Anal canal anatomy

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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.

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