ANATOMY OF THE ANAL CANAL AND ANAL FISTULA

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BY
SABRY MOHAMED TAHA
M.B.,B.Ch.

under supervision of
PROF. Dr. MOHAMED SAMIR ABU ZAID
PROFESSOR OF SURGERY

AIN-SHAMS UNIVERSITY
FACULTY OF MEDICINE

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Sabry M. Taha

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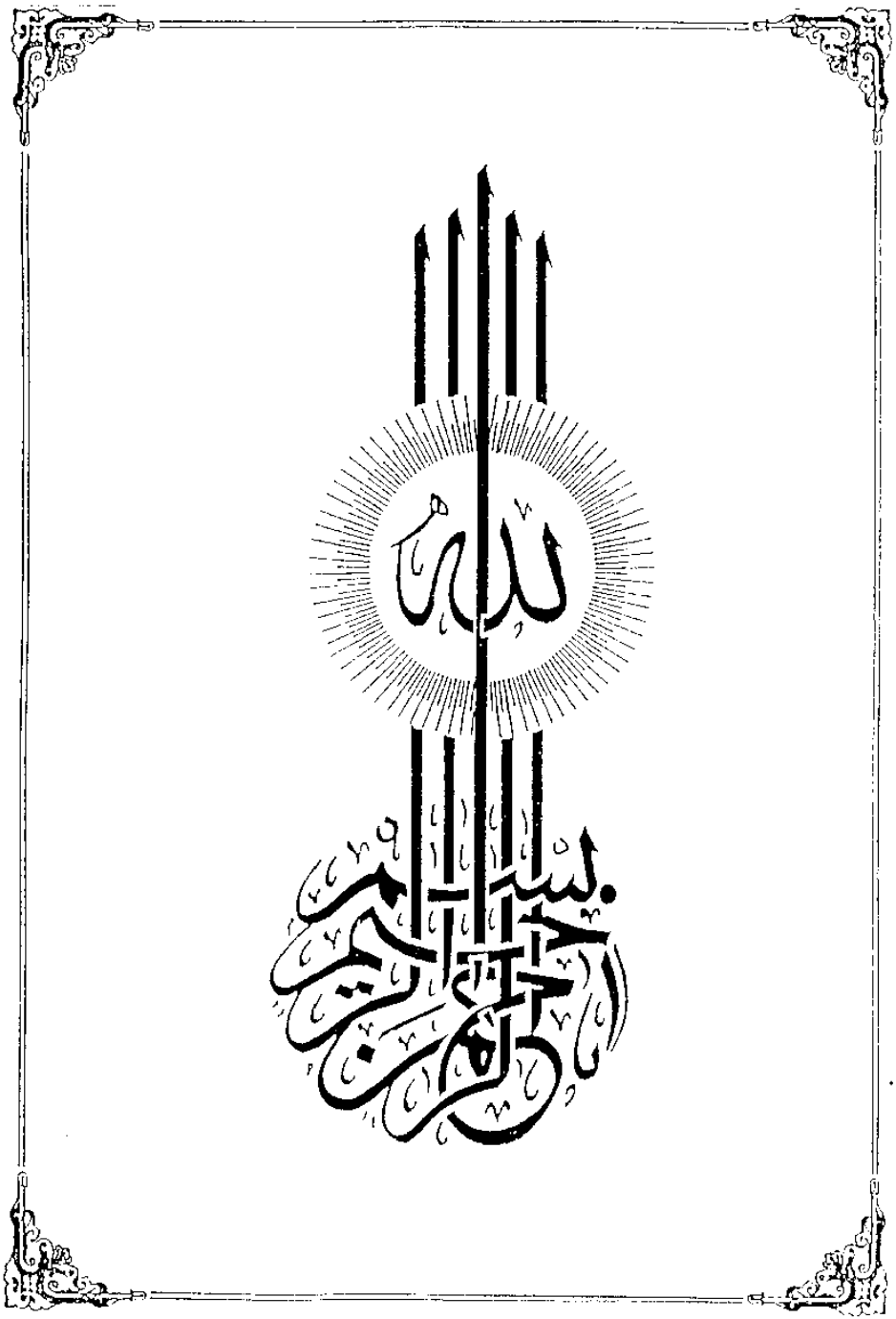

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INTRODUCTION

The aim of this work is to study different courses taken by a fistulous track in relation to the modern concept of the surgical anatomy of the anus.

Carefull assessment of the relationship between the track and the anal musculature was done. The external sphincter was taken as the key stone. This study was done according to the classification of anal fistula which was issued by PARKS (1976).

Evaluation of the classic lay-open operation was done whenever it was possible.

The material of this study was 30 cases of anal fistulae which were collected from 2 hospitals; Mancheit El Bakry hospital in Cairo, and El Galla Military Hospital in Esmaalia. The duration of this study was 18 months.

CHAPTER I

ANATOMY & PHYSIOLOGY

ANATOMY OF THE RECTUM AND ANAL CANAL

As a matter of fact it is impossible to perform an operation without accurate anatomical knowledge, especially in case of fistula-in-ano, where hazardous surgery can lead to disasterous results, so it is wise to study the detailed anatomy of the rectum and anal canal in relation to fistula-in-ano.

Surgical views on anorectal anatomy were put on a sound bases by Milligan and Morgan (1934) when they stressed for the first time on the importance of what is called anorectal ring in relation to maintaining continence, and this was the basis of there classification of anal fistula. Recent studies of anorectal anatomy did not ulter the skeleton of there study but added valuable additions to there work.

Anatomy of the Rectum

The rectum begins at the rectosigmoid junction where it turns sharply downwards to follow the sacral curve. This rectosigmoid junction may be marked by a distinct flexure in case of fairly long loop of the sigmoid, if it

is present. Formerly, it was said that there is a sphincter at the rectosigmoid junction, but it is well known now that such a sphincter is not present.

The rectum proceeds downwards, then downwards and forwards closely applied to the concavity of the sacrum and coccyx for 13-15 cm, it ends in front and below the tip of the coccyx by turning abruptly downwards and backwards and then passes through the levator ani to become the anal canal.

The upper third of the rectum is completely covered with peritoneum except for a thin strip posteriorly where the peritoneum is reflected off as the two leaves of the thick mesorectum, this becomes broader and shorter as the rectum descends down. At the middle third, the peritoneum covers the anterior aspect and the sides of the rectum, and as it progresses it becomes reflected forwards at the bottom of the rectovesical or rectouterine pouch and the back of the seminal vesicles, and the bladder, or the vagina and uterus in the female, leaving the lower third of the rectum without any peritoneal covering. Therefore it is possible to distinguish between intraperitoneal and extraperitoneal parts of the rectum or the rectum haut and rectum bas of the frensh surgeons. The peritoneal reflection is not a fixed landmark but it is of considerable individual variations.

Below the pelvic peritoneum and on either side of the rectum, there is a space filled with fibrofatty tissue. The fibrous elements of which are a part of the pelvic fascia and connects the parietal pelvic fascia on the side wall of the pelvis with the rectum. These are the lateral ligaments of the rectum, they have a roughly triangular shape with the base on the pelvic side wall and apex joining the side of the rectum. They may give support to the rectum and they contain inside them the middle haemorrhaoidal vessels.

The posterior aspect the extraperitoneal rectum is loosely bound down to the front of the sacrum and coccyx by connective tissue, which is easily separated by blunt dissection. When this is done, it is found that there is still a thin layer of fascia covering the fat, vessels and lymph glands on the back of the rectum. This is the so called fascia propria or fascial capsule of the rectum. The sacrum and coccyx are also still covered with a fascia known as fascia of Waldayer (1890). This becomes thinner and less distinct as it descends downwards. Inferiorly it bends forwards and downwards to become attached to the anorectal junction and to the fascia propria of the rectum. The middle sacral vesseles lie between it and the bone.

DENONVILIERS FASCIA is a fascial layer extending from the anterior peritoneal reflection of the extraperitoneal part of the rectum to the superior fascia of the urogenital diaphragm (triangular ligment) below, and laterally becomes continuous with the front of lateral ligaments. This fascia intervenes between the rectum behind and the prostate and seminal vesicles or vagina anteriorly but is more adherent to the rectum. Sometimes this fascia consists of two layers.

Other relations of the rectum :

Behind, outside the fascia of Waldayer the rectum is related to the sacrum and coccyx, the levator ani muscles, the left and sometimes the right occygeus muscle, the middle sacral vesseles and the roots of the sacral plexus on either side.

In front where the rectum is considerably covered with peritoneum, the relations of the rectum are mainly visceral; in the male, the extraperitoneal part is related to the prostate, seminal vesicles, vasa deferentia, ureters and bladder wall from below upwards; the intraperi toneal rectum is in contact with loops of the small intestine and sigmoid colon, and across the rectovesical pouch to the upper parts of the seminal vesicles and the bladder.

In the female, the extraperitoneal rectum lies immediately close to the posterior vaginal wall, the intraperitoneal rectum is related across the pouch of Douglas to the upper part of the vagina and the uterus with coils of small gut, the ovaries, uterine tubes and the sigmoid colon in the pouch itself.

Laterally above the peritoneal reflection are viscera, mainly loops of the small gut, uterine appendages and the segmoid colon. Below, the reflection is separated from the side wall of the pelvis, the ureter, and iliac vesseles by the connective tissue and fascia of the lateral ligament. At still lower level the levator ani becomes a close lateral relation separated by the lower part of the lateral ligaments.

ANATOMY OF THE ANAL CANAL

Anal Canal is a short passage 3 cm long connecting the rectum superiorly to the exterior, and is surrounded by a muscular compartment controlling the passage of its contents. It is collapsed anteroposteriorly by the action of its sphincters.

Relations of the anal Canal :

Posteriorly it is related to the coccyx with certain amounts of fibrous, fatty and muscular tissue in between; while laterally and on both sides there is the ischiorectal fossae with their contained fat and the inferior haemorrhoidal vessels and nerves crossing them to the anal canal. In the male; it is related anteriorly to the central point of the perineum, the bulb of the urethra and the posterior border of the urogenital diaphragm containing the membranous urethra, while in female it is related anteriorly to the perineal body and the lower part of the vaginal wall.

Mucocutaneous lining of the anal canal :

Embryological studies of the anal canal showed that it is formed by the fusion of postallantoic gut with the proctodeum, the surface of fusion being the proctodeal membrane. So, in study of the mucocutaneous lining of

the anal canal we find that it is composed of upper mucosal and lower cutaneous part with the line of anal valves at their junction, it is 2 cm. inner to the anal orifice and nearly at the junction of the middle and lower thirds of the canal, the line of anal valves is refered to as the dentate line or pectinate line in surgical practice. The anal valves represent the remnants of the proctodeal membrane, above each one of them there is a little pocket known as the anal sinus or anal crypt of Morgagni. It is said that infection of this sinus or any trauma to it may cause anorectal abscess with its complications. It was said that anal fissure is due to the tearing of one of the anal valves, this is doubtful nowadays. Above the pectinate line the mucosa of the anal canal is thrown into 8-14 longitudinal folds known as columns of Morgagni, an anal valve connects every 2 columns together. Just above the valves the lining epithelium gradually changes from stratified cuboidal into single columnar epithelium along a distance about 1 cm (Goligher et al. 1955), or so. Above the anal valves the mucosa is deep purple in color and at the anorectal ring it changes into the pink color of the rectal mucosa. The anal canal is lined with modified skin devoid of hair and sebaceous glands and sweat glands. Below the pectinate line, also it is closely adherent to the underlying tissue, the name pecten is given to this area

which is about 1 cm below the anal valves it is thin, smooth, stretched and pale. When traced downwards it thickens till it gradually acquires the histological appearance of normal skin just outside the anal orifice i.e. hair follicles and sweat glands.

Parks (1961) issued an excellent anatomical study of the anal intermuscular glands with an important reference to their role in the pathogenesis of anal fistula. It is well known that 4 to 8 of these glands are present in the normal canal, each of them opens directly to the apex of an anal crypt, occasionally 2 glands may open on the same crypt. The glands ramifying by their ducts into the submucosa. (Parks 1961) found that in 65% of his specimens one or more of the ducts may reach the internal sphincter, while with one half of the specimens ducts reach the intersphincteric plane. It was claimed that some of the gland ducts may reach beyond the external sphincter, but this contradicts the study of Parks as he stated that the glands never reached beyond the intersphincteric plane.

The end result is that the glands never ramify upwards above the level of the anal valves and are always present in the submucosa, internal sphincter or intersphincteric plane, the glands are lined by stratified