

Inguinal Hernias: Diagnosis and Management

KIM EDWARD LeBLANC, MD, PhD; LEANNE L. LeBLANC, MD; and KARL A. LeBLANC, MD, MBA
Louisiana State University School of Medicine, New Orleans, Louisiana

Inguinal hernias are one of the most common reasons a primary care patient may need referral for surgical intervention. The history and physical examination are usually sufficient to make the diagnosis. Symptomatic patients often have groin pain, which can sometimes be severe. Inguinal hernias may cause a burning, gurgling, or aching sensation in the groin, and a heavy or dragging sensation may worsen toward the end of the day and after prolonged activity. An abdominal bulge may disappear when the patient is in the prone position. Examination involves feeling for a bulge or impulse while the patient coughs or strains. Although imaging is rarely warranted, ultrasonography or magnetic resonance imaging can help diagnose a hernia in an athlete without a palpable impulse or bulge on physical examination. Ultrasonography may also be indicated with a recurrent hernia or suspected hydrocele, when the diagnosis is uncertain, or if there are surgical complications. Although most hernias are repaired, surgical intervention is not always necessary, such as with a small, minimally symptomatic hernia. If repair is necessary, the patient should be counseled about whether an open or laparoscopic technique is best. Surgical complications and hernia recurrences are uncommon. However, a patient with a recurrent hernia should be referred to the original surgeon, if possible. (*Am Fam Physician.* 2013;87(12):844-848. Copyright © 2013 American Academy of Family Physicians.)

► Patient information:

A handout on this topic, written by the authors of this article, is available at <http://www.aafp.org/afp/2013/0615/p844-s1.html>. Access to the handout is free and unrestricted.

CME This clinical content conforms to AAFP criteria for continuing medical education (CME). See CME Quiz on page 833.

Author disclosure: No relevant financial affiliations.

Hernia is a general term describing a bulge or protrusion of an organ or tissue through an abnormal opening within the anatomic structure. Although there are many different types of hernias, they are usually related to the abdomen, with approximately 75% of all hernias occurring in the inguinal region.¹ Abdominal wall hernias account for 4.7 million ambulatory care visits annually. More than 600,000 surgical repairs for inguinal hernias are performed nationwide each year,² making it one of the most common general surgical procedures performed in the United States.

Inguinal hernias have a 9:1 male predominance,³ with a higher incidence among men 40 to 59 years of age. It has been estimated that more than one-fourth of adult men in the United States have a medically recognizable inguinal hernia.⁴ Men with a diagnosed hiatal hernia have been shown to have double the risk of an inguinal hernia. Among women, taller height, chronic cough, umbilical hernia, older age, and rural residence have been associated with a higher incidence of inguinal hernia. Neither smoking nor alcohol use has been shown to affect

hernia occurrence. Several studies have demonstrated that men who are overweight or obese have a lower risk of inguinal hernia than men of normal weight.^{4,5}

Although this article focuses on inguinal hernias, other diagnostic possibilities should be considered in a patient with groin pain (*Table 1*). In athletes, groin pain most commonly results from an overuse injury associated with adductor tendons and muscles, and a specific differential diagnosis should be considered in these patients (*Table 2*).^{6,7} Any mass palpated in the inguinal region should prompt a thorough clinical evaluation because there are many possible diagnoses (*Table 3*).

Symptoms and Physical Findings

The diagnosis of an inguinal hernia is usually made through history and physical examination findings. Although data are limited, in one report, the sensitivity and specificity of the physical examination were 75% and 96%, respectively.⁸

Symptoms of an inguinal hernia may appear gradually over time or develop suddenly, as with incarceration (i.e., the contents of the hernia sac cannot be returned to the

abdominal cavity). Inguinal hernias may be asymptomatic and found incidentally on routine physical examination. Symptomatic patients often present with groin pain, which can be severe. Stretching or tearing of the tissue at and around the hernia defect can lead to a burning, gurgling, or aching sensation in the groin. This usually causes localized pain directly at the site of the hernia. Pain may worsen with Valsalva maneuvers. Patients may

experience a heavy or dragging sensation in the groin, especially toward the end of the day and after prolonged activity.¹ Activities that increase intra-abdominal pressure, such as coughing, lifting, or straining, cause more abdominal contents to be pushed through the hernia defect. As this occurs, the bulge of the hernia gradually increases in size. If the patient indicates that this bulge disappears while he or she is in the supine position, clinical suspicion of a hernia should be increased.

Hernias may be easily diagnosed with an adequate physical examination. The physical examination should begin by carefully inspecting the femoral and inguinal areas for bulges while the patient is standing. Then, the patient should be asked to strain down (i.e., Valsalva maneuver) while the physician observes for bulges. This may be accomplished by using the right hand to examine the patient's right side and the left hand to examine the patient's left side. The physician invaginates the loose skin of the scrotum with the index finger on the ipsilateral side of the patient, starting at a point low enough on the scrotum to reach as far as the internal inguinal ring. Starting on the scrotum, the examining finger follows the spermatic cord upward above the inguinal ligament to the triangular, slit-like opening of the external inguinal ring. The external inguinal ring is medial to and just below the pubic tubercle. The inguinal canal is gently followed laterally in its oblique course. While the examining finger is in the canal next to the internal inguinal ring, the patient strains down or coughs as the physician feels for any palpable herniation.⁹ The diagnosis of an inguinal hernia is confirmed if an "impulse" or bulge is felt.

If no bulge is detected with a Valsalva maneuver, a hernia is unlikely. However, athletic pubalgia (sports hernia) may be considered in athletes with groin pain and no bulge. A sports hernia is not a true hernia, but rather a tearing of tissue fibers. This typically occurs in patients with a history of high-intensity athletic activity. Although these patients have typical hernia symptoms, there is no evidence on physical examination. Further follow-up and reexamination are needed to diagnose a sports hernia. Pain along the symphysis pubis suggests osteitis pubis, whereas pain along the adductor tendons suggests adductor tendinopathy.

It is more challenging to diagnose a hernia in female patients. Direct palpation with an open hand over the groin area might detect the impulse of a hernia during a Valsalva maneuver. However, further workup

Chronic pain is the most common long-term issue after hernia repair.

Table 1. Differential Diagnosis of Groin Pain

Adhesions	Lumbar disk disease
Appendicitis	Meralgia paresthetica
Athletic pubalgia (sports hernia)	Pelvic pathology (osteitis pubis, adductor strain)
Diverticulosis/diverticulitis	Prostatitis
Hip pathology (osteoarthritis, avascular necrosis of femoral head)	Testicular disorders
Inflammatory bowel disease	Urinary tract infection

Table 2. Differential Diagnosis of Groin Pain in Athletes

<i>Diagnosis</i>	<i>Clinical presentation</i>
Avulsion fractures	History of sudden or forceful muscle contraction, tenderness over bony prominence, ecchymoses
Ligamentous sprains	History of trauma or fall, sudden onset
Muscle strains	History of sudden onset during muscle contraction
Nerve entrapment syndromes	Associated paresthesias or numbness
Osteitis pubis	Tenderness over symphysis pubis
Referred pain from lumbar, hip, or sacroiliac area	Associated findings in these areas
Sports hernia	History of high-intensity athletic activity, typical symptoms of hernia with no evidence on physical examination, pain with forced adduction against examiner's resistance
Stress fractures	History of repetitive motion activity or overuse, tenderness over bone
Tendinopathies	Pain with motion and contraction of specific muscle

Information from references 6 and 7.

Inguinal Hernias

with diagnostic testing or referral to a surgeon is often indicated. Rarely, diagnostic laparoscopy is necessary.

Incarceration may be managed in the office setting if there is no associated pain. The standard of care is to place the patient in the Trendelenburg position while holding gentle pressure on the area for up to 15 minutes. If acute onset of groin pain occurs, the hernia may have become strangulated (i.e., the blood supply to the entrapped contents is compromised). Strangulation should be suspected in the presence of tenderness, redness, nausea, and vomiting and is a surgical emergency.¹⁰

Imaging

Although imaging is rarely needed to diagnose a hernia, it may be useful in certain clinical situations (e.g., suspected sports hernia; recurrent hernia or possible hydrocele; uncertain diagnosis; surgical complications, especially chronic pain).⁸ The clinical use of ultrasonography has shown promise in these situations.^{11,12} The sensitivity of ultrasonography for the detection of groin hernias is greater than 90%, and the specificity is 82% to 86%.^{8,13}

Use of higher resolution axial computed tomography in the diagnosis of inguinal hernia is being investigated.¹⁴ Magnetic resonance imaging may be useful in differentiating inguinal and femoral hernias with a high sensitivity and specificity (greater than 95%).⁸ The use of magnetic resonance imaging is helpful in the diagnosis of athletic pubalgia or sports hernias, which may occur at any age with potentially more than one cause. The physician may consider magnetic resonance imaging in the workup of patients with activity-related groin pain when no inguinal hernia can be identified on physical examination.¹⁵

Surgical Management

In the past, surgical repair was recommended for all inguinal hernias because of the risk of complications such as incarceration or strangulation. However, recent studies have proved that small, minimally symptomatic, first occurrence hernias do not necessarily require repair, and these patients can be followed expectantly. However, they should be counseled on the symptoms of incarceration

Table 3. Differential Diagnosis of Groin and Scrotal Masses

<i>Diagnosis</i>	<i>Clinical presentation</i>
Ectopic testis	Absence of a testis in the scrotum
Epididymitis	Severe pain surrounding the testis, tenderness, fever, chills
Femoral adenitis/adenopathy	Bilateral, firm, tender nodes; fever
Femoral arterial aneurysm	Older patient, pulsatile mass, no systemic symptoms
Femoral hernia	More common in women, often incarcerated, bowel obstruction
Hematoma	Associated trauma, ecchymoses, tenderness, no change with Valsalva maneuver
Hidradenitis	Draining abscesses in intertriginous skin of the groin
Hydrocele	Mass in the scrotum or inguinal canal that transilluminates
Inguinal adenitis/adenopathy	Tenderness, redness possible, often bilateral, systemic symptoms
Inguinal hernia	Bulge or impulse detected in inguinal canal with Valsalva maneuver or coughing
Lipoma	Soft, asymptomatic mass; does not change in size
Lymphoma	Firm, tender mass; may increase in size; organomegaly; systemic symptoms
Metastatic neoplasia	Firm, tender mass; may be enlarging; systemic symptoms or weight loss
Psoas abscess	Flank or back pain, fever, inguinal mass, limp, weight loss
Sebaceous cyst	Soft mass, nontender, more superficial, no change with Valsalva maneuver
Testicular torsion	Acute onset of pain with a high-riding testis, swelling, very tender
Varicocele	Usually asymptomatic or dull ache, unilateral "bag of worms" in scrotum

and strangulation, and to seek prompt evaluation if these occur.^{16,17} Patients with symptomatic, large, or recurrent hernias should be referred for repair, generally within one month of detection.¹⁸ Hernia repair almost always involves some type of prosthetic material (i.e., mesh), with the possible exception of women of childbearing age because stretching of tissues during pregnancy may result in a recurrent hernia. The choice of mesh material used in the repair is based on the surgeon's preference.

The choice of open vs. laparoscopic repair depends on surgeon preference, but only about 10 percent of inguinal hernia repairs in the United States are performed via a laparoscopic technique.¹⁹ Open repair may be particularly beneficial in older, less healthy patients.²⁰ Laparoscopic repair is usually reserved for recurrent

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Although imaging techniques such as ultrasonography, computed tomography, and magnetic resonance imaging are rarely needed to diagnose inguinal hernias, they may be useful in certain clinical situations.	C	18
Ultrasonography has good sensitivity and specificity for the detection of groin hernias.	C	8
Small, minimally symptomatic, first hernias do not necessarily require repair, and these patients may be followed expectantly. They should be counseled on symptoms of incarceration or strangulation, and to seek prompt evaluation if these occur.	C	16, 17
Patients with symptomatic, large, or recurrent inguinal hernias should be referred for repair, generally within one month of detection.	C	18

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <http://www.aafp.org/afpsort/>.

or bilateral hernias. Open and laparoscopic techniques have similar results (Table 4).²¹⁻²⁴ Both procedures are effective if performed by an experienced surgeon, and have a recurrence rate from 0% to 9.4%.^{25,26}

The most common complications of hernia repair are hematomas, including penile or scrotal ecchymosis; seromas; and wound infection. Although these are uncommon, family physicians should be vigilant

because patients may present to them postoperatively. Chronic pain is the most common long-term problem after hernia repair, occurring in 5% to 12% of patients, and is related to nerve scarification, mesh contraction, chronic inflammation, or osteitis pubis.^{27,28} Treating hernia repair complications can be challenging, and these patients are often referred to the operating surgeon.²⁹

Postoperative Care

The current standard of care after hernia repair is general wound care. The length of required inactivity varies greatly based on the surgeon's preference, but activity is usually permitted within two to four weeks for laborers and within 10 days as tolerated for professionals.^{30,31}

Data Sources: The literature search was conducted using the keywords hernia, hernia surgery, groin pain, and laparoscopic repair. We searched the Centers for Disease Control and Prevention, Cochrane Database of Systematic Reviews, Agency for Healthcare Research and Quality Evidence Reports, National Guidelines Clearinghouse, Institute for Clinical Systems Improvement, U.S. Preventive Services Task Force, and Essential Evidence Plus. Search date: May 2, 2011, through May 6, 2011.

The authors thank Christine L. Manalla for her assistance in the writing and preparation of the manuscript.

The Authors

KIM EDWARD LeBLANC, MD, PhD, FAAFP, FACSM, is the Bernard and Marie Lahasky professor and head of the Department of Family Medicine at Louisiana State University School of Medicine in New Orleans. He is also a professor in the university's Department of Orthopedics and has a certificate of added qualification in sports medicine.

LEANNE L. LeBLANC, MD, FAAFP, is a family physician in private practice at JenCare Neighborhood Medical Centers in Kenner, La. At the time the article was written, she was an assistant professor of family medicine at Louisiana State University School of Medicine.

Table 4. Comparison of Laparoscopic and Open Techniques to Repair Primary Inguinal Hernias

<i>Outcome</i>	<i>Comparison</i>
Operative time	Longer with laparoscopy ²¹⁻²³ Equal ²⁴
Length of hospital stay	Shorter with laparoscopy ^{22,23} Equal ^{21,24}
Complications	More common with open technique ²³ Equal ^{21,22,24}
Return to usual activity	Earlier with laparoscopy ²¹⁻²³
Chronic pain	More common with laparoscopy ²¹ Equal ²⁴
Chronic numbness	More common with laparoscopy ²¹ Equal ²⁴
Hernia recurrence	Equal ²¹⁻²⁴

NOTE: It appears that laparoscopic repair increases operative time, but is associated with better patient outcomes and equal recurrence rates compared with open repair.

Information from references 21 through 24.

Inguinal Hernias

KARL A. LeBLANC, MD, MBA, FACS, is a clinical professor of surgery at Louisiana State University School of Medicine. He is also associate medical director of Our Lady of the Lake Physician Group and director and program chair of the fellowship program at the Minimally Invasive Surgery Institute in Baton Rouge, La.

Address correspondence to Kim Edward LeBlanc, MD, PhD, FFAFP, FACSM, Louisiana State University School of Medicine, 1542 Tulane Ave., Box T1-8, New Orleans, LA 70112 (e-mail: klebla@lsuhsc.edu). Reprints are not available from the authors.

REFERENCES

1. Evers BM. Small bowel. In: Sabiston DC, Townsend CM, eds. *Sabiston Textbook of Surgery: The Biological Basis of Modern Surgical Practice*. 18th ed. Philadelphia, Pa.: Saunders/Elsevier; 2008:873-916.
2. U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Digestive diseases statistics for the United States. June 2010. http://digestive.niddk.nih.gov/statistics/Digestive_Disease_Stats_508.pdf. Accessed November 16, 2012.
3. McIntosh A, Hutchinson A, Roberts A, Withers H. Evidence-based management of groin hernia in primary care—a systematic review. *Fam Pract*. 2000;17(5):442-447.
4. Ruhl CE, Everhart JE. Risk factors for inguinal hernia among adults in the US population. *Am J Epidemiol*. 2007;165(10):1154-1161.
5. Rosemar A, Angerås U, Rosengren A. Body mass index and groin hernia: a 34-year follow-up study in Swedish men. *Ann Surg*. 2008;247(6):1064-1068.
6. Morelli V, Weaver V. Groin injuries and groin pain in athletes: part 1. *Prim Care*. 2005;32(1):163-183.
7. LeBlanc KE, LeBlanc KA. Groin pain in athletes. *Hernia*. 2003;7(2):68-71.
8. van den Berg JC, de Valois JC, Go PM, Rosenbusch G. Detection of groin hernia with physical examination, ultrasound, and MRI compared with laparoscopic findings. *Invest Radiol*. 1999;34(12):739-743.
9. Bickley LS, Szilagyi PG, Bates B. *Bates' Guide to Physical Examination and History Taking*. 8th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2003:359-372.
10. Brunicaardi FC, Anderson DK, Schwartz SI, eds. *Schwartz's Principles of Surgery*. 9th ed. New York, NY: McGraw-Hill, 2010:1316-1318.
11. Jamadar DA, Franz MG. Inguinal region hernias. *Ultrasound Clin*. 2007;2(4):711-725.
12. Jamadar DA, Jacobson JA, Morag Y, et al. Sonography of inguinal region hernias. *AJR Am J Roentgenol*. 2006;187(1):185-190.
13. Korenkov M, Paul A, Troidl H. Color duplex sonography: diagnostic tool in the differentiation of inguinal hernias. *J Ultrasound Med*. 1999;18(8):565-568.
14. Burkhardt JH, Arshanskiy Y, Munson JL, Scholz FJ. Diagnosis of inguinal region hernias with axial CT: the lateral crescent sign and other key findings. *Radiographics*. 2011;31(2):E1-E12.
15. Zoga AC, Mullens FE, Meyers WC. The spectrum of MR imaging in athletic pubalgia. *Radiol Clin North Am*. 2010;48(6):1179-1197.
16. Fitzgibbons RJ Jr, Giobbie-Hurder A, Gibbs JO, et al. Watchful waiting vs repair of inguinal hernia in minimally symptomatic men: a randomized clinical trial [published correction appears in *JAMA*. 2006;295(23):2726]. *JAMA*. 2006;295(3):285-292.
17. Turaga K, Fitzgibbons RJ Jr, Puri V. Inguinal hernias: should we repair? *Surg Clin North Am*. 2008;88(1):127-138, ix.
18. National Guideline Clearinghouse. Hernia. February 23, 2011. <http://www.guideline.gov/content.aspx?id=25697>. Accessed May 20, 2011.
19. Mahon D, Decadt B, Rhodes M. Prospective randomized trial of laparoscopic (transabdominal preperitoneal) vs open (mesh) repair for bilateral and recurrent inguinal hernia. *Surg Endosc*. 2003;17(9):1386-1390.
20. Neumayer L, Giobbie-Hurder A, Jonasson O, et al.; Veterans Affairs Cooperative Studies Program 456 Investigators. Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med*. 2004;350(18):1819-1827.
21. McCormack K, Scott NW, Go PM, Ross S, Grant AM; EU Hernia Trialists Collaboration. Laparoscopic techniques versus open techniques for inguinal hernia repair. *Cochrane Database Syst Rev*. 2003;(1):CD001785.
22. Kuhry E, van Veen RN, Langeveld HR, Steyerberg EW, Jeekel J, Bonjer HJ. Open or endoscopic total extraperitoneal inguinal hernia repair? A systematic review. *Surg Endosc*. 2007;21(2):161-166.
23. Memon MA, Cooper NJ, Memon B, Memon MI, Abrams KR. Meta-analysis of randomized clinical trials comparing open and laparoscopic inguinal hernia repair. *Br J Surg*. 2003;90(12):1479-1492.
24. Pokorny H, Klingler A, Schmid T, et al. Recurrence and complications after laparoscopic versus open inguinal hernia repair: results of a prospective randomized multicenter trial. *Hernia*. 2008;12(4):385-389.
25. Wright D, Paterson C, Scott N, Hair A, O'Dwyer PJ. Five-year follow-up of patients undergoing laparoscopic or open groin hernia repair: a randomized controlled trial. *Ann Surg*. 2002;235(3):333-337.
26. Sarli L, Iusco DR, Sansebastiano G, Costi R. Simultaneous repair of bilateral inguinal hernias: a prospective, randomized study of open, tension-free versus laparoscopic approach. *Surg Laparosc Endosc Percutan Tech*. 2001;11(4):262-267.
27. Nienhuijs SW, Rosman C, Strobbe LJ, Wolff A, Bleichrodt RP. An overview of the features influencing pain after inguinal hernia repair. *Int J Surg*. 2008;6(4):351-356.
28. Aasvang EK, Gmaehle E, Hansen JB, et al. Predictive risk factors for persistent postherniotomy pain. *Anesthesiology*. 2010;112(4):957-969.
29. Ferzli GS, Edwards E, Al-Khoury G, Hardin R. Postherniorrhaphy groin pain and how to avoid it. *Surg Clin North Am*. 2008;88(1):203-216, x-xi.
30. Salcedo-Wasicek MC, Thirlby RC. Postoperative course after inguinal herniorrhaphy. A case-controlled comparison of patients receiving workers' compensation vs patients with commercial insurance. *Ann Surg*. 1995;130(1):29-32.
31. Barkun JS, Keyser EJ, Wexler MJ, et al. Short-term outcomes in open vs. laparoscopic herniorrhaphy: confounding impact of worker's compensation on convalescence. *J Gastrointest Surg*. 1999;3(6):575-582.