fistula-associated sepsis and many have immune-modulating e ff ects of value in Crohn’s disease. Patients must be warned - of potential side e ff ects of prolonged therapy , including peripheral neuropathy (metronidazole) and tendinopathy (ciprofloxacin). Biological therapies, including the anti-tumour necrosis factor drug vedolizumab and ciclosporin, are of value as part of multimodality treatment of perianal Crohn’s disease (Chapter 75).

CONDYLOMATA ACUMINATA (ANAL WARTS)

CONDYLOMATA ACUMINATA (ANAL WARTS)

There is increasing evidence that sexually transmitted infection with human papillomavirus (HPV) forms the aetiological basis of anal and perianal warts, anal intraepithelial neoplasia (AIN) and SCC of the anus. In areas of the world where sexual promiscuity (especially anal intercourse) is more common, and in immunocompromised individuals (HIV-infected individuals Abraham Buschke , 1868–1943, Chief of Dermatology , Rudolf Virchow Hospital, Berlin, Germany . Ludwig W Löwenstein , 1895–1959, pathologist, Berlin, Germany , later New Y ork Post-Graduate Medical School, NY , USA, described this condition in 1925. and transplant recipients), there have been dramatic increases in the incidence of these conditions over the last 30 years, most - importantly of AIN and anal cancers. Similar virally induced changes have been noted in the genital tracts of women (vulval intraepithelial neoplasia [VIN], cervical intraepithelial neopla - sia [CIN] and cancer s). It is essential to examine all areas of the genitalia and perineum in an a ff ected person as there is often a field change with the virus a ff ecting any squamous epithelium in that area. There are over 170 subtypes of HPV , but certain subtypes (16, 18, 31, 33) are associated with a g reater risk of - progression to dysplasia and malignancy . SCC is associated with HPV (especially subtypes 16, 18, 31 or 33). Associated warts on the penis and the female genital tract are common.

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CONGENITAL ABNORMALITIES

CONGENITAL ABNORMALITIES

Early in embryonic life there is a common chamber – the cloaca – into which the hind gut and the allantois open. This endoderm-lined chamber is separated from the surface ecto derm of the embryo by the cloacal membrane. The cloaca becomes divided into two parts – dorsal (rectum) and ventral (urogenital sinus) – by the downgrowth of a septum. The dorsal part of the cloacal membrane, kno wn as the anal membrane, is thus composed of an outer layer of ectoderm and an inner layer of endoderm. Resorption of this anal membrane by the eighth week of embryonic life creates the anal canal.

Classification

Classification

The most widely used classification of anal fistulae (Parks') is based on anal gland sepsis in the intersphincteric space (the internal opening is at the dentate line); this results in a primary track whose relation to the external sphincter defines the type of fistula, which influences management (Figure 80.29). The vast majority of fistulae are intersphincteric or trans-sphincteric. The American Gastroenterology Associ - ation classification (Table 80.2), which condenses the Par ks' classification into simple and complex fistula, is helpful in the decision to operate on clinical findings, investigate further or refer for specialist opinion. - /uni25CF /uni25CF /uni25CF /uni25CF - /uni25CF /uni25CF /uni25CF Intersphincteric fistulae (45%) do not cross the external sphincter (bar, for the purist, the most medial subcutaneous fibres running below the distal border of the internal sphinc - ter); most commonly they run directly from the internal to the external openings across the distal internal sphincter but may extend proximally in the intersphincteric plane to end blindly

TABLE 80.2 American Gastroenterology Association classi /f_i cation of anal /f_i stula. Simple /f_i stula Low (super /f_i cial or low inter- or low trans-sphincteric tract) Single external opening Complex /f_i stula High (high inter- or trans-sphincteric tract) Extra- or suprasphincteric tract Presence of abscess or collection Ano-vaginal /f_i stula Anal stricture

distal rectum at a second internal opening. Trans-sphincteric fistulae (40%) have a primary track that crosses both internal and external sphincters (the latter at a variable level) and that then passes through the ischiorectal fossa to reac h the skin of the buttock. The primary track may have secondary tracks arising from it, which often reach the roof of the ischiorectal fossa; they may rarely pass through the levator muscle to reach the pelvis. Circumferential (horseshoe) spread of sepsis may occur in the intersphincteric and pararec tal planes, as well as in the ischiorectal plane. Suprasphincteric fistulae (10%) run up to a level above the puborectalis and then curl downwards through the levators and ischioanal fossa to reach the skin. They are often caused by excessiv e probing of an abscess cavity or fistula tract during examination under anaesthesia. They are di ffi cult to distin guish from high-level trans-sphincteric tracks; however, the management strategies are similar. Extrasphincteric fistulae (5%) run without specific relation to the sphincters and usually result from pelvic disease or trauma.

Clinical assessment

Clinical assessment

A full medical (including obstetric, gastrointestinal, anal surgical and continence) history and proctosigmoidoscopy are necessary to gain information about sphincter strength and to exclude associated conditions. The key points to determine by clinical assessment of the fistula involve the following essential points: /uni25CF the site of the internal opening; /uni25CF the site of the external opening(s); /uni25CF the course of the primary track; /uni25CF the presence of secondary extensions; and /uni25CF the presence of other conditions complicating the fistula. Palpable induration between the external opening and the anal margin suggests a relatively superficial track, whereas supralevator induration suggests a primary track above the levators or high in the r oof of the ischiorectal fossa, or a high secondary extension. Intersphincteric fistulae usually have an external opening close to the anal verge. Goodsall’s rule (Figure 80.30), used to indicate the likely position of the inter nal opening according to the position of the external open ing(s), is helpful; however, the majority of internal openings are midline in both the anterior and posterior planes. The site of the internal opening may be felt as a point of induration or seen as an enlarged papilla. Dilute hydrogen pero xide, instilled via the external opening, can demonstrate the site of the internal opening (Figure 80.31); gentle use of probes (Figure 80.32 and a finger in the anorectum usually delineates primary and secondary tracks and their relations to the sphincters. Any concerns about fistula topography at clinical examination or examination under anaesthesia (more common after previous unsuccessful surgery) should prompt further investigations before surgical intervention. David Henry Goodsall , 1843–1906, surgeon, St Mark’s Hospital, London, UK. - - - -)

Anterior Figure 80.30 Goodsall’s rule. Figure 80.31 Injection of dilute hydrogen peroxide through the exter

nal /f_i stula opening identi /f_i es the position of the internal opening at the dentate line. Figure 80.32 Retrograde probing of an anal canal sometimes reveals the internal ori /f_i ce of the /f_i stula.

Clinical features

Clinical features

Although superficial, acute anal fissures are characterised by severe anal pain during defecation (‘passing glass’ or ‘a knife cutting’), which usually resolves only to recur at the next evac uation. Frequently a trace of fresh blood is noticed on tissue paper after wiping. Chronic fissures are characterised by a hypertrophied anal papilla internally and a sentinel tag exter nally (both consequent on repeated healing and breakdown), between which lies an indurated anal ulcer that exposes fibres of the internal sphincter. Patients may also complain of itching secondary to ir ritation from the sentinel tag, discharge from the ulcer or discharge from an associated intersphincteric fistula, which has arisen through infection penetrating via the fissure base. Although most su ff erers are young adults, the condition can a ff ect any age, from infants to the elderly . A fissure that is not midline or one with atypical features should raise the suspicion of a specific aetiology . The inability to be able to conduct an adequate examination in the clinic should prompt early examination under anaesthesia, with biopsy and culture to exclude Crohn’s disease, tuberculosis, sexually transmitted or human immunodeficiency virus (HIV)-related ulcers (syph ilis, Chlamydia , chancroid, lymphogranuloma venereum, HSV , cytomegalovirus, Kaposi’s sarcoma, B-cell lymphoma) and SCC. Clinical features

Bleeding is the earliest symptom. The nature of the bleeding is characteristically separate from the motion and is seen either on the paper on wiping or as a fresh splash in the pan. The bleeding is rarely su ffi cient to cause anaemia and other causes should be excluded. The bleeding is usually painless, although Pain should alert to the possibility of another diagnosis (e.g. anal fissure). Internal haemorrhoids associated with bleeding fi rst-degree haemorrhoids. Patients may alone are called complain of lumps (‘piles’) that appear at the anal orifice during defecation and that return spontaneously afterwards (second-degree haemorrhoids), that have to be replaced manually (third-degree haemorrhoids) (Figure 80.20) or that lie permanently outside (fourth-degree haemorrhoids). By this stage there is often a significant cutaneous component to the haemorrhoidal prolapse, termed ‘ mixed ’ haemor - rhoids, which may be best considered as external extensions of internal haemorrhoids that arise through repeated congestion and oedema. Summary box 80.5 Haemorrhoids: clinical features /uni25CF /uni25CF /uni25CF /uni25CF = Summary box 80.6 - Four degrees of haemorrhoids - /uni25CF /uni25CF - /uni25CF /uni25CF - Summary box 80.7 Complications of haemorrhoids /uni25CF /uni25CF /uni25CF /uni25CF

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Haemorrhoids (‘piles’) are symptomatic enlargements of anal cushions More common when intra-abdominal pressure is raised, e.g. constipation and pregnancy Classically occur in the 3, 7 and 11 o’clock positions with the patient in the lithotomy position Symptoms: bright-red, painless bleeding, pruritus, mucus discharge, prolapse First degree – bleed only, no prolapse Second degree – prolapse but reduce spontaneously Third degree – prolapse but have to be manually reduced Fourth degree – permanently prolapsed Strangulation and thrombosis Ulceration Gangrene Portal

pyaemia

Clinical features

Increasing di ffi culty in defecation is the leading symptom. The patient finds that increasingly large doses of aperients are required and, if the stools are formed, they are ‘pipe-stem’ in shape. In cases of inflammatory stricture, tenesmus, bleeding and the passage of mucopus are superadded. Sometimes the patient comes under observation only when subacute or acute intestinal obstruction has supervened.

Diagnosis and management

Diagnosis and management

A high index of suspicion and targeted biopsy yields the diag nosis, whereas multiple (mapping) biopsies give an indication of the extent and overall severity of the disease. AIN /uni00A0 III should be regularly monitored clinically and, if necessary , by r Jean Lugol , 1786–1851, French physician, Lugol’s iodine was first made in 1829. o ff er colposcopy of the anus (anoscopy), utilising 5% acetic acid with Lugol’s iodine to assess in vivo the dysplastic areas - of the anus. The a ff ected areas show up white and can be biopsied. Focal disease may be excised and local excision is e ff ective for lesions <30% of the circumference of the anus. More widespread disease can be dealt with surgically by wide local excision and closure of the resultant defect by flap or skin graft, with or without covering colostomy (especially if there is intra-anal disease). However, for a condition with uncertain malignant potential, this approach should be used with caution as it carries with it significant morbidity . Anal mapping uses a 3-mm corneal punch biopsy , and a total of 8–12 biopsies allows for adequate mapping of most disease. An operative map or photograph is helpful. Examination of - the vulva, vagina and cervix is also needed as female patients are at risk of other anogenital intraepithelial neoplasia; it is recommended that those with AIN /uni00A0 III have a yearly cervical smear test. The grade and extent of anal disease determines management. Localised or focal AIN is defined as <30% of the anal circumference, whereas extensive AIN involves more than 30% of the circumference. Lesions involving <30% of the anal circumference can be simply excised with the resulting wound left to granulate or closed as appropriate. AIN /uni00A0 III lesions involving >30% of the anal margin or canal cannot be excised as the risk of severe anal stenosis is significant. The remaining areas are regularly observed at 6-monthly intervals. AIN /uni00A0 I/II and AIN /uni00A0 III have di ff ering natural histories. Topical imiquimod (5%) or oral retinoids have some e ff ect - on the progression of dysplasia and can cause regression by at least two histological grades. Other newer options may include anti-HPV trea tment; vaccination may reduce the incidence in the long term. AIN /uni00A0 I/II has an indolent course except in immunocompe - tent patients, for whom 12-monthly anoscopy is recommended. Patients with AIN /uni00A0 III and multicentric intraepithelial neoplasia should be managed by clinicians with an interest in this disease and require a multidisciplinary approach involving gynaeco - logical specialists. Immuno-incompetent patients (including those with HIV) are considered separately in view of the higher progression rates and poorer results, with higher recurrence - rates after surgery compared with immunocompetent patients. These require extended follow-up with 6-monthly anoscopy .

Differential diagnosis

Differential diagnosis

The only conditions with which an anorectal abscess is likely to be confused are abscesses connected with a pilonidal sinus, Bartholin’s gland or Cowper’s gland. Management of acute anorectal sepsis is primarily surgical, including careful examination under anaesthesia, sigmoid oscopy and proctoscopy , and adequate drainage of the pus. For perianal and ischiorectal sepsis (with an incidence of 60% and 30%, respectively), drainage is through the perineal skin. Traditionally this has been through a cruciate incision over the most fluctuant point, with excision of the skin edges to deroof the abscess; however, although drainage must be ensured, skin preservation is important and wide excision of otherwise healthy tissue should be avoided. A gentle search may be made for an underlying fistula if the surgeon is experienced; if obvi ous, a loose draining seton may be passed. Injudicious probing in the acute stage is, however, potentially dangerous and may lead to a much more di ffi cult situation. Unless by highly e enced hands, immediate fistulotomy should not be performed. Despite lack of evidence, the practice of packing the abscess cavity is commonplace. The management of supraleva tor sepsis is dependent upon its origin. Sepsis originating in pelvic disease necessitates appropriate management of the underlying cause (appen diceal, gynaecological, diverticular, Crohn’s disease , malig nancy), although intrarectal drainage may be appropriate to avoid creation of an extrasphincteric fistula. Summary box 80.11 Anorectal abscess /uni25CF /uni25CF /uni25CF /uni25CF

Presents as a painful, throbbing swelling in the anal region with associated pyrexia Classi /f_i ed according to anatomical site Treatment is drainage of pus and appropriate systemic antibiotics Consider underlying diagnosis: /f_i stula- in-ano , Crohn’s disease, diabetes, immunosuppression

Differential diagnosis

In the early stages, distinction from furunculosis can be di ffi cult. Crohn’s disease, cryptoglandular fistula, pilonidal sinus, tuberculosis, actinomycosis, lymphogranuloma venereum and granuloma inguinale must be considered when later stages present.

Digital examination with the index finger

Digital examination with the index finger

With an adequately lubricated index finger, the soft tissues around the anus are palpated for induration, tenderness and subcutaneous lesions. The index finger is then introduced gently into the anal canal along its posterior aspect. At the apex of the canal, the sling of puborectalis is felt posteriorly; supralevator induration feels bony hard and is more easily appreciated if unilateral. The posterior surface of the prostate gland with its median sulcus can be palpated anteriorly in male patients; in female patients, the uterine cervix can be palpated. The presence of any distal intrarectal, intra-anal or extraluminal mass is recorded. Sphincter length, resting tone and voluntary squeeze are assessed. On withdrawal, the examining finger is inspected for the presence of mucus, blood or pus and to identify stool colour.

(b) (c) Figure 80.3 (a) The left lateral, (b) knee–elbow and (c) lithotomy positions for examination. (Redrawn with permission from Mann CV. Surgical treatment of haemorrhoids . London: Springer, 2002.)

EXAMINATION OF THE ANUS

EXAMINATION OF THE ANUS

Careful clinical examination will be diagnostic in the vast majority of patients complaining of anal symptoms, but it requires a relaxed patient who is informed of what the examination will entail, a private environment, a chaperone (for the security of both parties) and good light. Most commonly , the patient is examined in the left lateral (Sims) position with the buttocks overlying the edge of the examination couch and with the axis of the torso crossing, rather than parallel with, the edge of the couch. Alternatively , in younger patients, the prone jack-knife or knee–elbow positions may be used (Figure 80.3). Some units with access to a gynaecology couch may place the patient supine with legs in stirrups. The examining couch should be of su ffi cient height to allow easy inspection and access for any necessary manoeuvres. Personal protective equipment should be worn.

Endometriosis

Endometriosis

Endometriosis of the rectovaginal septum may present as a stricture. There is usually a history of frequent menstrual periods with severe pain during the first 2 days of the menstrual flow .

External haemorrhoids

External haemorrhoids

A thrombosed external haemorrhoid relates anatomically to the veins of the superficial or external haemorrhoidal plexus and is commonly termed a perianal haematoma. It presents as a sudden onset, olive-shaped, painful blue subcutaneous swell ing at the anal margin and is usually consequent upon straining at stool, coughing or lifting a heavy weight. The thrombosis is usually situated in a lateral region of the anal margin. If the patient presents within the first 48 hours, the clot may be ev acuated under local anaesthesia. Untreated it may resolve, suppurate, fibrose and give rise to a cutaneous tag, burst and the clot extrude (Figure 80.26) or continue bleeding. In the majority of cases, resolution or fibrosis occurs. John T empleton Bowen , 1857–1941, Professor of Dermatology , Harvard University Medical School, Boston, MA, USA, described this intradermal precancer ous skin lesion in 1912. Sir James Paget , 1814–1899, surgeon, St Bartholomew’s Hospital, London, UK, described this disease in 1874. - - - -

Figure 80.26 A thrombosed external haemorrhoid that has sponta

neously ruptured. Most of the underlying blood clot has extruded. There is also a mucosal prolapse, which is separate from the cuta

neous lesion.

FISTULA- IN-ANO Aetiology

FISTULA- IN-ANO Aetiology

A fistula- in - ano , or anal fistula, is a chronic abnormal commu nication extending from the anorectal lumen (the internal opening) to an external opening on the skin of the perineum or buttock (or rarely , in women, to the vagina). T he majority are idiopathic or cryptoglandular and are lined by granulation tissue. Anal fistulae may be found in association with Crohn’s disease, tuberculosis, lymphogranuloma venereum, actinomy cosis, rectal duplication, foreign body and malignancy (which may also very rarely arise within a longstanding fistula).

FURTHER READING

FURTHER READING

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Fissurectomy

Fissurectomy

Surgical excision of a fissure involves excising of the fibrotic edge, curettage of the base and excision of the sentinel tag and/ or anal papilla. Fissurectomy is an alternative to lateral internal sphincterotomy and is used if there are contraindications to lateral internal sphincterotomy . It is frequently combined with an advancement flap anoplasty .

HAEMORRHOIDS

HAEMORRHOIDS

Haemorrhoids are symptomatic enlargements of the internal haemorrhoidal venous plexus (Greek: haima = blood, rhoos flowing; synonym: piles, Latin: pila = a ball). Internal haemor rhoids characteristically lie in the 3, 7 and 11 o’clock positions (with the patient in the lithotomy position). Secondary haem orrhoids may develop between the primary positions. External haemorrhoids relate to venous channels of the inferior haem orrhoidal plexus deep in the skin surrounding the anal verge and are frequently confused with anal skin tags that are not true haemorrhoids. The internal haemorrhoidal plexus constitutes the sub mucosal component of the anal cushions that are important in sealing the anal canal. Man’s upright postur e, the absence of valves in the portal venous system and raised abdominal pressure due to pregnancy or particularly thr ough straining during defecation contribute to venous plexus engorgement and development of varicosities. Shearing forces lead to mucosal trauma (bleeding) and caudal displacement of the anal cushions (prolapse). This in turn leads to impaired venous drainage, progressive venous engorgement, local stasis and transudation of fluid (pruritus). With time, fragmentation of the supporting structures (a normal consequence of ageing but perhaps accelerated in those with haemorrhoids) leads to loss of elasticity of the cushions such that they no longer retract following defecation.

HIDRADENITIS SUPPURATIVA

HIDRADENITIS SUPPURATIVA

HA is a chronic suppurative condition of apocrine gland- bearing skin found in the axillae, submammary regions, nape of the neck, groin, mons pubis, inner thighs and sides of the scrotum, as well as the perineum and buttocks. It is a source of considerable physical and psychological morbidity . There is no confirmatory test or specific characteristic for diagnosis, which makes definition di ffi cult. Acne, pilonidal sinus and chronic scalp folliculitis may coexist.

(d) A curved incision is made over the intersphincteric groove. (b) The /f_i stula tract

Hypertrophied anal papilla

Hypertrophied anal papilla

Anal papillae occur at the dentate line and are remnants of the ectodermal membrane that separated the hindgut from the proctodaeum. As these papillae are present in 60% of patients examined proctologically , they should be regarded as normal structures. Anal papillae can become elongated in the presence of an anal fissure. Occasionally , an elongated anal papilla may be the cause of pruritus. An elongated anal papilla associated with pain and/or bleeding at defecation is sometimes encoun - tered in infancy . Haemorrhage into a hypertrophied anal papilla can cause sudden rectal pain. A prolapsed papilla may become nipped by contraction of the sphincter mechanism after defecation. Occasionally , a red oedematous papilla is encountered, with local pain and a purulent disc harge from the associated crypt. This condition of ‘cryptitis’ may be cured by laying open the mouth of the infected anal gland and excising the papilla. Troublesome papillae may be simply excised.

INCONTINENCE Aetiology

INCONTINENCE Aetiology

Continence is dependent upon the structural and functional integrity of both the neurological pathways and the gastro - - intestinal tract. The risk factors for incontinence are many (Table 80.1). Patients complaining of the involuntary loss of rectal contents require a comprehensive assessment of the nature and severity of symptoms; past history , especially of gastrointestinal disease, neurological conditions, obstetric events and anorectal surgery; and clinical examination including sigmoidoscopy and/or colonoscopy as indicated. Soren Laurberg , contemporary , Professor of Surgery , Aarhus , Denmark. diagnostic, but special investigations are then usually required to clarify the exact cause, including exclusion of an underlying malignancy , and to direct management. Faecal incontinence is a symptom not a diagnosis and an underlying cause should be sought. Faecal loading or impaction is a major contributor to incon - tinence in the elderly . A rectum impacted with faeces can result in ‘overflow incontinence’. This is easily diagnosed on digital examination and rectally administered treatment to clear the bowel, followed by regular c hecking to avoid recurrence. When ‘empty’ on digital examination or when there is no relief from incontinence after evacuation of faeces, the three main mech - anisms (sometimes acting in combination) that contribute to incontinence are: loose stool, reduced rectal volume/compli - ance and anatomical and/or functional injuries to the anal sphincter complex. Sphincteric causes of incontinence may be classified as structural, in which ther e is disruption (or atrophy) of part of the sphincter muscles; neuropathic (previously ter med idio - pathic), in w hich the nerve supply to the sphincters is damaged, usually by chronic straining or complicated vaginal delivery (prolonged second stage); or a combination of the two. The most common causes of sphincteric disruption are obstetric damage, anal surgery (following haemorrhoidectomy , dilata - tion or sphincterotomy for anal fissure, and fistulotomy for anal fistula) and trauma (including anal intercourse, forced or oth - erwise). Incontinence may also arise following major colorectal resection with a colorectal or coloanal anastomosis owing to the reduction or loss of the rectal reservoir and disruption of intramural nerve pathways. Function can be further adversely a ff ected by radiation. This is now known as low anterior resec - tion syndrome (LARS) (Laurberg).

(c) (d) A' A Figure 80.9 Off-midline closure techniques for pilonidal sinus. Kary dakis’s operation (a) :

an off-midline incision is made around the sinus complex, which is excised, and a contralateral /f_l ap is mobilised to allow tension-free off-midline closure (b) . The Limberg /f_l ap (c) sinus complex is excised using a rhomboid incision and a measured /f_l ap is r otated (A) to (A') to achieve tension-free closure (d) . (a) Figure 80.10 (a, b) Bascom’s technique for pilonidal sinus (a) ; lateral incision and curetting cavity permission from O’Connell PR, Madoff RD, Solomon MJ (eds). Press, 2015.)

: the (b) (b) ; excision midline pits. (Reproduced with Operative surgery of the colon, rectum and anus , 6th edn. Boca Raton, FL: CRC

/uni25CF /uni25CF

Congenital/ Anorectal anomalies childhood Spina bi /f_i da Hirschsprung's disease Behavioural Acquired/ Diabetes mellitus adulthood Cerebrovascular accident Parkinson's disease Multiple sclerosis Spinal cord injury Other neurological conditions: Myotonic dystrophy Shy–Drager syndrome Amyloid neuropathy Gastrointestinal infection Irritable bowel syndrome Metabolic bowel disease In /f_l ammatory bowel disease Megacolon/megarectum Anal trauma Abdominal surgery: Small bowel resection Colonic resection Pelvic surgery: Hysterectomy Rectal excision Pelvic malignancy Pelvic radiotherapy Rectal prolapse Rectal evacuatory disorder: Mechanical, e.g. rectocele, intussusception Functional, i.e. pelvic /f_l oor dyssynergia Anal surgery: Haemorrhoidectomy Surgery for /f_i stula Surgery for /f_i ssure Rectal disimpaction Obstetric events General Ageing Psychobehavioural factors Intellectual incapacity Drugs: Primary constipating and laxative agents

Imperforate anus

Imperforate anus

Imperforate anus (strictly , it should be anal ‘agenesis’ or ‘atre sia’) has historically been divided into two main groups – high and low – depending on the level of termination of the rectum in relation to the pelvic floor. Treatment and prognosis are influenced by any associated abnormalities of the sacrum and genitourinary systems (see Chapter 18). Guido Carlo Currarino , 1920–2015, radiologist, Southwestern Medical School and Children’s Medical Center, Dallas, TX, USA.

Injectable biomaterials

Injectable biomaterials

Injectable biomaterials to add bulk to the anal canal and thereby augment faecal continence were first introduced by Shafik, who injected polytetrafluoroethylene paste into the anal submucosa. The ideal agent should be biocompatible, easy to deploy and should not migrate. Many materials have been investigated. ® Recently the SphinKeeper (Ratto) has been shown to restore sphincter function through placement of self-expanding prostheses into the intersphincteric space, adding bulk to the sphincter complex (Figure 80.13). Sacral nerve stimulation (SNS) is a novel tech nique that uses low-voltage electrical stimulation to the S3 or S4 nerve roots to augment continence (Figure 80.14 Ahmed Shafik , 1933–2007, surgeon, Cairo University , Cairo, Egypt. Carlo Ratto , contemporary , surgeon, Gemelli University Hospital, Rome, Italy . Klaus E Matzel , contemporary , surgeon, University of Erlangen, Erlangen, Germany . thought to work primarily by activation of autonomic sensory pathways in patients with pelvic neuropathy , which principally screening occurs after childbirth. The technique consists of a phase of peripheral nerve evaluation, followed by a therapeutic phase of permanent neurostimulator implantation (Matzel) (Figure 80.15). SNS is sustainable with long-term improve - ment in symptoms. Postoperative complication rates are low; however, infection or loss of e ffi cacy may require device explan - tation. Percutaneous posterior tibial nerve stimula - tion (PTNS) is a less expensive neuromodulation technique; - however, results from prospective studies suggest only modest improvement in outcome.). It is

Figure 80.13 Endoanal ultrasonography evaluation of a surgically ® placed expandable sphincter prosthesis ‘SphinKeeper ’ (circle) radially within the intersphincteric space. (Courtesy of Dr Alison Corr, Consultant Radiologist, St Mark’s Hospital, London, UK). 60° 90° Figure 80.14 Diagram showing placement of the electrode through a sacral foramen.

Figure 80.15 Radiograph of sacral nerve stimulation electrode place ment in the line of the S3 root. The implanted nerve stimulator is visible in the gluteal area. (Reproduced with permission from O’Connell PR, Madoff RD, Solomon MJ (eds). Operative surgery of the colon, rectum and anus , 6th edn. Boca Raton, FL: CRC Press, 2015.) Stimulator implanted in the abdominal wall Electrode plate Nerve to gracilis Gracilis muscle Distal gracilis tendon Anal canal wrapped around /f_i xed to contralateral anus ischial tuberosity Figure 80.16 The electrically stimulated gracilis neosphincter or dynamic graciloplasty.

Inspection

Inspection

The buttocks are gently parted to allow inspection of the anus and perineum: the presence of any skin lesions and whether they are confined to the perineum or evident elsewhere on general examination, e.g. psoriasis, lichen planus, or on genital examination, e.g. warts, candidiasis, lichen sclerosus, the vesi - cles of herpes simplex virus (HSV); evidence of anal leakage; whether the anus is closed or patulous; and the position of the anus and perineum at rest and on bearing down (the latter may reveal prolapse of haemorrhoids or ev en the rectum). Pain on parting the buttocks, perhaps together with the presence of a sentinel tag, may indicate the presence of an underlying fissure, but may also prompt the need for endoluminal examination under anaesthesia to exclude more suspicious pathology , for example squamous cell carcinoma (SCC) of the anal canal.

Introduction

Introduction

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Investigations

Investigations

Anorectal physiology studies provide objective assessment of the anorectal function. Manometry is a simple method for measuring internal (resting) and external (squeeze) anal sphincter tone. Endoanal ultrasonography (EAUS) provides a dynamic assessment of the thickness and structural integrity of the external and internal sphincters (Figure 80.11). Dynamic standard or MRI defecography is not routine in patients with incontinence; however, in select cases they can be useful when obstructive or prolapse symptoms are mixed in with inconti nence symptoms. Harald Hirschsprung , 1830–1916, physician, The Queen Louise Hospital for Children, Copenhagen, Denmark, described congenital megacolon in 1887. James Parkinson , 1755–1824, general practitioner, Shoreditch, London, UK. G Milton Shy , 1919–1967, neurologist, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, MD, USA. Glen Drager , 1917–1967, Baylor College of Medicine, Houston, TX, USA. Sir Alan Guyatt Parks , 1920–1982, surgeon, St Mark’s Hospital and The London Hospital, London, UK.

Figure 80.11 Axial view of endoanal ultrasonography through the mid-anal canal of a female patient with faecal incontinence following vaginal delivery. The study demonstrates a defect in the internal (white arrows) and external (red arrows) anal

sphincter /f_i bres in keeping with an obstetric anal sphincter injury (courtesy of Dr Alison Corr, Consul

tant Radiologist, St Mark’s Hospital, London, UK)

Inflammatory bowel disease

Inflammatory bowel disease

Stricture of the anorectum may complicate Crohn’s disease and, in this instance, the stricture is annular. These stenoses are characterised by transmural scarring and inflammation. Occasionally , an anal stricture may occur in ulcerative colitis. Until a biopsy is obtained, a carcinoma should be suspected.

Lateral anal sphincterotomy

Lateral anal sphincterotomy

In this operation, the internal sphincter is divided away from - the fissure itself – usually either in the right or the left lateral positions. The procedure can be carried out using an open or a closed method, under local, regional or general anaesthesia, and with the patient in the lithotomy or prone jack-knife position. The distal internal sphincter is palpated with a bivalved speculum at the intersphincteric groove. In the closed method, a small longitudinal incision is made over this, and the submucosal and intersphincteric planes are carefully developed to allow precise division of the internal sphincter with a knife or scissors to the level of the apex of the fissure (Figure 80.18); the wound is then closed with absorbable sutures. Alternatively , either plane can be entered using a scalpel (no. 11 blade), with the blade advanced parallel to the sphincter and then rotated such that the sharp edge faces the internal sphincter, which can then be divided along its distal third. Pressure should be applied to the wound for a few minutes to prevent haematoma formation. In the open technique, the anoderm overlying the distal internal sphincter is divided longitudinally to expose the sphincter, which is divided, and the wound is closed with absorbable sutures. Although the fissure needs no specific attention, problematic papillae and external tags can be excised. The optimal amount of sphincter to be divided is a matter of debate, and additional factors have to be considered such as patient age, sex, previous vaginal delivery and operations on the anal canal. Early complications of sphincterotomy include haemorrhage, haematoma, bruising, perianal abscess and fistula. Healing rates are in the range of 85%, but there is also a significant risk of altered continence (9% flatus incontinence, 6% soiling, <1% solid stool incontinence).

Figure 80.18 Lateral internal sphincterotomy. A dissecting scissors is used to open the intersphincteric space and divide the internal anal sphincter. (Reproduced with permission from O’Connell PR, Madoff RD, Solomon MJ (eds). Operative surgery of the colon, rectum and anus , 6th edn. Boca Raton, FL: CRC Press, 2015.)

Learning objectives

Learning objectives

To understand: The anatomy and physiology of the anus and anal â€¢ canal with special reference to clinical presentation, investigation and differential diagnosis

Lymphatic drainage

Lymphatic drainage

Lymph from the upper half of the anal canal flows upwards to drain into the mesorectal lymph nodes and from there goes to the para-aortic nodes via the inferior mesenteric chain. Lymph Summary box 80.1 Anatomy and physiology of the anal canal /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF William Hamish Fearon Thomson , contemporary , surgeon, Gloucestershire Royal Hospital, Gloucester, UK. James Marion Sims , 1813–1883, gynaecological surgeon, State Hospital for Women, New Y ork, NY , USA, introduced this position to give access to the anterior vaginal wall during operations for the closure of vesicovaginal fistulae. into the superficial and then into the deep inguinal group of lymph glands.

The internal sphincter is composed of circular, non-striated involuntary muscle supplied by autonomic nerves The external sphincter is composed of striated voluntary muscle supplied by the pudendal nerve Extensions from the longitudinal muscle layer support the sphincter complex The space between sphincters is known as the intersphincteric plane The superior part of the external sphincter fuses with the puborectalis muscle, which is essential for maintaining the anorectal angle, necessary for continence The lower part of the anal canal is lined by sensitive squamous epithelium Blood supply to the anal canal is via superior, middle and inferior rectal vessels Lymphatic drainage of the lower half of the anal canal goes to inguinal lymph nodes

MALIGNANT TUMOURS Malignant lesions of the anus an

MALIGNANT TUMOURS Malignant lesions of the anus and anal canal

Anal malignancy is rare and accounts for less than 2% of all large bowel cancers; however, the incidence is rising, with a direct association with HPV infection, AIN and immuno - - suppression. The crude incidence rate is 0.65 per 100 /uni00A0 000 in the UK. The male-to-female ratio is approximately 1:2. The great majority are SCCs . Those arising below the epeat dentate line are usually keratinising, whereas those above are non- keratinising squamous, variously termed basaloid, cloacogenic or transitional. There is now broad consensus that both are similar in their presentation and response to treatment and should be treated as carcinomas whether keratinising or not. Adenocarcinomas are the next most common and are thought to arise from anal glands. Other tumours include melanoma, lymphoma, sarcoma and tumours of perianal skin. Squamous cell carcinoma Anal SCC usually presents with pain and bleeding, thus it is often initially misdiagnosed as a benign condition, highlighting the need for a level of suspicion and adequate examination. A mass, pruritus or discharge is less common. Advanced tumours may cause faecal incontinence by invasion of the sphincters and, in women, anterior extension may result in anovaginal fistulation. On examination, anal margin tumours look like malignant ulcers, with raised indurated edges (Figure 80.40 There may be associated HPV lesions. Anal canal tumours are palpable as irregular indurated tender ulceration. Sphincter involvement may be evident. Involvement of perirectal and groin lymph nodes may be palpable on examination. Investigation An examination under anaesthetic allows detailed assessment of the tumour size, involvement of regional nodes and adja cent structures and the opportunity to obtain a biopsy for histological examination. Management MRI scanning of the pelvis and CT of the chest, abdomen and pelvis allows locoregional and distant staging. Positron emission tomography (PET)-CT is increasingly used and may help in equivocal inguinal node assessment. Norman D Nigro , 1912–2009, surgeon, Wayne State University , Detroit, MI, USA. resection; however, since the late 1970s chemoradiotherapy (Nigro) has become the primary treatment. The UK Co ordinating Committee on Cancer R esearch (UKCCCR) Anal Cancer Trial (ACT /uni00A0 I) found that chemoradiation with radiotherapy (50.5 /uni00A0 Gy) gave superior local control compared with radiotherapy alone while the ACT /uni00A0 II trial found similar outcomes when chemoradiotherapy using cisplatin/5 - fluorouracil (5-FU) was compared with mitomycin/5-FU. The longer infusion time required to administer cisplatin/5-FU has led to the preferred use of the mitomycin/5-FU combination. Curr ent trials (ACT /uni00A0 III, ACT /uni00A0 IV and ACT /uni00A0 V) are investigating more personalised treatment protocols, including local excision only for small tumours and a combination of excision

along with varying radiotherapy regimes for other tumours. Radical surgical excision by abdominoperineal resection is indicated in those with residual tumour, complications of treatment, incontinence or fistula after tumour resolution and recurrent disease. Despite good results with chemoradio - therapy , 20–25% of patients will ha ve an incomplete tumour response or local disease recurrence. After thorough assess - ment, these patients may require radical abdominoperineal resection as a salv age procedure. Locally extensive disease may require pelvic exenterative procedures that usually entail peri - neal r econstruction using a myocutaneous flap. Enlarged regional inguinal lymph nodes are common and may be secondary to inflammation rather than malignancy . Histological/cytological confirmation is mandatory . Positive nodes are treated by chemoradiotherapy . Radial groin dissec - tion has a high morbidity .

Figure 80.40 Anus squamous cell carcinoma.

Management

Management

Most patients with incontinence can be managed conserva - tively with dietary advice, stool bulking or constipating agents, cleansing enemas, rectal irrigation, nurse-led bowel retraining, including specific biofeedback programmes, or anal plugs, which e xpand within and thus seal the anal canal. Failure of such measures and the severity of symptoms may result in selection for surgery . Management

Exclusion of other causes of rectal bleeding, especially colorec tal malignancy , is the first priority . In the absence of a specific predisposing cause, important measures include improving bowel and defecatory habits , adopting a defecatory position to minimise straining (see Chapter 73) and the addition of stool softeners and bulking agents. Various proprietary creams can be applied at night and before defecation. Suppositories of phlebotonics (plant-based flavonoid extracts) and synthetic James Barron , 1914–1996, surgeon, Henry Ford Hospital, Detroit, MI, USA. ability and increase lymphatic drainage. In patients with first- or second-degree internal haemorrhoids whose symptoms are not improved by con - servativ e measures, injection sclerotherapy with submucosal injection of 5% phenol in arachis oil or almond oil may be used (Figure 80.21). The aim is to cause fibrosis that obliterates the vascular channels and a scar that supports prolapsing anorectal mucosa. It is important to inject about 3–5 /uni00A0 mL not into the of sclerosant into the apex of the pedicle and haemorrhoid itself using a disposable needle and syringe. The procedure is repeated for each haemorrhoid complex and the patient reassessed after 8 weeks; if necessary , the injections are repeated. Pain upon injection means that the needle is in the wrong place and should be withdrawn. Injections that are too superficial are heralded by the rapid bulging of the mucosa, which turns white; this leads to superficial ulceration but rarely serious septic sequelae. However, injections placed too deeply can have serious consequences, including prostatitis and pelvic sepsis. For this reason, haemorrhoidal injection has largely been superseded by rubber band ligation. The Barron’s bander is a commonly available device used to slip tight elastic bands onto the base of the pedicle of each haemorrhoid (Figure 80.22). It is essential that the band is applied above the dentate line as below can cause intense pain. The bands cause ischaemic necrosis of the piles, which slough o ff within 10 days; this may be associated with bleeding, about which the patient must be warned. The resulting fibrosis supports the remaining anal cushions. All three primary haemorrhoids may be treated at one session, and the process may be repeated after several weeks. Other ablative techniques such as cryotherapy and infrared photocoagulation are not commonly used.

NON-MALIGNANT STRICTURES ANAL STENOSIS

NON-MALIGNANT STRICTURES: ANAL STENOSIS

Anal stenosis is a rare but serious complication of anorectal surgery . Removal of excess anoderm and mucosa without adequate skin bridges during haemorrhoidectomy can lead to scarring and stricturing. Stenosis can also occur after stapled haemorrhoidopexy and coloanal anastomoses. Other causes include trauma, postradiation fibrosis, tuberculosis and fibrosing skin conditions, e.g. scleroderma. Lymphogranuloma inguinale may cause an inflammatory stricture of the rectum.

Operations to augment the anal sphincters

Operations to augment the anal sphincters

If the degree of sphincter disruption or weakness is such that restoration of function cannot be achieved by direct means, the sphincter can be augmented by using muscle transposed from nearby (gluteus maximus or gracilis) or by using an artificial sphincter. Transposition of the gracilis muscle around the anal canal is followed by electrical stimulation, with conversion from a fast-twitch to a less fatigable slow-twitch muscle by an Sir Norman S Williams , contemporary , Emeritus Professor of Surgery , The Royal London Hospital, London, UK. implanted pacemaker (Williams) (Figure 80.16). Because of its magnitude this technique is performed only in highly selected and motivated patients, most of whom have had more conven - tional treatment that has failed to cure their incontinence. Despite all currently available treatments presented and discussed above, each patient requires individualised manage - ment. The evidence unfortuna tely is not robust, and decision making relies on expert opinion. The surgeon is only a small part of the multidisciplinary team of specialists necessary to manage these patients. An end-stoma ma y be appropriate for patients with severe end-stage incontinence in whom all available treatments have failed. While a stoma is associated with significant psychosocial issues and stoma-related compli - cations, it can allow patients to resume normal activities and improve their quality of life.

Figure 80.17 The appearance of an anal /f_i ssure. If the buttocks are gently parted, the presence of an anal /f_i ssure can usually be detected as an ulcer of variable depth with the skin tag and an

anal papilla.

Operations

Operations

Indications The indications for haemorrhoidectomy include: /uni25CF third- and fourth-degree haemorrhoids; /uni25CF second-degree haemorrhoids that have not been cured by non-operative treatments; /uni25CF ‘mixed’ haemorrhoids when the external haemorrhoid is well defined; /uni25CF bleeding causing anaemia. If there is any doubt about the diagnosis of haemorrhoids, examination under anaesthesia and/or endoscopic visuali - sation are necessary . The indications are more relative than absolute, as surgery aims simply to impr ove symptoms and is not without risk of complication. - Technique It is usual for the patient to have been taking stool softeners in the days before surgery and a preoperative enema to empty the rectum. The procedure is usually performed under general or regional anaesthesia with the patient in the lithotomy or prone jack-knife position. Haemorrhoidectomy can be performed using an open or a closed technique. The open technique is

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most commonly used in the UK and is known as the Milligan– Morgan operation – named after the surgeons who described it. The closed technique (Ferguson) is the popular technique in the USA. Both involve ligation and excision of the haem orrhoid, but in the open technique the anal mucosa and skin are left open to heal by secondary intention, and in the closed technique the wound is sutured. Edward Thomas Campbell Milligan , 1886–1972, surgeon, St Mark’s Hospital, London, UK. Sir Cli ff ord Naughton Morgan , 1901–1986, surgeon, St Mark’s and St Bartholomew’s Hospitals, London, UK. James A Ferguson , 1915–2005, surgeon, Ferguson Clinic, Grand Rapids, MI, USA. Antonio Longo , contemporary , surgeon, Sicily , Italy . tissues between the haemorrhoids may be injected with dilute adrenaline (1:300 /uni00A0 000 dilution) to reduce bleeding and aid preservation of the skin bridges left following exci - sion. Artery forceps are applied to the skin-covered external components of the haemorrhoids and traction exerted to reveal the internal components, which are also grasped by artery force ps. With scissors or cutting diathermy , a V-shaped cut is made through the skin (Figure 80.23a). Traction by both operator and assistant, combined with careful dissection, will expose the lower border of the internal sphincter. The dissection proceeds up the anal canal, with the sides of the mucosal dissection converging towards the pile apex and with the internal sphincter visible and separate from the dissected pile (Figure 80.23b). A /uni00A0 transfixion ligature of strong Vicryl is applied to the pedicle at this level (Figure 80.23c), the pile is excised well distal to the ligature and, after ensuring haemostasis, the ligature is cut long. Each haemorrhoid is dealt with in this manner, taking care to leave mucocutaneous bridges. If /uni00A0 there are significant secondary haemorrhoids under these bridges they can be excised out by submucosal dissection (Parks). Careful haemostasis is important. A soft absorbable anal dressing is inserted. /uni25CF Closed technique . The haemorrhoid is excised, together with the overlying mucosa, as illustrated in Figure 80.24 . The pedicle is transfixed with a 3/0 polyglactin suture and the mucosal defect is closed with a continuous suture, using the same stitch. The remaining haemorrhoids are excised and ligated in a

similar fashion, ensuring that there are adequate mucosal and skin bridges between each area of excision to avoid a subsequent stenosis. /uni25CF Stapled technique . Stapled haemorrhoidopexy , also known as PPH (procedure for prolapse and haemorrhoids) (Longo), utilises a bespoke circular stapling device to excise - a cylinder of mucosa and submucosa (together with the ves - sels within) above the dentate line while simultaneously sta - pling the mucosal ends together (Figure 80.25). Great care

(b) Figure 80.22 (a) Barron’s banding apparatus. (Reproduced with per mission from O’Connell PR, Madoff RD, Solomon MJ (eds). Operative surgery of the colon, rectum and anus , 6th edn. Boca Raton, FL: CRC Press, 2015.) (b) The appearance of a typical ‘banded’ haemorrhoid. (a) (b) Figure 80.23 Ligation and excision of haemorrhoids. Open technique: pedicle; (c) trans /f_i xion of the pedicle. (Adapted with permission

from O’Connell PR, Madoff RD, Solomon MJ (eds). colon, rectum and anus , 6th edn. Boca Raton, FL: CRC Press, 2015.)

(c) (a) artery forceps have been applied; (b) dissection of the left lateral Operative surgery of the

must be taken to ensure the staple line is above the dentate line and that the posterior vaginal wall is not accidently included. The procedure is less painful than conventional haemorrhoidectomy and is associated with quicker recov ery . However, recurrence rates are higher than following conventional haemorrhoidectomy and external haemor rhoids may persist. Moreover, stapled haemorrhoidopexy has the potential for serious morbidity (staple line dehis cence, infection, r ectovaginal fistula) and distressing new symptoms such as tenesmus (related to mucosal stimulation by the staples) may requir e reoperation and staple removal. Counselling and shared decision making is important such that the patient can weigh the short-term benefits against higher recurrence rates. /uni25CF Transanal haemorrhoidal ligation (HAL) . Trans- anal Doppler-guided ligation of those vessels feeding the haemorrhoidal masses with or without suture ‘mucopexy’ Christian Johann Doppler , 1803–1853, Professor of Experimental Physics, Vienna, Austria, enunciated the ‘Doppler principle’ in 1842. rhoids. The HubBLe trial, which compared HAL with rubber band ligation, found that the recurrence rate fol - lowing HAL was significantly lower, but HAL was less e. The complication rate and postoperative cost- e ff ectiv pain scores are better after HAL than with conventional surger y . Summary box 80.8 Treatment of haemorrhoids /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

Figure 80.24 Closed technique: the haemorrhoidectomy wound has been closed with a continuous suture. (a) (b) Figure 80.25 Stapled haemorrhoidectomy: (a) the purse-string suture is placed several centimetres above the dentate line; fully opened stapling gun is inserted endoanally so that it is above the purse-string suture, which is then tied around the shaft of the gun. The gun is closed and /f_i red; (c) after /f_i ring, a 3- to 4-cm strip of mucosa and submucosa containing the haemorrhoids is excised and the mucosal edges are simultaneously stapled together. Symptomatic – advice about defecatory habits, stool softeners and bulking agents Injection of sclerosant Rubber banding HAL/stapled haemorrhoidopexy Haemorrhoidectomy

Operative measures

Operative measures

Anal sphincter dilatation has been used to reduce sphincter tone; however, this potentially disrupts the anal sphincters at multiple sites with an associated risk of incontinence such that it is rarely indicated.

Other anal malignancies

Other anal malignancies

Adenocarcinoma within the anal canal is usually an extension of a distal rectal cancer. Rarely , adenocarcinoma may arise from anal glandular epithelium or develop within a longstand - ing (usually complex) anal fistula, hence the need to biopsy non-healing fi stula- in - ano . The treatment is as for low rectal cancers (i.e. abdominoperineal excision of the rectum with or without neoadjuvant chemoradiotherapy , Chapter 79). Malignant melanoma of the anus is very rare and usually pres -). ents as a bluish-black soft mass that may mimic a thrombosed external pile, although it may be amelanotic. The prognosis, irrespective of treatment, is extremely poor. Perianal Paget’ s disease is exceedingly rare. - Summary box 80.13 Anal cancer /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

Uncommon, usually squamous cell Associated with HPV, HIV and immunosuppression Lymphatic spread is to the inguinal lymph nodes Treatment is by chemoradiotherapy in the /f_i rst instance Major ablative surgery is required for salvage

Figure 80.41 Y–V advancement /f_l ap for anal stenosis.

Other techniques

Other techniques

Video-assisted anal fistula treatment (V AAFT) involves the introduction of a rigid fistuloscope into the tract through the external opening. The scope has a channel to accommodate a forceps, brush or diathermy . The scope is passed into accessible tracks to allow lavage, curettage, cautery or the introduction of setons. V AAFT represents a form of advanced track identifica - tion and preparation before a definitive technique is performed. Fistula tract laser closure (FiLaC) uses radial emitting laser to - obliterate the luminal aspect of the fistula to a known depth, throughout its length. An over-the-scope clip (OTSC) involves closing the internal opening using a nitinol clip, disconnecting the external tract. Clip migration and elective removal because of pain are the main complications. The FISCLOSE trial is currently recruiting. Summary box 80.12 Anorectal fistulae /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

(c) Figure 80.38 Ligation of an intersphincteric /f_i stula tract. (a) is identi /f_i ed in the intersphincteric space. (c) The /f_i stula tract is divided between right-angled forceps and trans /f_i xed with 2/0 vicryl sutures. (d) /uni00A0 Wound closure and intact tract ligation is con /f_i rmed with a probe (courtesy of Mr Rory Kennelly, FRCSI, Dublin, Ireland). Are classi /f_i ed according to the relationship to the anal sphincters The majority are simple and may be safely treated by /f_i stulotomy Complex /f_i stulae require detailed anatomical assessment that may include MRI Staged treatment including use of setons should be considered LIFT, /f_l ap advancement, VAAFT, FiLaC and OTSC allow sphincter preservation Biological therapy is used in multimodality treatment of /f_i stulae associated with Crohn’s disease

PHYSIOLOGICAL ASPECTS OF THE ANAL SPHINCTERS AND P

PHYSIOLOGICAL ASPECTS OF THE ANAL SPHINCTERS AND PEL VIC FLOOR

- Anal continence and defecation are highly complex processes that necessitate the structural and functional integrity of the cerebral, autonomic and enteric nervous systems, the gastro - intestinal tract (especially the rectum) and the pelvic floor and anal sphincter complex, any of which may be compromised and lead to disturbances of function of varying severity . The sphincter mechanism provides the ultimate barrier to leakage and its integrity can be assessed fairly simply and objectively in the physiology laboratory . Perineal position and degree of descent on straining (markers of pelvic floor and pudendal nerve function) can be quantified, and functional anal canal length, resting tone (reflective predominantly of internal sphincter activity) and squeeze increment (reflective of external sphincter function) can be measured by a variety of simple manometric techniques (Figure 80.5). Distension of the rectum produces reflex relaxation of the internal sphincter, which allows rectal contents to come into contact with the anal transition zone mucosa. This allows discrimination of solid, liquid and gas contents. The rate of recovery of sphincter tone after relaxation di ff ers between the proximal and distal anal canal (Figure 80.6). This is an important continence mechanism. The structural integrity of the sphincters can be visu alised with endoluminal ultrasonography (Figure 80.7a which usually consists of high-resolution three-dimensional images constructed from standard two-dimensional images. Magnetic resonance imaging (MRI) provides excellent tissue di ff erentiation, although spatial resolution of the anal sphinc - ters using a body coil is reduced (Figure 80.7b). The dynamics of defecation can be assessed radiologically by evacuation proctography , in which radio-opaque pseudo- stool is inserted into the rectum and the patient asked to rest, - ectal contents squeeze and then bear down to evacuate the r), under real-time imaging (Figure 80.8 and 80.1). The procedure may also be performed with oral contrast to outline the small bowel and in females following insertion of a

70 60 O) 2 50 40 30 20 Pressure (cmH 10 0 7 6543 210 Distance from anal verge (cm) Figure 80.5 A typical normal ‘pull-through’ manometric study of the anal canal (3.5 cm long; maximal resting anal canal pressure approx imately 60 cmH O). 2 Rectal balloon Rectal balloon in /f_l ated de /f_l ated 140 120 O) 2 100 80 60 40 Anal pressure (cmH 20 0 1 min Time Figure 80.6 Anal manometry tracing demonstrating a normal rectoanal inhibitory re /f_l ex when the rectal balloon is in /f_l ated with 50 mL of air.

(b) Figure 80.7 (a) Axial view of endoanal ultrasonography through the mid-anal canal of a female patient. Normal intact /f_i bres of the internal (thin arrow) and external (thick arrow) anal sphincter complex. (b) Cor

onal T2-weighted magnetic resonance imaging through the anal canal of a male patient showing the three distinct zones of the low-signal external anal sphincter complex (arrows) (courtesy of Dr Alison Corr, Consultant Radiologist, St Mark’s Hospital, London, UK).

radio-opaque vaginal tampon that will allow anatomical changes during defecation (e.g. rectocele, enterocele) to be identified. Dynamic magnetic resonance (MR) proctography provides more details of other pelvic organs; however, evacu ation in the supine position may be less physiological than the sitting position that can be achieved within an open magnet (Figure 80.8). Interobserver agreement for MR proctography is better than for barium defecograph y; however, imaging must be interpreted in the context of the patient’s symptoms and used to guide rational rather than empirical treatment strate gies.

Figure 80.8 Visualisation of the rectum is achieved with barium-impregnated ‘synthetic stool’ using conventional defecating proctography (a) /uni00A0 or magnetic resonance proctography (b) . A large rectocele is apparent.

PRURITUS ANI

PRURITUS ANI

This is intractable itching around the anus, a common and embarrassing condition. Usually , the skin is reddened and hyperkeratotic and it may become cracked and moist. The causes are numerous but most commonly relate to poor or excessive hygiene, moist discharge secondary to other anorectal conditions, parasitic causes, especially threadworms (Enterobius vermicularis), and dermatological conditions (allergy , psoriasis, lichen planus). Care must be taken not to miss neoplastic changes such as anal SCC, malignant melanoma, Bowen’s disease and extramammary Paget’s disease.

Pathology

Pathology

Occlusion of gland ducts leads to bacterial proliferation, gland rupture and the spread of infection and epithelial components into the surrounding soft tissue and to adjacent glands. Second - ary infection causes further local extension, skin damage and deformity , with multiple communicating subcutaneous sinus tracts. There is some evidence that the disease may be related to a relative andr ogen excess.

Pilonidal sinus

Pilonidal sinus

The term pilonidal sinus describes a condition found in the natal cleft overlying the coccyx, consisting of one or more, usually non-infected, midline openings, which communicate with a fibrous track lined by granulation tissue and containing hair lying loosely within the lumen. Aetiology and pathology Although acquired theories of development are better accepted than the more historical congenital theories, exact mechanisms of development are speculative. Evidence that supports the theory of the origin of pilonidal sinuses as acquired can be summarised as follows: /uni25CF Interdigital pilonidal sinus is an occupational disease of hairdressers. /uni25CF The age of the appearance of a pilonidal sinus is older than expected of a congenital lesion. /uni25CF Hair follicles are rarely present in the walls of the sinus. /uni25CF The pointed hair ends are directed towards the blind end of the sinus. /uni25CF The disease mostly a ff ects hirsute men. /uni25CF Recurrence is common, even though adequate excision of the track is carried out. It is thought that the combination of buttock friction and shearing forces in that area allows shed hair or broken hairs that have collected there to drill thr ough the midline skin, or that infection in relation to a hair follicle allows hair to enter the skin by the suction created by movement of the buttocks, so creating a subcutaneous, chronically infected, midline track. From this primary sinus, secondary tracks may spread laterally , which may emerge at the skin as granulation tissue-lined, dis charging openings. Usually , but not invariably (when diagnosis may be confused with anal fistula or hidradenitis suppurativa [HA]), the sinus runs cephalad. Carcinoma arising in chronic pilonidal disease is exceedingly rare. Clinical features The condition is seen much more frequently in men than in women, usually after puberty and before the fourth decade of life and is characteristically seen in dark-haired individuals rather than those with softer blond hair. Patients complain of intermittent pain, swelling and discharge at the base of the spine but little in the way of constitutional symptoms. There is often a history of repeated abscesses that have burst spon taneously , or that have been incised, usually away from the midline. The primary sinus may have one or many openings, Alexander A Limberg , 1894–1974, plastic surgeon, Leningrad, former Soviet Union. George E Karydakis , surgeon, Athens, Greece. John U Bascom , 1925–2013, surgeon, Eugene, OR, USA. sacrococcygeal joint and the tip of the coccyx. If no primary pits are seen or if the sinus either drains lateral to the sacrum or appears caudal to the primary pits , other diagnoses should be considered. These might include HA, complex anal fistula, osteomyelitis with draining skin sinuses or infective conditions such as tuberculosis or actinomycosis. Conservative treatment The natural history is to regress over time. For those with minimal symptoms, simple cleaning of the tracks and removal of all hair, with regular hair exfoliation of the area and strict hygiene, may be recommended. Local techniques to cauterise the tracks using silver nitrate or laser coagulation may be useful in less complex disease. Treatment of an acute exacerbation (abscess) The abscess should be drained through a small longitudinal incision made over the abscess and o ff the midline, with thorough curettage of granulation tissue and hair. This may result in complete resolution. Surgical treatment of chronic pilonidal disease There are a multitude of surgical procedures advocated to eradicate pilonidal disease, which attests to the lack of overall superiority of one

surgical technique. Time spent o ff work, recurrence rates and surgeon preference influence the choice of technique. Options include laying open of all tracks with or without marsupialisation, excision of all tracks with or without primary closure and excision of all tracks with closure by some other means designed to avoid a midline wound (Limberg procedure, Z-plasty , Karydakis procedure (Figure 80.9). Bascom’s procedure involves an incision lateral to the midline to gain access to the sinus cavity , which is rid of hair and gran - ulation tissue (Figure 80.10), and excision and closure of the midline pits. The lateral wound is left open to heal secondarily . Failure to heal or recurrence is treated by a flap or cleft lift pr ocedure, also described by Bascom. Irrespective of procedure, postoperative wound care is - important and centres around elimination of hair (ingrown, local or other) from the wound. Recurrence rates are less but healing times slow er after open healing compared with pri - mary closure techniques. For primary closure, recurrence rates are lower and healing time faster after o ff -midline compared with midline closure techniques.

Postanal dermoid

Postanal dermoid

The space in front of the lower part of the sacrum and coccyx may be occupied by a soft, cystic swelling – a postanal dermoid - cyst. Hidden in the hollow of the sacrum it is unlikely to be discovered unless a sinus communicating with the exterior is present or it develops as a result of inflammation. Such a cyst usually remains asymptomatic until adult life, when it is prone to becoming infected. Exceptionally , because of its size, it gives rise to di ffi culty in defecation. The cyst is easily palpable on - rectal examination. Differential diagnosis An anterior sacral meningocele must be excluded, particularly in the presence of bony abnormality of the sacrum. This enlarges when the child cries and is frequently associated with paralysis of the lower limbs and incontinence. When a discharging sinus is present, a postanal dermoid will probably - be mistaken for a pilonidal sinus or even an anal fistula. Pressure over the sacrococcygeal region with a finger in the rectum may cause a flow of sebaceous material, and injection of contrast medium followed by radiography reveals a bottle-necked cyst in front of the coccyx. Treatment Treatment involves complete excision of the cyst and, if present, the sinus. In the case of large cysts, it is necessary to remove the coccyx to gain access. The coccyx should also be removed en - bloc in any child with a presacral dermoid because of the risk of sacrococcygeal teratoma. Care must be taken to exclude the Currarino triad, an autosomal dominant hereditary condition characterised by sacral malformation, anorectal malformation (often stenosis) and a presacral mass consisting of a dermoid cyst/teratoma and/or anterior meningocele.

Postoperative care

Postoperative care

In many countries, haemorrhoidectomy is performed on a day-case basis. The patient is instructed to take two warm baths each day and is given a bulk laxative to take twice daily , together with appropriate analgesia. A 5-day course of oral - metronidazole may reduce pain. Dry dressings are applied as necessary , a sterile sanitary towel usually being ideal. The - patient is seen again 3–4 weeks after discharge and a rectal examination is performed. If there is evidence of stenosis, the - patient is encouraged to use an anal dilator.

Postoperative complications

Postoperative complications

Postoperative complications may be early or late. Early complications include: /uni25CF Pain . Opiate analgesia, local anaesthetic agents, GTN and calcium channel blockers, together with botulinum toxin are useful postoperative adjuncts for postoperative pain.

(c) (b) the anvil of the

may need relief by catheterisation. /uni25CF Reactionary haemorrhage . This is much more com mon than secondary haemorrhage. The haemorrhage may be mainly or entirely concealed but will become evident on examining the rectum. If persistent following adequate analgesia, the patient must be taken to the operating the atre and the bleeding point secured by careful diathermy or under-running with a ligature on a needle, care being taken to avoid damage to the internal sphincter. Should a definite bleeding point not be found, the anal canal and rectum should be packed to ensure haemostasis and the area re-examined under anaesthesia on r emoval of the packs. Late postoperative complications include: /uni25CF Secondary haemorrhage . This is uncommon, occur ring about the seventh or eighth day after operation. If severe, the bleeding will need to be controlled under gen eral anaesthesia. /uni25CF Anal stricture . This must be prevented at all costs. A rectal examination at the postoperative review will indicate whether it may be necessary to dilate the anal canal under general anaesthetic. Daily use of a dilator should give a satisfactory result. /uni25CF Anal fissures and submucous abscesses . /uni25CF Incontinence . This occurs if there has been inadvertent damage to the underlying internal sphincter. Summary box 80.9 Complications of haemorrhoidectomy /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

Early Late Pain Secondary haemorrhage Acute retention of urine Anal stricture Reactionary haemorrhage Anal /f_i ssure Incontinence

Presentation

Presentation

A perianal abscess, confined by the terminal extensions of the longitudinal muscle, is usually associated with a short (2–3 day) history of increasingly severe, well-localised pain and a palpable tender lump at the anal margin. Examination reveals an indurated hot, tender perianal swelling. Patients with infection in the larger fatty-filled ischiorectal space, in which Caspar Bartholin (Secundus), 1655–1709, Professor of Medicine, Anatomy and Physics, Copenhagen, Denmark, described these glands in 1677. William Cowper , 1666–1709, surgeon, London, UK, described these glands in 1697. - - - tissue tension is much lower, usually present later, with less well-localised symptoms but more constitutional upset and fever. On examination, the a ff ected buttock is di ff usely swollen with widespread induration and deep tenderness. If sepsis is higher, - deep rectal pain, fever and sometimes disturbed micturition may be the only features, with nothing evident on external examination but tender supralevator induration palpable on digital examination above the anorectal junction.

5 Figure 80.27 Coronal section of pelvis showing the anatomy relevant to anorectal infection and sites of 4 abscess formation. 1, Levator ani muscle; 2, super /f_i cial perineal fascia; 3, super /f_i cial perianal space; 4, ischi

orectal space; 5, supralevator space. 3 C A, Intersphincteric; B, ischiorectal; C, /uni00A0 super /f_i cial perianal; D, supralevator; E, submucosal. Figure 80.28 Axial magnetic resonance imaging scan (short tau inver

sion recovery [STIR] sequence) showing posterior horseshoe spread of sepsis within the intersphincteric space (arrow).

Presentation

Patients usually complain of intermittent purulent discharge (which may be bloody) and discomfort, which increases until temporary relief occurs when the pus discharges. There is often a history of anorectal sepsis. The passage of flatus or faeces through the external opening is suggestive of a rectal rather than an anal internal opening. - - xperi - - -

Intersphincteric Supra-sphincteric Trans-sphincteric low Extra-sphincteric Trans-sphincteric high Figure 80.29 Coronal section of pelvis showing Parks' classi /f_i cation of anal /f_i stula tracts.

Presentation

The condition is not seen before puberty and rarely presents after the fourth decade of life. Overall, it is three times more common in women than in men, although anogenital disease is more common in men. Obesity is a common association. When a ff ecting the perineum, lesions begin as multiple raised boils, with recurrent lesions within the same vicinity leading to sinus tract formation, bridged scarring and multiple points of discharge. Rarely , it may involve the anal canal anoderm, but it does not extend above the dentate line or involve the sphincter muscle.

Figure 80.39 Preoperative image (a) of a giant condyloma acuminatum (Buschke–Löwenstein tumour) with sagittal T2-weighted magnetic res onance imaging (b) demonstrating the large exophytic frond-like mass protruding from the anal verge. Bilateral inferior gluteal artery perforator (I-GAP) /f_l ap reconstruction following perineal resection (c) (courtesy of Mr Anthony Antoniou,

Consultant Colorectal Surgeon, St Mark’s Hospital, London, UK).

Presentation

Many are asymptomatic but pruritus, discharge, bleeding and pain are usual presenting complaints. In the early stages, examination reveals separate pinkish-white warts close to the anal margin and also often on the anoderm within the distal anal canal. Later, the warts enlarge, coalesce and carpet the skin. Rarely , relentless growth results in giant condylomata (Buschke–Löwenstein tumour), which may obliterate the anal orifice (Figure 80.39). The diagnosis is aided by aceto-whitening on application of acetic acid but confirmed by biopsy , which will also indicate the presence or absence of dysplasia. Presentation

Around 10% of AIN lesions are diagnosed by the pathologist after excision of abnormal skin lesions. Low-grade lesions may be raised and similar to anal condylomata; however, high-grade AIN /uni00A0 III lesions may be characterised by hyperkeratosis or by changes in the pigmentation of the epithelium, so this may appear white, red or brown with the pigmentation commonly being irregular. The lesions may be flat or raised, but ulceration is suggestive of invasive disease. It is important that any suspi cious areas are biopsied and examined histologically . Patients’ symptoms include pruritus, pain, bleeding and discharge. AIN is present in 28–35% of excised anal warts. Approximately 10% of AIN /uni00A0 III lesions will progr ess to anal carcinoma at 5 years. Regression of AIN /uni00A0 III rarely occurs, but AIN /uni00A0 I and AIN /uni00A0 II may regress. The association between AIN /uni00A0 III and carcinoma is strengthened by the findings of AIN /uni00A0 III in 80% of anal cancer biopsies.

Principles of fistula surgery

Principles of fistula surgery

The aim of surgery is to keep the patient continent and comfortable and whenever possible to eradicate the fistula. John of Arderne , 1307–1390, was the first English surgeon of note. He practised at Newark-on-Trent, and, from 1370, in London, UK. He described his opera tion for the treatment of fistulae in about 1376. - - - - Fistulotomy , or laying the fistula tract open and allowing it to heal by secondary intention, has been practised for centuries De Arte and was beautifully described by John of Arderne in his -

Figure 80.33 Three-dimensional endoanal ultrasonography images in the axial and sagittal plane showing an ano-vagina /f_i stula (arrows) tracking from 12 o’clock towards the posterior vaginal wall at the lower canal level (courtesy of Dr Alison Corr, Consultant Radiologist, St Mark’s Hospital, London, UK). Figure 80.34 Axial T1-weighted post- contrast (a) and

sagittal T2-weighted (b) magnetic resonance imaging sequences demonstrating an anterior /f_i stula tract (arrow) traversing the perineal body to track under the base of the penis towards the scrotum (courtesy of Dr Alison Corr, Consultant Radiologist, St Mark’s Hospital, London, UK). Figure 80.35 Coronal magnetic resonance imaging scan (short tau inversion recovery [STIR] sequence) demonstrating a primary track in the right ischiorectal space (short arrow) that crosses the sphincters to open

into the anal canal just below the puborectalis. A blind sec

ondary extension (long arrow) passing to the contralateral side in the roof of the left ischiorectal fossa was the cause of /f_i stula persistence.

meaning a bristle) to drain fistula tracts and gradually deliver the tract to the surface has a long history , most famously used by Charles Felix to treat French King Louis XIV . Patients with minimal symptoms may be managed expec tantly . Fistula eradication requires surgery , the extent of which must be balanced with the need to preserve continence. Divi sion of any component of the sphincter mechanism carries some risk to continence. The most important determinant of function after fistulotomy is the amount of muscle left behind rather than tha t divided. In the pr esence of a normal bowel habit, continence is usually maintained as long as a minimum length of external sphincter is retained (2 /uni00A0 cm as a rule but less in some cases). Most fistulae are simple; however, a significant minority are complex (Table 80.2) and warrant specialist referral. The multitude of strategies advocated attests to these di ffi cult situ ations; comparisons between tec hniques are di ffi cult because of the heterogeneity of patient groups, the variability in clas sification, the inapplicability of certain techniques in some situa tions, inadequate reporting of functional outcomes, inad equate follow-up and surgeon preference over-riding entry into pr ospective randomised trials. Track preparation Tract preparation is an increasingly accepted concept in fistula surgery . It assumes that healing is prevented by epithelialisa tion of the track or that a secondary extension or undrained collection will induce early recurrence. Thus, a period of loose seton drainage followed by thorough debridement of the fistula track should improve healing rates. Some tec hniques, such as fistula plug, ‘ligation of the intersphincteric fistula tract’ (LIFT) (Rojanasakul) or ‘fistula tract laser closure’ (FiLaC™), require a particular track anatomy – such as a single straight trans-sphincteric tract – to be successful. In these cases, track preparation will facilitate healing of secondary tracks before definitive surgery . Fistulotomy Fistulotomy involves division of all structures lying between the external and internal openings. It is therefore applied mainly to intersphincteric fistulae and trans-sphincteric fistulae involv ing less than 30% of the external sphincter (but not anterior fistulae in women). After full examination under anaesthesia in the lithotomy or prone jack-knife position, during which the internal opening is identified, a grooved fistula probe is passed from the external to the internal opening (Figur e 80.36 amount of sphincter below and above the probe is noted and, if indicated, the track is laid open over the probe. Granulation tissue is curetted and sent for histological appraisal and the wound edges are trimmed. Secondary tracks, often identified as granulation tissue that persists despite curettage, should be laid open or drained. Marsupialisation reduces wound size and speeds up healing. Primary tracks crossing the external sphincter more deeply have been managed with good outcomes by fistulotomy and immediate reconstitution of the Charles Felix de Tassy , 1635–1703, on 18 November 1686 operated on Louis XIV , inserting a seton. Arun Rojanasakul , contemporary , Professor of Surgery , Chulalongkorn University , Bangkok, Thailand. - - - - - - divided muscle – failure to eradicate all sepsis and subsequent breakdown of the repair can be problematic. Alternatively , a staged fistulotomy may be carried out in which secondary tracks are laid open and

only part of the sphincter enclosed by the primary track is divided, with the remainder encircled by a loose seton. After su ffi cient time for healing of the wound and fibrosis, the seton-enclosed track is divided at a second stage. Fistulectomy This technique involves coring out of the fistula, usually by diathermy cautery; it allows better definition of fistula anatomy than fistulotomy , especially the level at which the track crosses the sphincters and the presence of secondary extensions. If the sphincteric component of the fistula is deemed low enough to allow safe fistulotomy , then this may proceed (at the expense - of longer healing times than conventional fistulotomy). If laying open is not advisable, the sphincteric component can be managed by another method. Setons), the Setons have been used in a variety of ways in fistula surgery and it is important for surgeons to be clear about what they are trying to achieve in a particular situation. Loose setons are tied such that there is no tension upon the encircled tissue; there is no intent to cut the tissue. A variety of materials have been used but the seton should be non-absorbable, non-degenerative and comfortable. Tight or cutting setons are placed with the intention of cutting through the enclosed muscle. Loose setons are most commonly used before ‘advanced’ techniques (fistulectomy , advancement flap, cutting seton)

(a) (b) (c) (d) Figure 80.36 Fistulotomy. A grooved probe is passed from the exter

nal to internal openings (a) and the track laid open over the probe (b) . The track is curetted to remove granulation tissue (c) , the edges of the wound are trimmed and the wound may then be marsupialised (d) . (Redrawn with permission from Nicholls RJ, Dozois RR. Surgery of the colon and rectum . Edinburgh: Churchill Livingstone, 1997.)

of a staged fistulotomy . Such a staged approach is valuable in treating secondary (horseshoe) tracks in the ischiorectal fossa, where the primary track crosses the external sphincter to reach the deep postanal space (Hanley). The internal sphincter is laid open to the level of the internal opening (or higher if there is a cephalad intersphincteric extension) to eradicate the presumed source and the sepsis in the intersphincteric space. A seton is then passed along the residual track around the denuded exter nal sphincter and tied loosely , and the wounds are dressed. The seton is left in place for 3 months and either simply removed or replaced by a cutting seton to complete the fistulotomy . Loose setons are also used for long-term palliation to avoid septic and painful exacerbations b y establishing e ff ec tive drainage, most often in Crohn’s disease and in those with problematic fistulae not wishing to countenance the possibility of incontinence (Figur e 80.37). Cutting setons aim to achieve the high fistula eradica tion rates associated with fistulotomy but without the degree of functional impairment endowed by division of the sphinc ters at a single stage. The enclosed muscle is gradually severed (‘cheese wiring’), such that the divided muscles do not spring apart, and the site of the fistula track is replaced by a thin line of fibr osis. Some recommend prior internal sphincter division; others recommend incorporation of the internal

sphincter within the cutting seton. A variety of seton material has been used, either elastic and ‘self-cutting’ or non-elastic and tight ened at intervals, with the sphincter being divided at varying speeds. The same aim has been achieved by chemical cautery using an Ayurvedic method known in India as ksharasootra, which a specially prepared seton thread burns through the enclosed tissue. This outpatient method has been shown to be equivalent to one-stage fistulotomy in patients with inter sphincteric and distal trans-sphincteric fistulae. Ligation of intersphincteric fistula tract LIFT involves disconnection of the internal opening from the fistula tract at the level of the intersphincteric plane and removal of the residual infected glands without dividing any part of the sphincter complex. The tract is then ligated and divided, the internal part is removed and the external part of the track is curetted and drained (Figure 80.38). Hence it is a sphincter-preserving procedure, thereby maintaining continence. Systematic reviews report healing rates of 75% with little or no impairment of continence.

Proctalgia fugax

Proctalgia fugax

This problem is characterised by attacks of severe pain arising in the rectum, recurring at irregular intervals and apparently unrelated to organic disease. The pain is described as cramp-like, often occurring at night, lasting minutes and disappearing spontaneously . It seems to occur more commonly in patients su ff ering from anxiety or undue stress. The pain may be intense but gradually subsides. It may be caused by cramp in the pubococcygeus muscle. A salbutamol inhaler can be used to treat acute attacks while amitriptyline may reduce the frequency . A more chronic form of the disease has been termed the ‘levator syndrome’ and can be associated with -

Figure 80.19 Mobilised skin /f_l ap prior to suturing intra-anally over the debrided and freshened posterior /f_i ssure base.

severe evacuatory dysfunction (see Chapter 73). Biofeedback techniques have been used to help such patients.

Figure 80.20 ‘Mixed’ haemorrhoids; third-degree internal haemor rhoids become visible when the patient strains. This can be repro duced by withdrawal of a small swab inserted into the anal canal.

Proctoscopy

Proctoscopy

Proctoscopy , performed with the patient in the same position, allows a detailed inspection of the distal rectum and anal canal (Figure 80.4). Minor procedures can also be carried out through this instrument, e.g. treatment of haemorrhoids by injection or banding (see Haemorrhoids) and biopsy . Asking the patient to bear down on slow withdrawal of the procto scope may reveal a descending intussusception.

Rectal examination

Rectal examination

The finger encounters a sharply defined shelf-like interruption of the lumen. If the calibre is large enough to admit the finger, it should be noted whether the stricture is annular or tubular. Sometimes this point can be determined only after dilatation. A biopsy of the stricture must be taken. Often the examination will be painful and needs to be performed under general anaes - thesia when biopsies and gentle, graduated dilatation ma y be undertaken.

Sigmoidoscopy

Sigmoidoscopy

Although sigmoidoscopy is strictly an examination of the rectum, it should always be performed as rectal pathology is frequently associated with an anal lesion (e.g. anal fistula); not infrequently , rectal pathology is found independent of the anal lesion. Summary box 80.2 Examination of the anus /uni25CF /uni25CF

Figure 80.4 Various types of proctoscope. (Redrawn with permission from Mann CV. Surgical treatment of haemorrhoids . London: Springer, 2002.) A rectal examination is essential for any patient with anorectal and/or bowel symptoms – ‘If you don’t put your /f_i nger in, you might put your foot in it’ A proctosigmoidoscopy (rigid or /f_l exible) is essential in any patient with bowel symptoms

Special investigations

Special investigations

A successful outcome after fistula surgery requires careful assessment of the fistula tract, sphincter integrity and func tion and patient expectations (especially in terms of risk to continence). Clinical examination will give some indication of functional anal sphincter length, resting tone and voluntary squeeze; these may be more objectively assessed by manom etry , whereas EAUS giv es useful information about sphincter integrity – the knowledge so gained may well influence surgical strategy . EAUS, especially with hydrogen peroxide instilled through the external opening, is more accurate than clinical examination and is useful to determine whether a fistula is simple or complex (Figure 80.33). MRI is the ‘gold standard’ for fistula imaging. Short tau inversion recovery (STIR) sequencing (a fat-suppression tech nique) to highlight the presence of pus and granulation tissue without the need for contrast medium has been re volutionary (Figure 80.34). The great advantage of MRI is its ability to demonstrate secondary extensions, w hich may be missed at surgery and cause persistence (Figure 80.35). Fistulography and computed tomography (CT) are useful if an extrasphinc teric fistula is suspected.

The epithelium and subepithelial structures

The epithelium and subepithelial structures

The pink columnar epithelium lining the rectum extends through the anorectal ring into the upper anal canal. Passing downwards the columnar mucosa becomes a cuboidal ‘transi - tional zone’ characterised by 8–12 vertical columns separated by anal sinuses that form folds at their lower ends, the anal valves or crypts (of Morgagni). The r ow of alternating columns and crypts gives a serrated appearance known as the dentate line , which is considered to be the embryological junction between the endodermal and ectodermal parts of the anal canal (the proctodaeum) (Figure 80.1). Below the dentate line the anoderm is lined by non-keratinised stratified squamous epithelium that is devoid of glands and hair but richly inner - vated by somatic sensory nerve endings (Wedel). Between the epithelial layer and the internal sphincter lies the submucosa, consisting of vascular, muscular and connec - tive tissue supportive elements. F rom the longitudinal muscle, medial extensions cross the internal anal sphincter and form part of the supporting meshwork of the submucosa, blending with the true submucosal smooth muscle layer supporting the mucosa itself, ter med the ‘mucosal suspensory ligament’. This separates the superior (portal) and inferior (systemic) haemor - rhoidal plexuses. Here the mucosa is more firmly tethered to underlying tissues than above. It is important to appreciate that the meshwork of supporting tissues (muscle fibres and connec - tive tissue) within the subepithelial space is intimately linked to deeper structures within the anal sphincter complex, including the internal sphincter, longitudinal muscle layer and external anal sphincter. With age, the smooth muscle component of this mesh is gradually re placed with fibroelastic connective tissue, which in turn becomes fragmented. The subepithelial space contains venous dilatations supported by the fibroelastic connective tissue and smooth muscle sca ff olding. Debate has centred on the nature of the vascular component of haemorrhoids. Thomson demonstrated that the divisions of the superior rectal artery were not constant and that the anal submucosa also receives a blood supply from the middle and inferior rectal arteries. In addition, there is free communication between tributaries of the superior, middle and inferior rectal veins, as well as direct arteriovenous communications with the submucosal venous dilatations. These communications have been shown both histologically and radiologically , and the oxygen tension of the blood contained within the venous dilatations is more arterial than venous. This explains the bright red colour of haemorrhoidal bleeding rather than the darker venous blood that might be expected.

Treatment of complications

Treatment of complications

Strangulation and thrombosis are relatively uncommon. The patient presents in severe discomfort with often circumferential haemorrhoidal prolapse with impending mucosal necrosis. Distinction must be made from rectal prolapse and external haemorrhoidal thrombosis. Urgent haemorrhoidectomy (see Operations) may expedite symptom resolution, but great care is needed to avoid later anal stenosis. Many surgeons adopt a conservative approach, ensuring adequate pain relief, bed rest, cold saline compresses and laxatives. Resolution usually occurs in 3–4 days. Systemic antibiotics are usually given to reduce the risk of portal pyaemia. Severe haemorrhage is usually associated with a bleeding diathesis or anticoagulation. If such causes are excluded, a local compress containing adrenaline (epinephrine) solution will usually su ffi ce with blood transfusion if necessary . After adequate blood product replacement, examination under anaesthesia, ligation and excision of the piles may be required.

(b) Figure 80.21 (a) Disposable kit for injection of haemorrhoids. (Repro duced with permission from O’Connell PR, Madoff RD, Solomon MJ (eds). Operative surgery of the colon, rectum and anus , 6th edn. Boca Raton, FL: CRC Press, 2015.) (b) Correct injection site at the apex of the haemorrhoidal complex.

Treatment

Treatment

After confirmation of the diagnosis and exclusion of secondary causes of anal ulceration, conservative management should result in the healing of almost all acute and the majority of chronic fissures. Emphasis must be placed on normalisation of bowel habits. The addition of fibre to the diet to bulk up the stool, stool softeners and adequate water intake are simple and helpful measures. Warm baths and topical local anaesthetic agents relieve pain. Patients with normal bowel function and excessive straining at defecation might benefit from anorectal biofeedback to correct it. The mainstay of current conservative management is the topical application of pharmacological agents that relax the internal sphincter. If simple measures fail, treatment can be escalated to ‘chemical sphincterotomy’ using agents that induce smooth muscle (internal sphincter) relaxation. Glyceryl trinitrate (GTN) (0.2% applied two or three times per day to the anal margin) is a nitric oxide donor while diltiazem (2% applied twice daily) is a calcium channel antagonist. Botulinum toxin (10–100 units) injected into the internal sphincter in either divided or a single dose reduces Burrill Bernard Crohn , 1884–1983, gastroenterologist, Mount Sinai Hospital, New Y ork, NY , USA. Moritz Kaposi , 1837–1902, Professor of Dermatology , Vienna, Austria, described pigmented sarcoma of the skin in 1872. neuromuscular junctions. Temporary incontinence occurs in up to 10% of patients. The cure ra te is approximately 50%, although GTN can be associated with headaches, which limits its acceptability to patients. Diltiazem and botulinum toxin have similar e ffi cacy with fewer side e ff ects. Summary box 80.3 Anal fissure /uni25CF /uni25CF - Symptoms: /uni25CF /uni25CF - /uni25CF /uni25CF

Acute or chronic ulcer in the midline of the anal canal Ectopic site suggests a more sinister cause Pain on defecation Bright-red bleeding Mucus discharge Constipation

Treatment

Symptomatic treatment begins with dietary measures to ensure a soft, formed stool. For hygiene, cotton wool or moist tissue should be substituted for toilet paper. Soap is avoided and replaced by water alone, and the area pat-dried rather than rubbed. These measures, combined with wearing cotton underwear and the application of calamine lotion or zinc oxide barrier cream, are su ffi cient in many cases. In patients with dermatitis topical application of 0.5% or 1% hydrocortisone cream is beneficial. - Summary box 80.10 Pruritus ani /uni25CF /uni25CF /uni25CF /uni25CF -

Common Numerous causes, including skin diseases, parasites (threadworm), anal discharge, allergies, diabetes Treat the cause if possible Symptomatic treatment is the mainstay

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Treatment

In the early stages, general measures, including weight reduc tion and antiseptic soaps, may be helpful. Antibiotics may induce remission but often the disease relapses and progresses, at which point surgery is indicated. Inadequa te treatment may lead to prolonged morbidity , but any surgery should be less debilitating than the condition. Surgical intervention ranges from simple incision and drainage of acute sepsis to radical excision of all apocrine gland-bearing skin. Careful laying open of all tracts, possibly as a staged procedure according to anatomical location, is an option that appeals to many patients. Radical excision requires closure by skin graft or rotation flap and, occasionally , a defunctioning colostomy to allow healing. Treatment

Because of the field e ff ect endowed by viral skin infection, long - term resolution can be problematic. Careful serial application of 25% podophyllin to discrete warts on the perianal skin is excision under local, regional or general anaesthesia involves raising and separating the lesions with local infiltration of dilute adrenaline, which allows more accurate scissor or electro cautery excision to maximise the preservation of normal skin. Treatment

Non-operative treatment is recommended for mild stenosis. The use of stool softeners and fibre supplements helps aid the passage of stools. Dilatation Anal dilatation can be performed under general anaesthesia and then by the patient, using an anal dilator. For anal and many rectal strictures, dilatation at regular intervals is all that is required. Anoplasty For severe anal stenosis, an anoplasty is used to replace loss of anal tissue. The stricture is incised and a rotation or advance - ment flap of skin and subcutaneous tissue replaces the defect and enlarges the anal orifice (Figure 80.41). This technique is particularly useful for postoperative strictures. Colostomy Colostomy must be undertaken when a stricture is causing intestinal obstruction and in advanced cases of stricture complicated by fistulae- in - ano . In selected cases, this can be followed by restorative resection of the stricture-bearing area. If this step is anticipated, a loop ileostomy is constructed. Rectal excision and coloanal anastomosis Rectal excision is required when the strictures are at, or just above, the anorectal junction and are associated with a normal anal canal, but irreversible changes necessitate removal of the area. Coloanal anastomosis can restore function but is contra - indicated in Crohn’s disease. Benign anal stricture /uni25CF /uni25CF /uni25CF /uni25CF

May be iatrogenic, e.g. after haemorrhoidectomy Biopsy must be taken to rule out malignancy Can usually be managed by regular dilatation Severe anal stenosis may require an anoplasty

Venous drainage

Venous drainage

The anal veins are distributed in a similar fashion to the arterial supply . The upper half of the anal canal is drained by the superior rectal veins, tributaries of the inferior mesenteric vein and thus the portomesenteric venous system, and the middle rectal veins, which drain into the internal iliac veins. The inferior rectal veins drain the lower half of the anal canal and the subcutaneous perianal plexus of veins; they eventually join the internal iliac vein on each side.

coccygea)

coccygea)

A dimple in the skin beneath the tip of the coccyx, sometimes amounting to a short blind pit, is noticed from time to time in the course of a clinical examination and is of no consequence.