33

Hernias & Other Lesions of the Abdominal Wall*

Karen E. Deveney, MD

HERNIAS

An external hernia is an abnormal protrusion of intra-abdominal tissue through a fascial defect in the abdominal wall. About 75% of hernias occur in the groin (indirect inguinal, direct inguinal, femoral). Incisional and ventral hernias comprise about 10%; umbilical, 3%; and others, about 3%. Generally, a hernial mass is composed of covering tissues (skin, subcutaneous tissues, etc), a peritoneal sac, and any contained viscera. Particularly if the neck of the sac is narrow where it emerges from the abdomen, bowel protruding into the hernia may become obstructed or strangulated. If the hernia is not repaired early, the defect may enlarge, and operative repair may become more complicated. The definitive treatment of hernia is early operative repair.

A **reducible hernia** is one in which the contents of the sac return to the abdomen spontaneously or with manual pressure when the patient is recumbent.

An **irreducible (incarcerated) hernia** is one whose contents cannot be returned to the abdomen, usually because they are trapped by a narrow neck. The term incarceration does not imply obstruction, inflammation, or ischemia of the herniated organs, though incarceration is necessary for obstruction or strangulation to occur.

Though the lumen of a segment of bowel within the hernia sac may become **obstructed,** there may initially be no interference with blood supply. Compromise to the blood supply of the contents of the sac (eg, omentum or intestine) results in a **strangulated hernia,** in which gangrene of the sac and its contents has occurred. The incidence of strangulation is higher in femoral than in inguinal hernias, but strangulation may occur in other hernias as well.

An uncommon and dangerous type of hernia, a **Richter hernia,** occurs when only a part of the cir-

cumference of the bowel becomes incarcerated or strangulated in the fascial defect. A strangulated Richter hernia may spontaneously reduce and the gangrenous piece of intestine be overlooked at operation. The bowel may subsequently perforate, with resultant peritonitis.

HERNIAS OF THE GROIN

Anatomy

All hernias of the abdominal wall consist of a peritoneal sac that protrudes through a weakness or defect in the muscular layers of the abdomen. The defect may be congenital or acquired.

Just outside the peritoneum is the **transversalis fascia,** an aponeurosis whose weakness or defect is the major source of groin hernias. Next are found the **transversus abdominis, internal oblique,** and **external oblique muscles,** which are fleshy laterally and aponeurotic medially. Their aponeuroses form investing layers of the strong **rectus abdominis muscles** above the semilunar line. Below this line, the aponeurosis lies entirely in front of the muscle. Between the two vertical rectus muscles, the aponeuroses meet again to form the **linea alba,** which is well defined only above the umbilicus. The subcutaneous fat contains Scarpa's fascia—a misnomer, since it is only a condensation of connective tissue with no substantial strength.

In the groin, an **indirect inguinal hernia** results when obliteration of the processus vaginalis, the peritoneal extension accompanying the testis in its descent into the scrotum, fails to occur. The resultant hernia sac passes through the **internal inguinal ring,** a defect in the transversalis fascia halfway between the anterior iliac spine and the pubic tubercle. The sac is located anteromedially within the spermatic cord and may extend partway along the **inguinal canal** or accompany the cord out through the subcutaneous (external) inguinal ring, a defect medially in the external oblique muscle just above the pubic tubercle. A hernia that passes fully into the scrotum is known as a **complete hernia.** The sac and the spermatic cord

---

*See Chapter 46 for further discussion of hernias in the pediatric age group and Chapter 22 for a discussion of internal hernias.

er Lesions
minal Wall*

Karen E. Deveney, MD

ecomes incarcerated or
defect. A strangulated
neously reduce and the
e be overlooked at opera-
ently perforate, with re-

N

l wall consist of a peri-
ough a weakness or de-
f the abdomen. The de-
uired.
n is the **transversalis**
 weakness or defect is
ias. Next are found the
rnal oblique, and ex-
ch are fleshy laterally
eir aponeuroses form
ctus abdominis mus-
. Below this line, the
nt of the muscle. Be-
s muscles, the apo-
e **linea alba,** which is
bilicus. The subcuta-
fascia—a misnomer,
of connective tissue

uinal hernia results
s vaginalis, the peri-
the testis in its de-
occur. The resultant
rnal inguinal ring,
ia halfway between
ic tubercle. The sac
the spermatic cord
e **inguinal canal** or
 the subcutaneous
medially in the ex-
e pubic tubercle. A
rotum is known as
he spermatic cord

are invested by the **cremaster muscle,** an extension
of fibers of the internal oblique muscle.

Other anatomic structures of the groin that are im-
portant in understanding the formation of hernias and
types of hernia repairs include the **conjoined tendon,**
or falx inguinalis, a fusion of the medial aponeurotic
transversus abdominis and internal oblique muscles
that passes along the inferolateral edge of the rectus
abdominis muscle and attaches to the pubic tubercle.
Between the pubic tubercle and anterior iliac spine
passes the **inguinal (Poupart) ligament,** formed by
the lowermost border of the external oblique aponeu-
rosis as it rolls on itself and thickens into a cord.

The lower end of the inguinal ligament is reflected
dorsally and laterally from the pubic tubercle back
along the iliopectineal line of the pubis as the **lacu-
nar (Gimbernat) ligament.** The lacunar ligament is
about 1.25 cm long and triangular in shape. The
sharp, crescentic lateral border of this ligament is the
unyielding noose for the strangulation of a femoral
hernia.

Cooper's ligament is a strong, fibrous band that
extends laterally for about 2.5 cm along the
iliopectineal line on the superior aspect of the supe-
rior pubic ramus, starting at the lateral base of the la-
cunar ligament.

Hesselbach's triangle is bounded by the inguinal
ligament, the inferior epigastric vessels, and the lat-
eral border of the rectus muscle. A weakness or de-
fect in the transversalis fascia, which forms the floor
of this triangle, results in a **direct inguinal hernia.** In
most direct hernias, the transversalis fascia is dif-
fusely attenuated, though a discrete defect in the fas-
cia may occasionally occur. This **funicular** type of
direct inguinal hernia is more likely to become incar-
cerated, since it has distinct borders.

A **femoral hernia** passes beneath the inguinal lig-
ament into the upper thigh. The predisposing ana-
tomic feature for femoral hernias is a small empty
space between the lacunar ligament medially and the
femoral vein laterally—the **femoral canal.** Because
its borders are distinct and unyielding, a femoral her-
nia has the highest risk of incarceration and strangu-
lation.

Causes

Nearly all inguinal hernias in infants, children, and
young adults are **indirect inguinal hernias.** Al-
though these "congenital" hernias most often present
during the first year of life, the first clinical evidence
of hernia may not appear until middle or old age,
when increased intra-abdominal pressure and dilata-
tion of the internal inguinal ring allow abdominal
contents to enter the previously empty peritoneal di-
verticulum. An untreated indirect hernia will inevita-
bly dilate the internal ring and displace or attenuate
the inguinal floor. The peritoneum may protrude on
either side of the inferior epigastric vessels to give a

combined direct and indirect hernia, called a **panta-
loon hernia.**

In contrast, **direct inguinal hernias** are acquired
as the result of a developed weakness of the trans-
versalis fascia in Hesselbach's area. There is some
evidence that direct inguinal hernias may be related
to hereditary or acquired defects in collagen synthesis
or turnover. **Femoral hernias** involve an acquired
protrusion of a peritoneal sac through the femoral
ring. In women, the ring may become dilated by the
physical and biochemical changes during pregnancy.

Any condition that chronically increases intra-
abdominal pressure may contribute to the appearance
and progression of a hernia. Marked obesity, abdom-
inal strain from heavy exercise or lifting, cough, con-
stipation with straining at stool, and prostatism with
straining on micturition are often implicated. Cirrho-
sis with ascites, pregnancy, chronic ambulatory peri-
toneal dialysis, and chronically enlarged pelvic or-
gans or pelvic tumors may also contribute. Loss of
tissue turgor in Hesselbach's area, associated with a
weakening of the transversalis fascia, occurs with ad-
vancing age and in chronic debilitating disease.

That colonic cancer may predispose in some way
to inguinal herniation was initially suggested a half
century ago, and the concept and has gained renewed
credibility from several recent studies. While there is
no clear mechanism whereby colon cancer could
cause hernia, the prevalence of colonic neoplasia and
the insensitivity of tests for occult blood in the stool
argue in favor of routine flexible sigmoidoscopy in
all patients over age 50.

Skandalakis JE et al: Surgical anatomy of the inguinal area.
World J Surg 1989;13:490.
Wheeler WE et al: Flexible sigmoidoscopy screening for
asymptomatic colorectal disease in patients with and
without inguinal hernia. South Med J 1991;84:876.

1. INDIRECT & DIRECT INGUINAL HERNIAS

Clinical Findings

A. Symptoms: Most hernias produce no symp-
toms until the patient notices a lump or swelling in
the groin, though some patients may describe a sud-
den pain and bulge that occurred while lifting or
straining. Frequently, hernias are detected in the
course of routine physical examinations such as pre-
employment examinations. Some patients complain
of a dragging sensation and, particularly with indirect
inguinal hernias, radiation of pain into the scrotum.
As a hernia enlarges, it is likely to produce a sense of
discomfort or aching pain, and the patient must lie
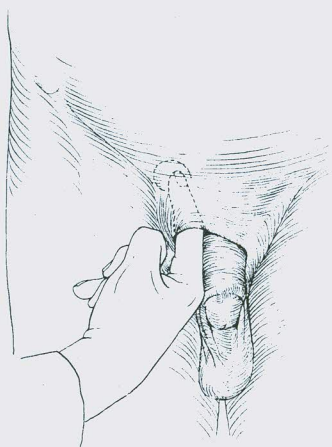down to reduce the hernia.

In general, direct hernias produce fewer symptoms
than indirect inguinal hernias and are less likely to
become incarcerated or strangulated.

B. Signs: Examination of the groin reveals a mass that may or may not be reducible. The patient should be examined both supine and standing and also with coughing and straining, since small hernias may be difficult to demonstrate. The external ring can be identified by invaginating the scrotum and palpating with the index finger just above and lateral to the pubic tubercle (Figure 33–1). If the external ring is very small, the examiner's finger may not enter the inguinal canal, and it may be difficult to be sure that a pulsation felt on coughing is truly a hernia. At the other extreme, a widely patent external ring does not by itself constitute hernia. Tissue must be felt protruding into the inguinal canal during coughing in order for a hernia to be diagnosed.

Differentiating between direct and indirect inguinal hernia on examination is difficult and is of little importance since most groin hernias should be repaired regardless of type. Nevertheless, each type of inguinal hernia has specific features more common to it. A hernia that descends into the scrotum is almost certainly indirect. On inspection with the patient erect and straining, a direct hernia more commonly appears as a symmetric, circular swelling at the external ring; the swelling disappears when the patient lies down. An indirect hernia appears as an elliptic swelling that may not reduce easily.

On palpation, the posterior wall of the inguinal canal is firm and resistant in an indirect hernia but relaxed or absent in a direct hernia. If the patient is asked to cough or strain while the examining finger is directed laterally and upward into the inguinal canal, a direct hernia protrudes against the side of the finger, whereas an indirect hernia is felt at the tip of the finger.

Compression over the internal ring when the patient strains may also help to differentiate between indirect and direct hernias. A direct hernia bulges forward through Hesselbach's triangle, but the opposite hand can maintain reduction of an indirect hernia at the internal ring.

These distinctions are obscured as a hernia enlarges and distorts the anatomic relationships of the inguinal rings and canal. In most patients the type of inguinal hernia cannot be established accurately before surgery.

Differential Diagnosis

Groin pain of musculoskeletal or obscure origin may be difficult to distinguish from hernia. Herniography, in which x-rays are obtained after intraperitoneal injection of contrast medium, may aid in the diagnosis in cases of groin pain when no hernia can be felt even after multiple maneuvers to increase intra-abdominal pressure.

Herniation of properitoneal fat through the inguinal ring into the spermatic cord ("lipoma of the cord") is commonly misinterpreted as a hernia sac. Its true nature may only be confirmed at operation. Occasionally, a femoral hernia that has extended above the inguinal ligament after passing through the fossa ovalis femoris may be confused with an inguinal hernia. If the examining finger is placed on the pubic tubercle, the neck of the sac of a femoral hernia lies lateral and below, while that of an inguinal hernia lies above.

Inguinal hernia must be differentiated from hydrocele of the spermatic cord, lymphadenopathy or abscesses of the groin, varicocele, and residual hematoma following trauma or spontaneous hemorrhage in patients taking anticoagulants. An undescended testis in the inguinal canal must also be considered when the testis cannot be felt in the scrotum.

The presence of an impulse in the mass with coughing, bowel sounds in the mass, and failure to transilluminate are features which indicate that an irreducible mass in the groin is a hernia.

Treatment

Inguinal hernias should always be repaired unless there are specific contraindications. The same advice applies to patients of all ages; the complications of incarceration, obstruction, and strangulation are greater threats than are the risks of operation.

Elderly patients tolerate elective repair of a groin hernia very well, especially when other medical problems are optimally controlled and local anesthetic is used. Emergency operation carries a much greater risk for the elderly than carefully planned elective operation.

If the patient has significant prostatic hyperplasia, it is prudent to solve this problem first, since the risks of urinary retention and urinary tract infection are high following hernia repair in patients with significant prostatic obstruction.

Although most direct hernias do not carry as high a

Figure 33–1. Insertion of finger through upper scrotum into external inguinal ring.

direct hernia bulges for-
riangle, but the opposite
of an indirect hernia at

scured as a hernia en-
mic relationships of the
ost patients the type of
ablished accurately be-

letal or obscure origin
nguish from hernia.
s are obtained after in-
rast medium, may aid
in pain when no hernia
maneuvers to increase

fat through the ingui-
cord ("lipoma of the
ted as a hernia sac. Its
ned at operation. Oc-
t has extended above
ing through the fossa
with an inguinal her-
aced on the pubic tu-
moral hernia lies lat-
inguinal hernia lies

entiated from hydro-
ymphadenopathy or
, and residual hema-
eous hemorrhage in
undescended testis
e considered when
otum.

in the mass with
ass, and failure to
indicate that an ir-
rnia.

be repaired unless
. The same advice
complications of
strangulation are
operation.

repair of a groin
her medical prob-
ocal anesthetic is
a much greater
nned elective op-

atic hyperplasia,
t, since the risks
ct infection are
nts with signifi-

carry as high a

---

risk of incarceration as indirect hernias, the difficulty in reliably differentiating them from indirect hernias makes the repair of all inguinal hernias advisable. Funicular hernias, which are particularly likely to incarcerate, should always be repaired.

Because of the possibility of strangulation, an incarcerated, painful, or tender hernia usually requires an emergency operation. In patients with serious concomitant disease, nonoperative reduction of the incarcerated hernia may first be attempted. The patient is placed with hips elevated and given analgesics and sedation sufficient to promote muscle relaxation. Repair of the hernia may be deferred if the hernia mass reduces with gentle manipulation and if there is no clinical evidence of strangulated bowel. Though strangulation is usually clinically evident, gangrenous tissue can occasionally be reduced into the abdomen by manual or spontaneous reduction. It is therefore safest to repair the reduced hernia at the earliest opportunity.

At surgery, one must decide whether to explore the abdomen to make certain that the intestine is viable. If the patient has leukocytosis or clinical signs of peritonitis or if the hernia sac contains dark or bloody fluid, the abdomen should be explored.

**A. Principles of Operative Treatment of Inguinal Hernia:**

1. Successful repair requires that any correctable aggravating factors be identified and treated (chronic cough, prostatic obstruction, colonic tumor, ascites, etc) and that the defect be reconstructed with the best available tissues that can be approximated without tension.

2. An indirect hernia sac should be anatomically isolated, dissected to its origin from the peritoneum, and ligated (Figure 33–2). In infants and young adults in whom the inguinal anatomy is normal, repair can usually be limited to high ligation, removal of the sac, and reduction of the internal ring to an appropriate size. For most adult hernias, the inguinal floor should also be reconstructed. The internal ring should be reduced to a size just adequate to allow egress of the cord structures. In women, the internal ring can be totally closed to prevent recurrence through that site. To construct a solid inguinal floor in men with recurrent hernias, it may rarely be necessary to divide the cord and completely close the internal ring. The testicle may be removed or left in the scrotum.

3. In direct inguinal hernia (Figure 33–3), the inguinal canal may be so wide and its floor so weak that the repair appears to be under tension. In such cases, a vertical relaxing incision in the anterior rectus abdominis sheath will allow the repair to rest without tension.

4. Even though a direct hernia is found, the cord should always be carefully searched for a possible indirect hernia as well.

5. In patients with large hernias, bilateral repair should not usually be performed as one procedure,
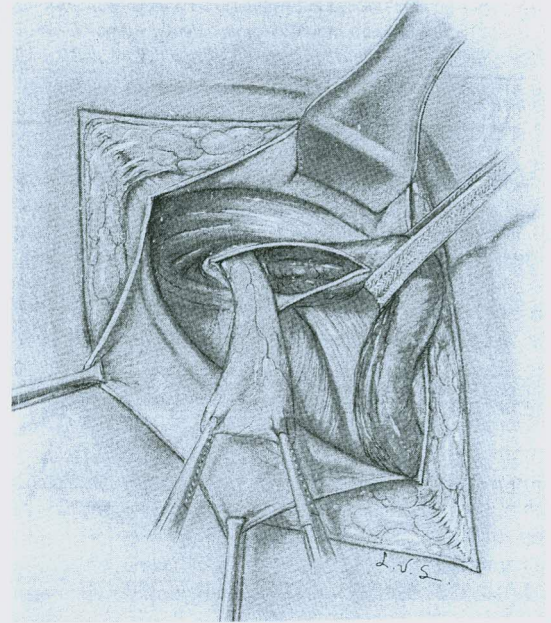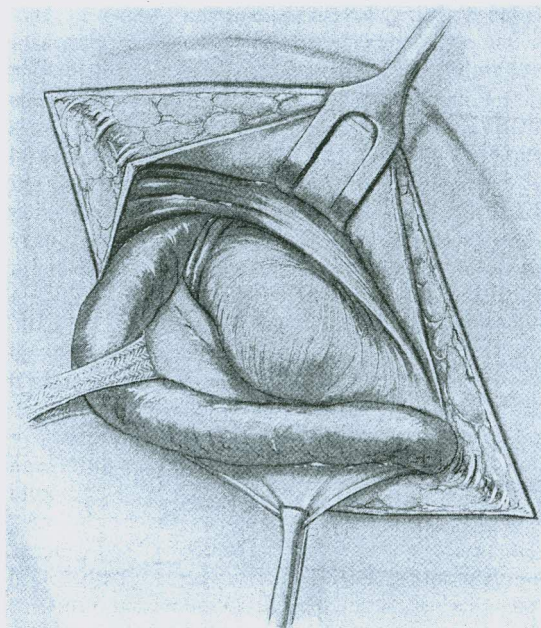

Figure 33–2. Indirect inguinal hernia. Inguinal canal opened, showing spermatic cord retracted medially and indirect hernia peritoneal sac dissected free to above the level of the internal inguinal ring.

---

since greater tension in the repairs increases the recurrence rate and surgical complications. In children and adults with small hernias, bilateral hernia repair is recommended because it spares the patient a second anesthetic.

6. **Recurrent hernia** within a few months or a year of operation usually indicates an inadequate repair, such as overlooking an indirect sac or failing to repair the fascial defect securely. Any repair completed under tension is subject to early recurrence. Recurrences two or more years after repair are more likely to be caused by progressive weakening of the patient's fascia. Repeated recurrence after careful repair by an experienced surgeon suggests a defect in collagen synthesis. Because the fascial defect is often small, firm, and unyielding, recurrent hernias are much more likely to develop incarceration or strangulation than unoperated inguinal hernias, and they should nearly always be repaired again.

If recurrence is due to an overlooked indirect sac, the posterior wall is often solid and removal of the sac may be all that is required. Occasionally, a recurrence is discovered to consist of a small, sharply circumscribed defect in the previous hernioplasty, in which case closure of the defect suffices. More diffuse weakness of the posterior inguinal wall or repeated recurrences occasionally require more elaborate repair using fascia lata from the thigh or polypropylene (Marlex) mesh.

Figure 33–3. Direct inguinal hernia. Inguinal canal opened and spermatic cord retracted inferiorly and laterally to reveal the hernia bulging through the floor of Hesselbach's triangle.

B. Types of Operations for Inguinal Hernia: Different operative techniques are designed to deal with variations in the size and location of a hernia and the extent of associated tissue weakness.

Simple high ligation of the sac through an inguinal incision is the key to the repair of indirect hernias in infants and children. Combined with a tightening of the internal ring, it is called the **Marcy repair.**

Repair of inguinal hernias in adults can be accomplished successfully through an inguinal, properitoneal, or abdominal approach, though inguinal repairs are most widely used today. Though a given repair may be championed by a particular surgeon or group, there is no comparative study demonstrating the superiority of any one type; in fact, it seems likely that all the methods in common use give equivalent results. Details of technique and the experience and skill of the surgeon are more likely to account for differences in results.

Though most methods of repairing indirect inguinal hernias in adults emphasize high ligation of the sac, as in children, elimination of the sac by reducing it may suffice. The factor common to all successful methods of inguinal hernia repairs in adults is repair of the inguinal floor.

The **Bassini repair,** the most widely used method, approximates the conjoined tendon to Poupart's ligament and leaves the spermatic cord in its normal anatomic position under the external oblique aponeuro-

sis. The **Halsted repair** places the external oblique beneath the cord but otherwise resembles the Bassini repair. **Cooper's ligament (Lotheissen-McVay) repair** brings conjoined tendon farther posteriorly and inferiorly to Cooper's ligament. Unlike the Bassini and Halsted methods, McVay's repair is effective for femoral hernia but always requires a relaxing incision to relieve tension. Though the **Shouldice repair** has a low reported recurrence rate, it is not widely used, perhaps because of the more extensive dissection required and a belief that the skill of the surgeons may be as important as the method itself. In the Shouldice repair, the transversalis fascia is first divided and then imbricated to Poupart's ligament. Finally, the conjoined tendon and internal oblique muscle are also approximated in layers to the inguinal ligament.

The **properitoneal approach** exposes the groin from between the transversalis fascia and peritoneum via a lower abdominal incision to effect closure of the fascial defect. Because it requires more initial dissection and is associated with higher morbidity and recurrence rates in less experienced hands, it is not widely favored.

A desire to decrease the recurrence rate of hernias has prompted an increased use of prosthetic materials in repair of both recurrent and first-time hernias. Methods include "plugs" of mesh inserted into the internal ring and sheets of mesh to reinforce the repair. However, whether mesh has a useful role in routine hernia repair has not yet been established.

Within the past 2 years, serious investigation has begun into methods of repairing inguinal hernias laparoscopically. The method currently thought to have the greatest promise involves the use of staples to secure a patch of mesh over the internal ring. While the initial experience is encouraging, the efficacy—in particular, the long-term results—and the comparative morbidity of laparoscopic hernia repair are as yet unknown. Until these issues are settled, such operations should probably be restricted to prospective clinical trials.

C. Nonsurgical Management (Use of a Truss): The surgeon is occasionally called upon to prescribe a truss when a patient refuses operative repair or when there are absolute contraindications to operation. A truss should be fitted to provide adequate external compression over the defect in the abdominal wall. It should be taken off at night and put on in the morning before the patient arises. The use of a truss does not preclude later repair of a hernia, although it may cause fibrosis of the anatomic structures, so that subsequent repair may be difficult.

Pre- & Postoperative Course

The preoperative evaluation should be completed before hospitalization. The patient usually enters the hospital on the morning of operation. The anesthetic may be general, spinal, or local. Local anesthetic is effective for most patients, and the incidence of uri-

e external oblique
embles the Bassini
issen-McVay) re-
er posteriorly and
Unlike the Bassini
air is effective for
a relaxing incision
uldice repair has
s not widely used,
sive dissection re-
the surgeons may
. In the Shouldice
t divided and then
Finally, the con-
muscle are also
al ligament.
xposes the groin
a and peritoneum
fect closure of the
ore initial dissec-
norbidity and re-
hands, it is not

ce rate of hernias
osthetic materials
rst-time hernias.
serted into the in-
nforce the repair.
al role in routine
ished.

investigation has
inguinal hernias
ently thought to
he use of staples
he internal ring.
araging, the effi-
results—and the
pic hernia repair
sues are settled,
restricted to pro-

t **(Use of a**
y called upon to
ses operative re-
traindications to
to provide ade-
defect in the ab-
at night and put
rises. The use of
of a hernia, al-
anatomic struc-
e difficult.

d be completed
ually enters the
. The anesthetic
al anesthetic is
cidence of uri-

nary retention and pulmonary complications is lowest with local anesthesia. Recurrent hernias are more easily repaired with the patient under spinal or general anesthesia, since local anesthetic does not readily diffuse through scar tissue. In the past, the patient was routinely kept in the hospital for a few days after operation, but "come-and-go" hernia repair has been shown to be safe and effective, particularly for younger and healthier patients, and is now common. A sedentary worker may return to work within a few days; heavy manual labor has traditionally not been performed for up to 4–6 weeks after hernia repair, though recent studies document no increase in recurrence when full activity is resumed as early as 3 weeks after surgery.

Prognosis

In addition to chronic cough, prostatism, and constipation, poor tissue quality and poor operative technique may contribute to recurrence of inguinal hernia. Because tissue is often more attenuated in direct hernias, recurrence rates are higher than for indirect hernias. Placing the repair under tension and using absorbable suture are technical errors that lead to recurrence. Failure to find an indirect hernia, to dissect the sac high enough, or to adequately close the internal ring may lead to recurrence of indirect hernia. Postoperative wound infection is associated with increased recurrence. The recurrence rate is considerably increased in patients receiving chronic peritoneal dialysis—in one report, the rate was as high as 27%.

Recurrence rates after indirect hernia repair in adults are reported at best to be 0.6–3%, though the incidence is more probably 5–10%. Inadequate sac reduction or internal ring closure and failure to identify a femoral or direct hernia contribute to recurrence, as does inadequate repair of the inguinal canal. A wide range of figures is quoted for recurrence after repair of direct hernias, from less than 1% to as high as 28%. The point of recurrence is most often just lateral to the pubic tubercle, implicating excessive tension on the repair and adding evidence to favor the routine use of a relaxing incision in the rectus sheath in the repair of direct hernias.

Barbier J, Carretier M, Richer JP: Cooper ligament repair: An update. World J Surg 1989;13:499.

Curtsinger LJ III et al: Orchiectomy during herniorrhaphy: What should we tell the patient? Am J Surg 1987; 154:636.

Greenburg AG: Revisiting the recurrent groin hernia. Am J Surg 1987;154:35.

Gullmo A: Herniography. World J Surg 1989;13:560.

Heydorn WH et al: A five-year U.S. Army experience with 36,250 abdominal hernia repairs. Am Surg 1990;56:596.

Johnson J et al: Radionuclide imaging in the diagnosis of hernias related to peritoneal dialysis. Arch Surg 1987; 122:952.

Lichtenstein IL: Herniorrhaphy: A personal experience with 6,321 cases. Am J Surg 1987;153:553.

Lichtenstein IL et al: The tension-free hernioplasty. Am J Surg 1989;157:188.

Rutledge RH: Cooper's ligament repair: A 25-year experience with a single technique for all groin hernias in adults. Surgery 1988;103:1.

Stoppa RE: The treatment of complicated groin and incisional hernias. World J Surg 1989;13:545.

Young DV: Comparison of local, spinal, and general anesthesia for inguinal herniorrhaphy. Am J Surg 1987; 153:560.

2. SLIDING INGUINAL HERNIA (Figures 33–4 and 33–5)

A sliding inguinal hernia is a type of indirect inguinal hernia in which the wall of a viscus forms a portion of the wall of the hernia sac. On the right side the cecum is most commonly involved, and on the left side the sigmoid colon. The development of a sliding hernia is related to the variable degree of posterior fixation of the large bowel or other sliding components (eg, bladder, ovary) and their proximity to the internal inguinal ring.

Clinical Findings

Though sliding hernias have no special signs that
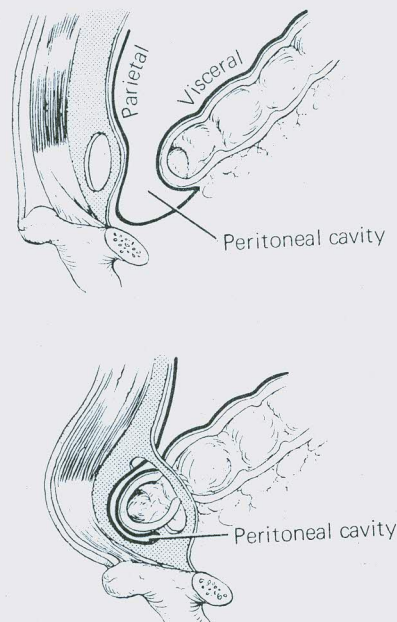
Figure 33–4. Right-sided sliding hernia. **Top:** Note cecum and ascending colon sliding on fascia of posterior abdominal wall. **Bottom:** Hernia has entered internal inguinal ring. Note that one-fourth of the hernia is not related to the peritoneal sac.
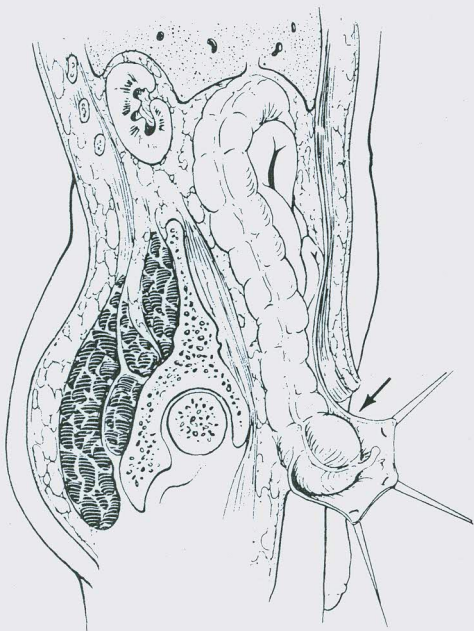
Figure 33–5. Right-sided sliding hernia seen in sagittal section. (After Linden in Thorek.) At arrow, the wall of the cecum forms a portion of the hernia sac.

distinguish them from other inguinal hernias, they should be suspected in any large hernia that cannot be completely reduced or whenever a large scrotal hernia is seen in an elderly man. Finding a segment of colon in the scrotum on barium enema strongly suggests a sliding hernia. Recognition of this variation is of great importance at operation, since failure to recognize it may result in inadvertent incision of the lumen of the bowel or bladder.

Treatment

It is essential to recognize the entity at an early stage of operation. As is true of all indirect inguinal hernias, the sac will lie anteriorly, but the posterior wall of the sac will be formed to a greater or lesser degree by colon.

After the cord has been dissected free from the hernia sac, most sliding hernias can be reduced by a series of inverting sutures (Bevan technique) and one of the standard types of inguinal repair performed. Very large sliding hernias may have to be reduced by entering the peritoneal cavity through a separate incision (La Roque) and the bowel pulled back into the abdomen and fixed to the posterior abdominal wall. The hernia is then repaired in the usual fashion.

Prognosis

Sliding hernias have a higher recurrence rate than uncomplicated indirect hernias.

The surgical complications most often encountered

following sliding hernia repair are encroachment on the circulation to the large bowel, with bowel necrosis, and actual strangulation of a portion of the large bowel when attempting a high ligation of the hernia sac.

Mackie JA Jr, Berkowitz HD: Sliding inguinal hernia. In: *Hernia,* 3rd ed. Nyhus LM, Condon RE (editors). Lippincott, 1989.

3. FEMORAL HERNIA

A femoral hernia descends through the femoral canal beneath the inguinal ligament. Because of its narrow neck, it is prone to incarceration and strangulation. Femoral hernia is much more common in women than in men, but in both sexes femoral hernia is less common than inguinal hernia. Femoral hernias comprise about one-third of groin hernias in women and about 2% of groin hernias in men.

Clinical Findings

A. Symptoms: Femoral hernias are notoriously asymptomatic until incarceration or strangulation occurs. Even with obstruction or strangulation, the patient may feel discomfort more in the abdomen than in the femoral area. Thus, colicky abdominal pain and signs of intestinal obstruction frequently are the presenting manifestations of a strangulated femoral hernia, without discomfort, pain, or tenderness in the femoral region.

B. Signs: A femoral hernia may present in a variety of ways. If it is small and uncomplicated, it usually appears as a small bulge in the upper medial thigh just below the level of the inguinal ligament. Because it may be deflected anteriorly through the fossa ovalis femoris to present as a visible or palpable mass at or above the inguinal ligament, it can be confused with an inguinal hernia.

Differential Diagnosis

Femoral hernia must be distinguished from inguinal hernia, a saphenous varix, and femoral adenopathy. A saphenous varix transmits a distinct thrill when a patient coughs, and it appears and disappears instantly when the patient stands or lies down—in contrast to femoral hernias, which are either irreducible or reduce gradually on pressure.

Treatment

A. Principles: The principles of femoral hernia repair are as follows: (1) complete excision of the hernia sac, (2) the use of nonabsorbable sutures, (3) repair of the defect in the transversalis fascia that is responsible for the hernia, and (4) use of Cooper's ligament for the repair, since it gives a firm support for sutures and forms the natural line for closure of the defect.

ir are encroachment on
owel, with bowel necro-
of a portion of the large
h ligation of the hernia

liding inguinal hernia. In:
London RE (editors). Lip-

through the femoral
ament. Because of its
rceration and strangu-
ch more common in
n sexes femoral hernia
ernia. Femoral hernias
oin hernias in women
n men.

rnias are notoriously
n or strangulation oc-
strangulation, the pa-
in the abdomen than
y abdominal pain and
equently are the pre-
gulated femoral her-
or tenderness in the

may present in a va-
complicated, it usu-
n the upper medial
inguinal ligament.
teriorly through the
a visible or palpable
ment, it can be con-

uished from ingui-
l femoral adenopa-
ts a distinct thrill
ars and disappears
or lies down—in
are either irreduc-
e.

of femoral hernia
e excision of the
bable sutures, (3)
salis fascia that is
use of Cooper's
es a firm support
ine for closure of

B. Types of Repair for Femoral Hernia: A
femoral hernia can be repaired through an inguinal,
thigh, properitoneal, or abdominal approach, though
the inguinal approach is most commonly used. No
matter what the approach, the hernia is often difficult
to reduce. Reduction may be facilitated by carefully
incising the iliopubic tract, Gimbernat's ligament, or
even the inguinal ligament. Occasionally, a coun-
terincision in the thigh is required to free attachments
below the inguinal ligament.

Irrespective of the approach used, successful fem-
oral hernia repair must close the femoral canal. The
Lotheissen-McVay repair, also used for inguinal her-
nia, is most commonly employed.

If the hernia sac and mass reduce when the patient
is given opiates or anesthesia and if bloody fluid ap-
pears in the hernia sac when it is exposed and opened,
one must strongly suspect the possibility of nonviable
bowel in the peritoneal cavity. In such cases, it is
mandatory to open and explore the abdomen, usually
through a separate midline incision.

Prognosis

Recurrence rates usually approximate the middle
range for direct inguinal hernia, ie, about 5–10%.

Bendavid R: A femoral "umbrella" for femoral hernia re-
pair. Surg Gynecol Obstet 1987;165:153.
Glassow F: Femoral hernia: Review of 2,105 repairs in a 17
year period. Am J Surg 1985;150:353.

OTHER TYPES OF HERNIAS

1. UMBILICAL HERNIAS IN ADULTS

Umbilical hernia in adults occurs long after closure
of the umbilical ring and is due to a gradual yielding
of the cicatricial tissue closing the ring. It is more
common in women than in men.

Predisposing factors include (1) multiple pregnan-
cies with prolonged labor, (2) ascites, (3) obesity, and
(4) large intra-abdominal tumors.

Clinical Findings

In adults, umbilical hernia does not usually obliter-
ate spontaneously, as in children, but instead in-
creases steadily in size. The hernia sac may have mul-
tiple loculations. Umbilical hernias usually contain
omentum, but small and large bowel may be present.
Emergency repair is often necessary, because the
neck of the hernia is usually quite narrow compared
to the size of the herniated mass and strangulation is
common.

Umbilical hernias with tight rings are often associ-

ated with sharp pain on coughing or straining. Very
large umbilical hernias more commonly produce a
dragging or aching sensation.

Treatment

Umbilical hernia in an adult should be repaired ex-
peditiously to avoid incarceration and strangulation.
The umbilical dimple should be preserved if possible
and the fascia approximated with nonabsorbable su-
ture. A transverse closure of the aponeurotic defect
results in the strongest repair. Large umbilical hernia
defects that cannot be closed without undue tension
may be closed with an inlay of Marlex mesh.

The presence of cirrhosis and ascites should not
discourage repair of an umbilical hernia, since incar-
ceration, strangulation, and rupture are particularly
dangerous in patients with these disorders. If signifi-
cant ascites exists, however, it should first be con-
trolled medically or by peritoneovenous shunt if nec-
essary, since morbidity and recurrence are higher
after hernia repair in patients with ascites. Preopera-
tive correction of fluid and electrolyte imbalance and
improvement of nutrition will improve the outcome
in these patients.

Prognosis

Factors that may lead to high rates of complication
and death after surgical repair include large size of
the hernia, old age or debility of the patient, and the
presence of related intra-abdominal disease. In
healthy individuals, surgical repair of the umbilical
defects gives good results with a low rate of recur-
rence.

Kirkpatrick S et al: Umbilical hernia rupture in cirrhotics
with ascites. Dig Dis Sci 1988;33:762.

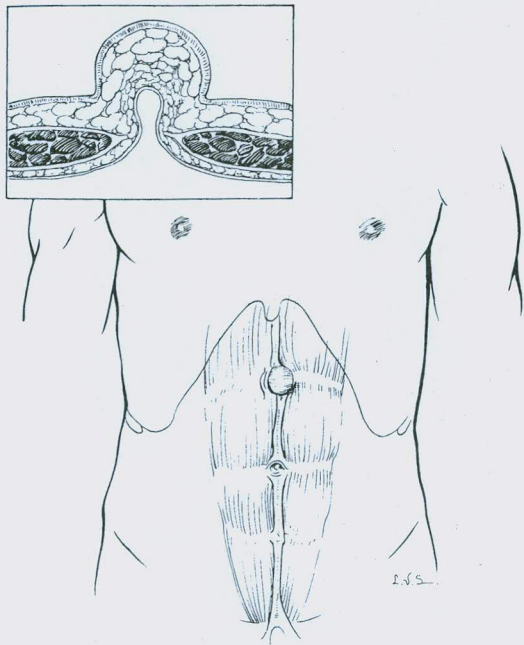### 2. EPIGASTRIC HERNIA
(Figure 33–6)

An epigastric hernia protrudes through the linea
alba above the level of the umbilicus. The hernia may
develop through one of the foramens of egress of the
small paramidline nerves and vessels or through an
area of congenital weakness in the linea alba.

About 3–5% of the population have epigastric her-
nias. They are more common in men than in women
and most common between the ages of 20 and 50.
About 20% of epigastric hernias are multiple, and
about 80% occur just off the midline.

Clinical Findings

A. Symptoms: Most epigastric hernias are pain-
less and are found on routine abdominal examination.
If symptomatic, their presentation ranges from mild
epigastric pain and tenderness to deep, burning epi-
gastric pain with radiation to the back or the lower
abdominal quadrants. The pain may be accompanied

Figure 33–6. Epigastric hernia. Note closeness to midline and presence in upper abdomen. The herniation is through the linea alba.

by abdominal bloating, nausea, or vomiting. The symptoms often occur after a large meal and on occasion may be relieved by reclining, probably because the supine position causes the herniated mass to drop away from the anterior abdominal wall. The smaller masses most frequently contain only properitoneal fat and are especially prone to incarceration and strangulation. These smaller hernias are often tender. Larger hernias seldom strangulate and may contain, in addition to properitoneal fat, a portion of the nearby omentum and, occasionally, a loop of small or large bowel.

B. Signs: If a mass is palpable, the diagnosis can often be confirmed by any maneuver that will increase intra-abdominal pressure and thereby cause the mass to bulge anteriorly. The diagnosis is difficult to make when the patient is obese, since a mass is hard to palpate; ultrasound or computed tomography may be needed in the very obese patient.

Differential Diagnosis

Differential diagnosis includes peptic ulcer, gallbladder disease, hiatal hernia, pancreatitis, and upper small bowel obstruction. On occasion, it may be impossible to distinguish the hernial mass from a subcutaneous lipoma, fibroma, or neurofibroma.

Treatment

Most epigastric hernias should be repaired, since small ones are likely to become incarcerated and large ones are often symptomatic and unsightly. The defect can usually be closed primarily. Herniated fat contents are usually dissected free and removed. Intraperitoneal herniating structures are reduced, but no attempt is made to close the peritoneal sac.

Prognosis

The recurrence rate is 10–20%, a higher incidence than with the routine inguinal or femoral hernia repair. This high recurrence rate may be partly due to failure to recognize and repair multiple small defects.

3. INCISIONAL HERNIA (Ventral Hernia)

About 10% of abdominal operations result in incisional hernias. The incidence of this iatrogenic type of hernia is not diminishing in spite of an awareness of the many causative factors.

Etiology

The factors most often responsible for incisional hernia are listed below. When more than one factor coexists in the same patient, the likelihood of postoperative wound failure is greatly increased.

(1) Poor surgical technique. Inadequate fascial bites, tension on the fascial edges, or too tight a closure are most often responsible for incisional failure.

(2) Postoperative wound infection.

(3) Age. Wound healing is usually slower and less solid in older patients.

(4) General debility. Cirrhosis, carcinoma, and chronic wasting diseases are factors that affect wound healing adversely. Any condition that compromises nutrition increases the likelihood of incision breakdown.

(5) Obesity. Fat patients frequently have increased intra-abdominal pressure. The presence of fat in the abdominal wound masks tissue layers and increases the incidence of seromas and hematomas in wounds.

(6) Postoperative pulmonary complications that stress the repair as a result of vigorous coughing. Smokers and patients with chronic pulmonary disease are therefore at increased risk of fascial disruption.

(7) Placement of drains or stomas in the primary operative wound.

Treatment

Incisional hernia should be treated by early repair. In addition to its unsightliness and the pain it causes, it may cause bowel obstruction. If the patient is unwilling to undergo surgery or is a poor surgical risk, symptoms may be controlled by an elastic corset.

Defects too large to close easily may be left without surgical repair if they are asymptomatic, since they are unlikely to incarcerate.

A. Small Hernias: Sma... ally require only a direct ... satisfactory closure. Interr... sure may be used, but the ... sorbable. Sutures tied too ti... pair will predispose to recu...

B. Large Hernias: Alt... ter distinguishes a small fr... can be considered large wh... be approximated without ... hernias, spinal or epidural ... relaxation, though general ... tion of muscle relaxants is ...

In performing the repai... and subcutaneous tissues ... moved. The hernia sac is t... from the underlying mus... there are no adherent intr... sac may be inverted and t... verted sac. If there is incar... traperitoneal contents, the ... be dissected free from the ... the abdomen. The fascial ... be cleaned so that the clo... rather that to scar.

Primary closure of a la... since tension on the closu... nia recurrence. Increasin... rent defects is performed ... Although a variety of tec... of the mesh, an inlay or s... a lower recurrence rate th... placement. If a large de... drainage system should ... own tissue should be us... closed without tension.

Prognosis

The recurrence rate fo... repairs varies directly w... fect. Small hernias have ... medium-sized hernias r... large hernias, too often ... recurrence rate as high ... incisional hernias is eve... a recurrence rate as high...

Houck JP et al: Repair of ... Obstet 1989;169:397.
Krukowski ZH et al: Poly... closure of midline abd... comparative clinical tri...
Molloy RG et al: Massi... wall replacement with ... 78:242.
Read RC et al: Recent trer... nal herniation. Arch Su...
Wantz GE: Incisional he... Gynecol Obstet 1991;1...

ecome incarcerated and
natic and unsightly. The
primarily. Herniated fat
d free and removed. In-
tures are reduced, but no
eritoneal sac.

20%, a higher incidence
l or femoral hernia re-
e may be partly due to
multiple small defects.

perations result in in-
of this iatrogenic type
spite of an awareness

onsible for incisional
more than one factor
likelihood of postop-
increased.

. Inadequate fascial
es, or too tight a clo-
or incisional failure.
tion.

ually slower and less

sis, carcinoma, and
factors that affect
condition that com-
likelihood of inci-

ntly have increased
esence of fat in the
ayers and increases
atomas in wounds.
complications that
igorous coughing.
ic pulmonary dis-
 of fascial disrup-

las in the primary

ed by early repair.
the pain it causes,
the patient is un-
oor surgical risk,
elastic corset.
may be left with-
nptomatic, since

A. Small Hernias: Small incisional hernias usu-
ally require only a direct fascia-to-fascia repair for
satisfactory closure. Interrupted or continuous clo-
sure may be used, but the sutures should be nonab-
sorbable. Sutures tied too tightly or tension on the re-
pair will predispose to recurrence.

B. Large Hernias: Although no specific diame-
ter distinguishes a small from a large hernia, a hernia
can be considered large when the fascial edges cannot
be approximated without tension. In repair of large
hernias, spinal or epidural anesthesia gives superior
relaxation, though general anesthesia with the addi-
tion of muscle relaxants is also excellent.

In performing the repair, excess and scarred skin
and subcutaneous tissues over the hernia are re-
moved. The hernia sac is then carefully dissected free
from the underlying muscles and fascial tissues. If
there are no adherent intraperitoneal structures, the
sac may be inverted and the repair done over the in-
verted sac. If there is incarceration or adhesion of in-
traperitoneal contents, the abdominal contents should
be dissected free from the sac and dropped back into
the abdomen. The fascial edges of the defect should
be cleaned so that the closure will be to solid tissues
rather that to scar.

Primary closure of a large defect is not advisable,
since tension on the closure increases the risk of her-
nia recurrence. Increasingly, repair of large or recur-
rent defects is performed using nonabsorbable mesh.
Although a variety of techniques exist for placement
of the mesh, an inlay or sandwich technique achieves
a lower recurrence rate than an edge-to-edge or onlay
placement. If a large dead space persists, a closed
drainage system should be employed. The patient's
own tissue should be used only if the wound can be
closed without tension.

Prognosis

The recurrence rate for first-time incisional hernia
repairs varies directly with the size of the fascial de-
fect. Small hernias have a recurrence rate of 2–5%;
medium-sized hernias recur in 5–15% of cases; and
large hernias, too often closed under tension, have a
recurrence rate as high as 25%. Repair of recurrent
incisional hernias is even less likely to succeed, with
a recurrence rate as high as 50%.

Houck JP et al: Repair of incisional hernia. Surg Gynecol
Obstet 1989;169:397.
Krukowski ZH et al: Polydioxanone or polypropylene for
closure of midline abdominal incisions: A prospective
comparative clinical trial. Br J Surg, 1987;74:828.
Molloy RG et al: Massive incisional hernia: Abdominal
wall replacement with Marlex mesh. Br J Surg 1991;
78:242.
Read RC et al: Recent trends in the management of incisio-
nal herniation. Arch Surg 1989;124:485.
Wantz GE: Incisional hernioplasty with Mersilene. Surg
Gynecol Obstet 1991;172:129.

Wissing J et al: Fascia closure after midline laparotomy:
Results of a randomized trial. Br J Surg, 1987;74:738.

4. VARIOUS RARE HERNIATIONS THROUGH THE ABDOMINAL WALL

Littre's Hernia

A Littre hernia is a hernia that contains a Meckel
diverticulum in the hernia sac. Although Littre first
described the condition in relation to a femoral her-
nia, the relative distribution of Littre's hernias is as
follows: inguinal, 50%; femoral, 20%; umbilical,
20%; and miscellaneous, 10%. Littre's hernias of the
groin are more common in men and on the right side.
The clinical findings are similar to those of Richter's
hernia; when strangulation is present, pain, fever, and
manifestations of small bowel obstruction occur late.

Treatment consists of repair of the hernia plus, if
possible, excision of the diverticulum. If acute
Meckel's diverticulitis is present, the acute inflam-
matory mass may have to be treated through a sepa-
rate abdominal incision.

Trupo FJ et al: Meckel's diverticulum in femoral hernia: A
Littre's hernia. South Med J 1987;80:655.

Spigelian Hernia

Spigelian hernia is an acquired ventral hernia
through the linea semilunaris, the line where the
sheaths of the lateral abdominal muscles fuse to form
the lateral rectus sheath. Spigelian hernias are nearly
always found above the level of the inferior epigastric
vessels. They most commonly occur where the semi-
circular line (fold of Douglas) crosses the linea semi-
lunaris.

The presenting symptom is pain that is usually lo-
calized to the hernia site and may be aggravated by
any maneuver that increases intra-abdominal pres-
sure. With time, the pain may become more dull, con-
stant, and diffuse, making diagnosis more difficult.

If a mass can be demonstrated, the diagnosis pres-
ents little difficulty. The diagnosis is most easily
made with the patient standing and straining; a bulge
then presents in the lower abdominal area and disap-
pears with a gurgling sound on pressure. Following
reduction of the mass, the hernia orifice can usually
be palpated.

Diagnosis is often made more difficult because the
hernial defect may lie beneath an intact external
oblique layer and therefore not be palpable. The her-
nia often dissects within the layers of the abdominal
wall and may not present a distinct mass, or the mass
may be located at a distance from the linea semi-
lunaris. Patients with spigelian hernias should have a
tender point over the hernia orifice, though tender-
ness alone is not sufficient to make the diagnosis.
Both ultrasound and CT scan may help to confirm the
diagnosis.

Spigelian hernias have a high incidence of incarceration and should be repaired. These hernias are quite easily cured by primary aponeurotic closure.

Spangen L: Spigelian hernia. World J Surg 1989;13:573.

Lumbar or Dorsal Hernia (Figure 33–7)

Lumbar or dorsal hernias are hernias through the posterior abdominal wall at some level in the lumbar region. The most common sites (95%) are the superior (Grynfeltt's) and inferior (Petit's) lumbar triangles. A "lump in the flank" is the common complaint, associated with a dull, heavy, pulling feeling. With the patient erect, the presence of a reducible, often tympanitic mass in the flank usually makes the diagnosis. Incarceration and strangulation occur in about 10% of cases. Hernias in the inferior lumbar triangle are most often small and occur in young, athletic women. They present as tender masses producing backache and usually contain fat. Lumbar hernia must be differentiated from abscesses, hematomas, soft tissue tumors, renal tumors, and muscle strain.

Acquired hernias may be traumatic or nontraumatic. Severe direct trauma, penetrating wounds, abscesses, and poor healing of flank incisions are the usual causes. Congenital hernias occur in infants and are usually isolated unilateral congenital defects.

Lumbar hernias increase in size and should be repaired when found. Repair is by mobilization of the nearby fascia and obliteration of the hernia defect by precise fascia-to-fascia closure. The recurrence rate is very low.
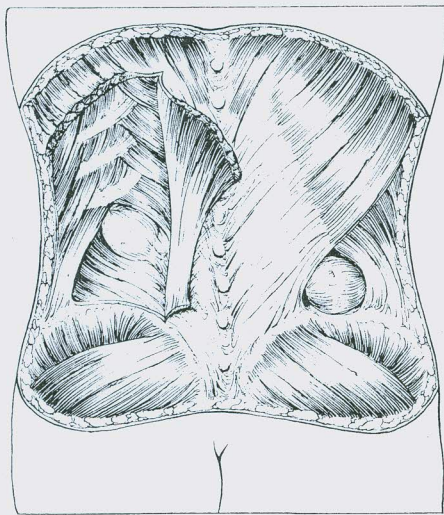
Figure 33–7. Anatomic relationships of lumbar or dorsal hernia. (Adapted from Netter.) On the left, lumbar or dorsal hernia into space of Grynfeltt. On the right, hernia into Petit's triangle (inferior lumbar space).

Faro SH et al: Traumatic lumbar hernia: CT diagnosis. AJR Am J Roentgenol 1990;154:757.
Thor K: Lumbar hernia. Acta Chir Scand 1985;151:389.

Obturator Hernia

Herniation through the obturator canal is more frequent in elderly women and is difficult to diagnose preoperatively. The mortality rate (13–40%) of these hernias makes them the most lethal of all abdominal hernias. These hernias most commonly present as small bowel obstruction with cramping abdominal pain and vomiting. The hernia is rarely palpable in the groin, though a mass may be felt on pelvic or rectal examination. The most specific finding is a positive Howship-Romberg sign, in which pain extends down the medial aspect of the thigh with abduction, extension, or internal rotation of the knee. Since this sign is present in fewer than half of cases, diagnosis should be suspected in any elderly debilitated woman without previous abdominal operations who presents with a small bowel obstruction. Though diagnosis can be confirmed by CT scan, operation should not be unduly delayed if complete bowel obstruction is present.

The abdominal approach gives the best exposure; these hernias should not be repaired from the thigh approach. The Cheatle-Henry approach (retropubic) may also be used. Simple repair is most often possible, though bladder wall has been used when the defect cannot be approximated primarily.

Bjork KJ et al: Obturator hernia. Surg Gynecol Obstet 1988;167:217.
Young A et al: Strangulated obturator hernia: Can mortality be reduced? South Med J 1988;81:1117.

Perineal Hernia

A perineal hernia protrudes through the muscles and fascia of the perineal floor. It may be primary but is usually acquired following perineal prostatectomy, abdominoperineal resection of the rectum, or pelvic exenteration.

These hernias present as easily reducible perineal bulges and usually are asymptomatic, but may present with pain, dysuria, bowel obstruction, or perineal skin breakdown.

Repair is usually done by an abdominal approach, with an adequate fascial and muscular perineal repair. Occasionally polypropylene (Marlex) mesh or flaps using the gracilis or gluteus may be necessary, when the available tissues are too attenuated for adequate primary repair.

Beck DE et al: Postoperative perineal hernia. Dis Colon Rectum 1987;30:21.
Brotschi E, Noe JM, Silen W: Perineal hernias after proctectomy: A new approach to repair. Am J Surg 1985; 149:301.

Interparietal He

Interparietal her self between the usually of an indi be direct or vent hernias are rare, i cause strangulatio mistaken for a tu can be suspected nation provided it tensive studies fo ceded diagnosis. usually show bow nal wall in case strangulation, and diagnostic.

As soon as the should be perform guinal approach.

Sciatic Hernia

Sciatic hernia and consists of contents through agnosis is made a the bowel occurs the abdominal ap are reduced, and fascial flap from mis muscle.

TRAUMATIC I

Abdominal w consequence of patient presents tion, ecchymosi are usually prese be obvious, how scan to confirm associated intra usually requirec marily if possib

Otero C et al: Inju full spectrum 81:517.
Wood RJ et al: T and review of

a: CT diagnosis. AJR
nd 1985;151:389.

r canal is more fre-
fficult to diagnose
(13–40%) of these
l of all abdominal
monly present as
mping abdominal
rarely palpable in
lt on pelvic or rec-
finding is a posi-
hich pain extends
h with abduction,
e knee. Since this
f cases, diagnosis
lebilitated woman
ions who presents
Though diagnosis
tion should not be
bstruction is pres-

ie best exposure;
d from the thigh
bach (retropubic)
most often possi-
sed when the de-
ly.

g Gynecol Obstet

nia: Can mortality
7.

igh the muscles
y be primary but
l prostatectomy,
ctum, or pelvic

lucible perineal
, but may pres-
ion, or perineal

ninal approach,
perineal repair.
) mesh or flaps
ecessary, when
d for adequate

nia. Dis Colon

nias after proc-
m J Surg 1985;

Interparietal Hernia

Interparietal hernias, in which the sac insinuates it-
self between the layers of the abdominal wall, are
usually of an indirect inguinal type but, rarely, may
be direct or ventral hernias. Although interparietal
hernias are rare, it is essential to recognize them, be-
cause strangulation is common and the mass is easily
mistaken for a tumor or abscess. The lesion usually
can be suspected on the basis of the physical exami-
nation provided it is kept in mind. In most cases, ex-
tensive studies for intra-abdominal tumors have pre-
ceded diagnosis. A lateral film of the abdomen will
usually show bowel within the layers of the abdomi-
nal wall in cases with intestinal incarceration or
strangulation, and an ultrasound or CT scan may be
diagnostic.

As soon as the diagnosis is established, operation
should be performed, usually through the standard in-
guinal approach.

Sciatic Hernia

Sciatic hernia is the rarest of abdominal hernias
and consists of an outpouching of intra-abdominal
contents through the greater sciatic foramen. The di-
agnosis is made after incarceration or strangulation of
the bowel occurs. The repair is usually made through
the abdominal approach. The hernia sac and contents
are reduced, and the weak area is closed by making a
fascial flap from the superficial fascia of the pirifor-
mis muscle.

TRAUMATIC HERNIA

Abdominal wall hernias occur rarely as a direct
consequence of direct blunt abdominal injury. The
patient presents with abdominal pain. On examina-
tion, ecchymosis of the abdominal wall and a bulge
are usually present. The existence of a hernia may not
be obvious, however, and the patient may require CT
scan to confirm it. Because of the high incidence of
associated intra-abdominal injuries, laparotomy is
usually required. The defect should be repaired pri-
marily if possible.

Otero C et al: Injury to the abdominal wall musculature: The
full spectrum of traumatic hernia. South Med J 1988;
81:517.
Wood RJ et al: Traumatic abdominal hernia: A case report
and review of the literature. Am Surg 1988;54:648.

OTHER LESIONS OF THE ABDOMINAL WALL

CONGENITAL DEFECTS

Congenital defects of the abdominal wall other
than hernias or lesions of the urachus and umbilicus
are rare. The important ones involving the urachus
and umbilicus are discussed in Chapter 47.

TRAUMA

Hematoma of the Rectus Sheath

This is a rare but important entity that may follow
mild trauma to the abdominal wall or may occur sec-
ondary to disorders of coagulation, blood dyscrasia,
or degenerative vascular diseases.

Abdominal pain, usually in the right lower abdo-
men, is a presenting sign. It may be sudden and se-
vere in onset or slowly progressive. The key to diag-
nosis is the physical examination. Careful palpation
will reveal an exquisitely tender mass within the ab-
dominal wall. If the patient tenses the rectus muscles
by raising the head or body, the swelling becomes
more tender and distinct on palpation, in contrast to
an intra-abdominal mass or tenderness that disap-
pears when the rectus muscles are contracted
(Fothergill's sign). In addition, there may be detect-
able discoloration or ecchymosis. If the physical
signs are not diagnostic, ultrasound or CT scan can
demonstrate the hematoma in the abdominal wall.

Usually, the condition can be treated without oper-
ation. The acute pain and discomfort should disap-
pear within 2 or 3 days, although a residual mass may
persist for several weeks. If pain is severe, an accept-
able alternative is evacuation of the clot and control
of the bleeding.

Gocke JE, MacCarty RL, Foulk WT: Rectus sheath hema-
toma: Diagnosis by computed tomography scanning.
Mayo Clin Proc 1981;56:757.
Zainea GG et al: Rectus sheath hematomas: Their pathogen-
esis, diagnosis, and management. Am Surg 1988;54:630.

PAIN IN THE ABDOMINAL WALL

A number of conditions are characterized by pain
in the abdominal wall without a demonstrable or-
ganic lesion. Pain from a diaphragmatic, supra-
diaphragmatic, or spinal cord lesion may be referred
to the abdomen. Herpes zoster (shingles) may present
as abdominal pain, in which case it will follow a
dermatomal distribution.

Scars may be sensitive or painful, particularly in the first 6 months after surgery.

Entrapment of a nerve by a nonabsorbable suture may cause persistent incisional pain, sometimes quite severe. Hyperesthesia of the skin over the involved dermatome may provide a clue to the cause.

In all cases of epigastric pain in the abdominal wall, careful search should be made for a small epigastric hernia, as noted earlier.

ABDOMINAL WALL TUMORS

Tumors of the abdominal wall are quite common, but most are benign, eg, lipomas, hemangiomas, and fibromas. Musculoaponeurotic fibromatoses (desmoid tumors), which often occur in abdominal wall scars or after parturition in women, are discussed in more detail in Chapter 48. Most malignant tumors of the abdominal wall are metastatic. Metastases may appear by direct invasion from intra-abdominal lesions or by vascular dissemination. The sudden appearance of a sensitive nodule anywhere in the abdominal wall that is clearly not a hernia should arouse suspicion of an occult cancer, the lung and pancreas being the more likely primary sites.

REFERENCES

Nyhus LM, Condon RE (editors): *Hernia,* 3rd ed. Lippincott, 1989.

Skandalakis JE et al: *Surgical Anatomy and Technique.* McGraw-Hill, 1989.

Adrenals

Quan-Yang Duh, MD, TI

Operations on the adrer primary hyperaldosteror hyperadrenocorticism (C ing's syndrome), and, les cortical tumors. These co terized by hypersecretic adrenal hormones.

Anatomy & Surgical I

The normal combine 7–12 g. The right gland the vena cava and sup 34–1). The left gland lie of the kidney, just later ately posterior to the su An important surgical f stancy of the adrenal v 2–5 mm long and sever the anterior aspect of posterolateral aspect of nal vein is several centi orly from the lower po renal vein after receiv The adrenal arteries a stant. They usually cor tery, the aorta, and the

With the exception indications for adren secretory states. Diag confirmation of a hyr ment of excess corti mines in blood or whether the problem of the stimulator of ACTH or renin) mus els are low or normal sive, autonomous sec except in pheochrom gree of autonomy, tinguishes hyperplas not all controlling m adenomas from canc little if any feedbacl is not in the adrena ment must be direct

Adrenal masses ized) by CT scan or