

# ATLAS OF HERNIA SURGERY

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# ATLAS OF HERNIA SURGERY

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Authorized English edition of *Hernien*

Atlas of Hernia Surgery

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HERNIA SURGERY

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With the collaboration of Hermann van Ackeren,  
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Dedicated to the surgeon and scientist  
Eduardo Bassini  
on the 100th anniversary of the radical hernia operation  
“Sulla cure radicale dell’ernia inguinale”  
(Arch Soc Ital Chir 4:380, 1887)

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# PREFACE

The spectacular results of microsurgery, transplant surgery, and cancer surgery tend to obscure the difficulties of more mundane surgical problems. These latter include, among others, the most frequent of all surgical procedures, the inguinal hernia repair. The appearance of 120,000 to 150,000 new cases of inguinal hernia each year in West Germany, emphasizes the socioeconomic importance of this benign disease that can be corrected only by surgical means.

Modern hernia repair began with Bassini (1887). His surgical technique brought to an end the era of unsuccessful and dangerous therapeutic manipulations. One hundred years later this great advance seems to have gone into oblivion. As a consequence of an almost medieval neomysticism, in 1983 in West Germany, more trusses were prescribed than there were surgical repairs of inguinal hernia. Apparently there are many patients and physicians who doubt the efficacy of herniorrhaphy.

In view of this, a true and accurate presentation of the indications for and results of herniorrhaphy were clearly indicated. Principal credit must be given to Dr. H. W. Schreiber, President of the 100th meeting of the German Surgical Society, who by selecting the hernia as the main theme of the meeting gave the initial impetus for this work.

A critical assessment must be made on the basis of the new perspectives of pathogenesis, epidemiology, and management. An attempt will also be made to refocus our attention on this disease entity that is often, and unjustly, labeled as trivial. It is hoped that this will convince even the nonsurgeon of the safety and efficacy of this procedure.

The subject is limited to intestinal herniations, i.e., the abdominal hernias. Because of space limitations, not all forms of hernia are discussed. Diaphragmatic, internal, and postoperative hernias are omitted, since these should be discussed in connection with their principal symptoms (e.g., ileus, esophageal reflux).

The disease processes that are included represent 10 to 15 percent of all surgical procedures. It is hoped that this book will contribute to the education of the surgical house officer, clear the path to successful hernia repair, and place hernia management on a rational basis. In the experienced surgeon it may reawaken the fascination that a detailed discussion of hernia repair still holds, even 100 years after Bassini.

Volker Schumpelick  
Aachen, March 1987

*"No disease of the human body belonging to the province of the surgeon requires in its treatment a greater combination of accurate anatomic knowledge with surgical skill, than a hernia in all its varieties."*

*Astley Cooper, in the foreword to Anatomy and Surgical Treatment of Inguinal and Congenital Hernia (1804)*

*"They are frequently sent from one truss maker to another, until after great expenditure of time and money they submit to their fate, complaining loudly about the incompetence of physicians and truss makers."*

*V. Czerny, "On Hernia Patients" (1877)*



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# I

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## BASIC PRINCIPLES



# ANATOMY

# 1

## The Inguinal Region

The oblique passage through the layers of the abdominal wall above the inguinal ligament is known as the inguinal canal (*canalis inguinalis*). It has an internal and an external opening. These “holes” in the abdominal wall are not separate and specific structures but are components of the abdominal wall. The same is true for the femoral canal. It also has no specific structures that would identify it as such. For this reason the architecture of the lower abdominal wall must be studied carefully and visualized clearly.

The *anterior abdominal wall* consists of several layers: muscles, fasciae, aponeuroses, and peritoneum.

## The Fasciae

### **Fascia abdominis superficialis**<sup>1–4,8,11,12</sup>

Every flat and oblique muscle of the anterior abdominal wall has its own fascia that can be separated from the muscle. This is true for the external oblique, the internal oblique, the transverse, and the straight muscles of the abdominal wall. The external oblique muscle thus has a superficial abdominal fascia and a deep fascia. The superficial leaf of the superficial abdominal fascia is the tighter fascia that is located on the aponeurosis and on the muscle. The deep leaf is much more difficult to identify and isolate. On the muscle it is still visible but on the aponeurosis it is fused with the aponeurosis.

The two leaves of the external oblique fascia are still separate at the inguinal ligament and lie on the aponeurosis of the muscle (inguinal ligament) (Fig. 1.1). They fuse at the superficial inguinal ring to form the external spermatic fascia and cover the spermatic cord. Occasionally, aponeurotic fibers can be seen to participate, in which case they are really aberrant intercrural fibers. Below the inguinal ligament the superficial fascia is attached to the fascia lata. The continuation of the superficial fascia, i.e. the fascia lata, separates into two leaves over the femoral vessels that are located in the ileopectineal fossa. The deeper leaf corresponds to the ileopectineal fascia on the lateral side of the femoral artery. The superficial leaf is the arcuate edge of the fossa ovalis through which the saphenous vein emerges (*margo falciformis*, *cornu superius* and *inferius*). Owing to the reduplication of the fascia lata, the superior leaf forms the cranial crus and the lower, arcuate edge of the fossa ovalis. It inserts, together with the deep leaf, on the pectineal fascia and on the pecten of the os pubis, together with the lucunar ligament. This deep component of the fascia lata helps to strengthen the medial wall of the femoral canal (Table 1.1).

Figure 1.1

Anatomy of the lower abdominal wall at the level of the external oblique muscle.  
1, Medial crus; 2, superficial inguinal ring; 3, lateral crus; 4, external oblique muscle.

### Fascia transversalis

Both the superficial and deep leaves are important structural components of the anterior abdominal wall, the inguinal and femoral region. The fascia transversalis covers the entire internal surface of the anterior abdominal wall (Fig. 1.2). In the inguinal region it consists of arches that extend superiorly to the linea arcuata and caudally to the femoral vessels. It is a covering that traverses the inguinal canal and lines the femoral canal. At the openings below the inguinal canal, there are no leading structures, such as the processus vaginalis of the peritoneum in the inguinal canal, above the inguinal ligament. In the vascular and muscular lacunae the fascia transversalis is attached to the iliac vessels and to the fascia of the iliopsoas muscle.

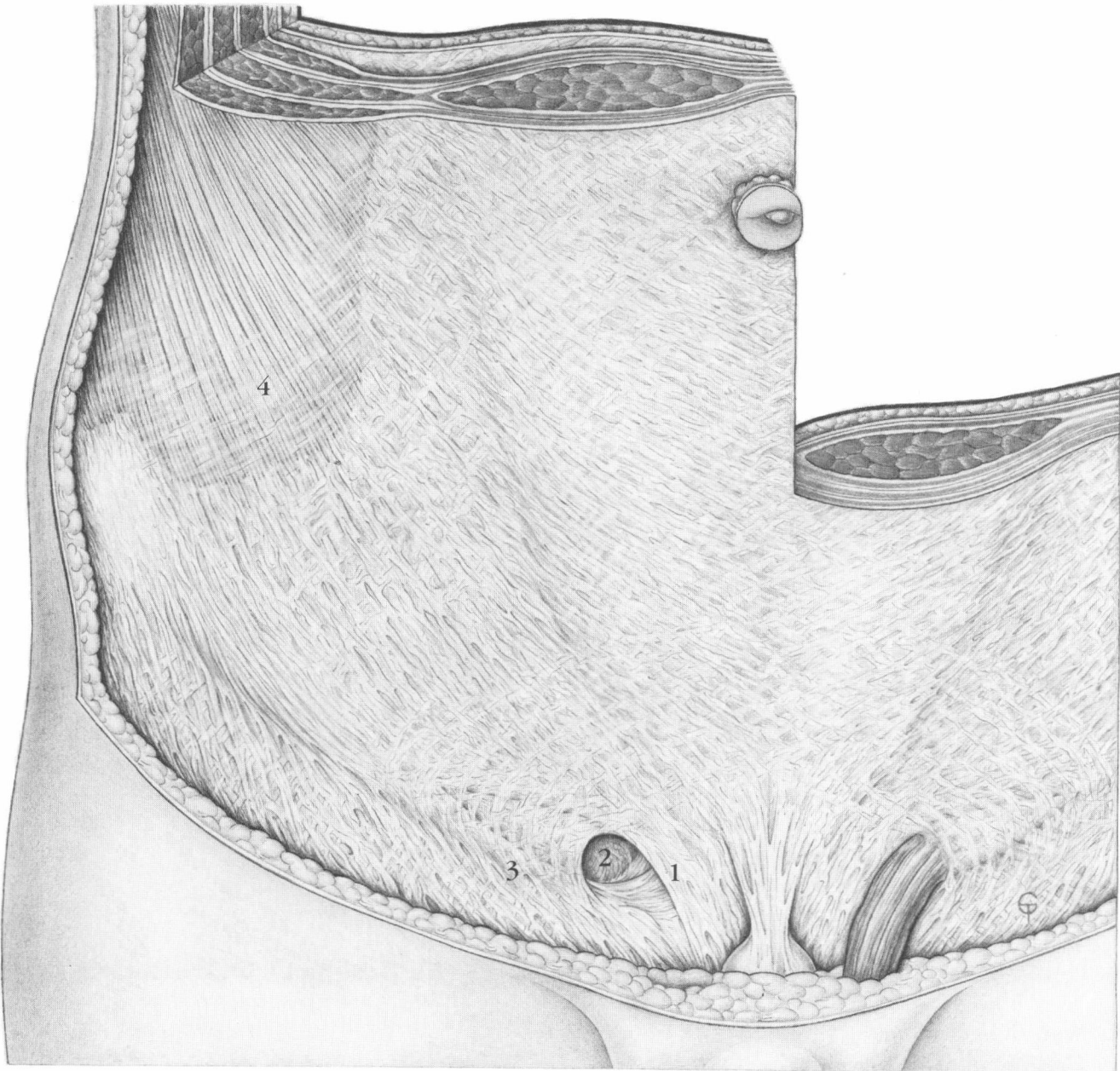




Table 1.1  
Anatomic Terms

**Henle's ligament:** Henle's sling, transversalis sling, lateral part of falx inguinalis  
Falx inguinalis: Hanley's band, falx aponeurotica inguinalis  
First described by Henle (1871)

**Hesselbach's ligament:** interfoveolar ligament, part of iliopubic tract  
First described by Hesselbach (1814)

**Thompson's ligament:** interpubic ligament, ligamentum iliopubicum

#### Hesselbach's triangle

*Medially:* Lateral edge of rectus abdominis, arcus m. transversus

*Laterally:* Sheath of inferior epigastric artery, interfoveolar ligament

*Caudally:* Inguinal ligament, iliopectineal ligament

The tip is pointing medially

**Cooper's ligament:** superior pubic ligament, fibrous edge of pecten pubis

#### Deep inguinal ring

Superficial layer: transversus abdominis layer

Deep layer: fascia transversalis and deep femoral arch

#### Superficial abdominal fascia

Superficial leaf: Camper's fascia

Deep leaf: Scarpa's fascia

Fused to external spermatic fascia

Fascia transversalis: consists in part of two leaves as fascial layer to muscle and as internal "surface fascia": sublayer of peritoneum.

Fused to internal spermatic fascia

#### Femoral region

Lacuna vasorum

Roof: Inguinal ligament

*Laterally:* Interlacunar part of iliac fascia, iliopectineal arch, interlacunar ligament

Floor: Pectineal fascia, iliopectineal ligament, pectineal ligament

*Medially:* Lacunar ligament (pectineal part of inguinal ligament, Gimbernat's ligament)

#### Femoral canal

Continuation of fascia transversalis onto femoral vessels connected

*Ventrally:* With fascia of m. obliquus internus abdominis

*Dorsally:* With fascia of m. transversus abdominis and branch of iliopsoas fascia

*Medially:* With insertion of m. transversus abdominis

The fascia transversalis can be described as:

- Aponeurosis
- Membrane
- Reinforced adipose layer
- Marginal lamella of the peritoneum

#### Fascia transversalis on the abdominal wall

The fascia transversalis varies in tightness and thickness both among individuals and also within different areas in the same individual. Generally it is quite thin in the upper abdominal regions and quite thick on the lateral abdominal wall. It is most strongly

Figure 1.2

Anatomy of the lower abdominal wall at the level of the fascia transversalis. Fencelike structure of Hesselbach's triangle between 1, 2, and 3. 1, Henle's sling; 2, interfoveolar ligament; 3, edge of rectus.

developed in the inguinal region. At the linea semilunaris the fascia is divided into two leaves: one leaf remains fused to the aponeurosis of the musculus transversus abdominis and is located anterior to the m. rectus abdominis. The other leaf (the marginal lamella of the peritoneum) is located behind the rectus and represents the dorsal lamella of the rectus sheath (Fig. 1.2).

The leaf of the fascia transversalis, which is anterior to the rectus abdominis, is again divided into two layers to enclose the pyramidal muscle.

The fasciae can be clearly separated from the aponeuroses.

Certain parts of the fascia transversalis and of the aponeurosis of the m. transversus abdominis that are located ventrally from the m. rectus abdominis have been classified and described in a wide variety of ways, and assigned to a variety of ligaments and

