Groin Hernia Repair

Inguinal and Femoral

American College of Surgeons
Inspiring Quality:
Highest Standards, Better Outcomes
100+years

Patient Education

This educational information is to help you be better informed about your operation and empower you with the skills and knowledge needed to actively participate in your care.

Keeping You Informed

Information that will help you further understand the operation and your role in your recovery.

Education is provided on:

Hernia Repair Overview.....1
Condition, Symptoms, Tests.....2
Treatment Options.....3
Risks and Possible Complications.....4
Preparation and Expectations.....5
Your Recovery and Discharge.....6
Pain Control.....7
Glossary/References.....8

SURGICAL PATIENT EDUCATION PROGRAM
Prepare for the Best Recovery

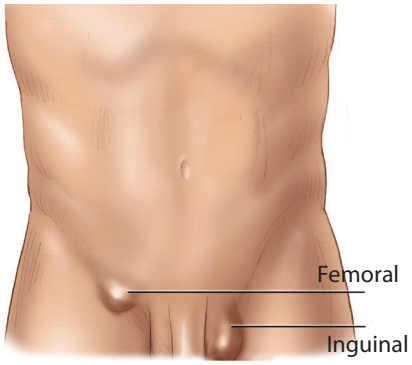
The Condition

A hernia occurs when tissue bulges out through an opening in the muscles. Any part of the abdominal wall can weaken and develop a hernia, but the most common sites are the groin (inguinal), the navel (umbilical) and a previous surgical incision site.

Common Symptoms

- Visible bulge in the scrotum or groin area, especially with coughing or straining
- Pain or pressure at the hernia site

Groin Hernia Location



Treatment Options

Surgical Procedure

Open hernia repair—An incision is made near the site and the hernia is repaired with mesh or by suturing (sewing) the muscle closed.

Laparoscopic hernia repair—The hernia is repaired by mesh or sutures inserted through instruments placed into small incisions in the abdomen.

Nonsurgical Procedure

Watchful waiting is a safe and acceptable option for adults with inguinal hernias that are not uncomfortable.[1-2]

Many patients become symptomatic after the first 1 to 2 years and crossover to surgery due to increased pain on exertion, chronic constipation or urinary symptoms.[3]

Benefits and Risks of Your Operation

Benefits—An operation is the only way to repair a hernia. You can return to your normal activities and in most cases will not have further discomfort.

Possible risks include—Return of the hernia; infection; injury to the bladder, blood vessels, intestines or nerves, difficulty passing urine, continued pain, and swelling of the testes or groin area.

Risks of not having an operation—Your hernia may cause pain and increase in size. If your intestine becomes trapped in the hernia pouch you will have sudden pain, vomiting, and need an immediate operation.

Expectations

Before your operation—Evaluation may include blood work and urinalysis. Your surgeon and anesthesia provider will discuss your health history, home medications, and pain control options.

The day of your operation—You will not eat or drink for 6 hours before the operation. Most often you will take your normal medication with a sip of water. You will need someone to drive you home.

Your recovery—If you do not have complications you usually will go home the same day.

Call your surgeon—If you have severe pain, stomach cramping, chills, or a high fever (over 101°F or 38.3°C), odor or increased drainage from your incision, or no bowel movements for 3 days.

This first page is an overview. For more detailed information, review the entire document.

SAMPLE

The Condition, Symptoms, and Diagnostic Tests

Keeping You Informed

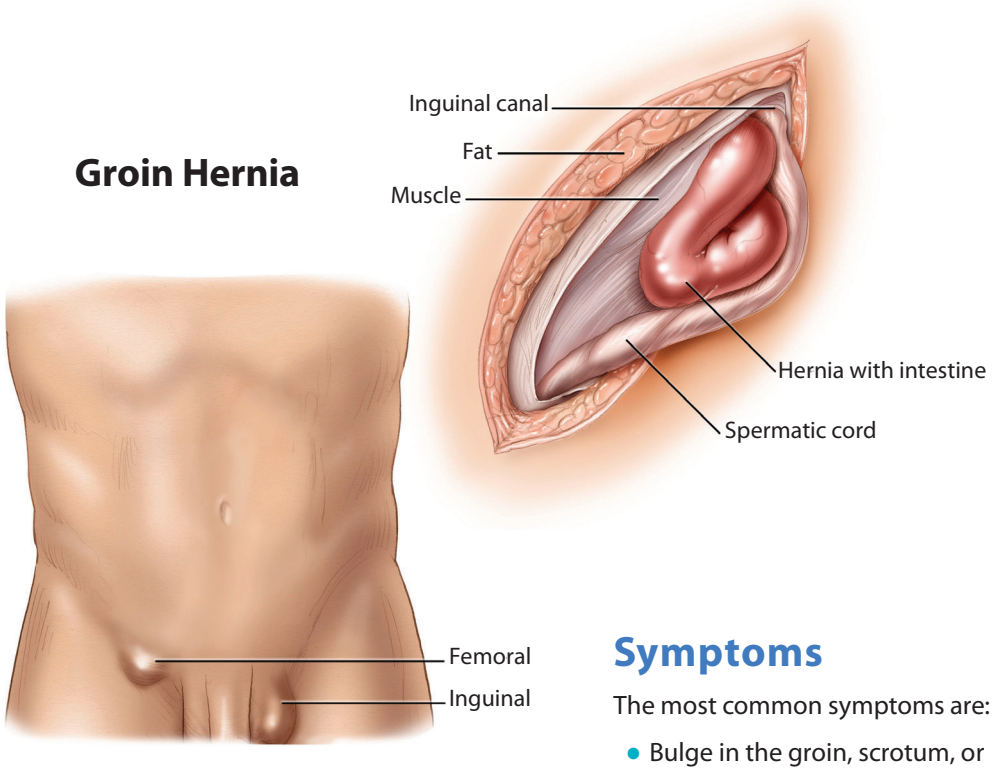
Who Gets Hernias?

There may be no cause for a hernia. Some risk factors are:

- Older age—muscles become weaker
- Obesity—increased weight places pressure on abdominal muscle
- Sudden twist, pulls, or strains
- Chronic straining
- Family history
- Connective tissue disorders
- Pregnancy—1 in 2,000 women develop a hernia during pregnancy.[2]

Other medical disorders

that have symptoms similar to hernias include enlarged lymph nodes, cysts, and testicular problems such as scrotal hydrocele.[2-4]



The Condition

The Hernia

A **groin hernia** occurs when the intestine bulges through the opening in the muscle in the groin area. A **reducible hernia** can be pushed back into the opening. When intestine or abdominal tissue fills the hernia sac and cannot be pushed back, it is called **irreducible or incarcerated**. A hernia is **strangulated** if the intestine is trapped in the hernia pouch and the blood supply to the intestine is decreased. **This is a surgical emergency.**[2]

There are two types of **groin hernias**:

An **inguinal hernia** appears as a bulge in the groin or scrotum. Inguinal hernias account for 75% of all hernias and are most common in men.[2]

A **femoral hernia** appears as a bulge in the groin, upper thigh, or labia (skin folds surrounding the vaginal opening). Femoral hernias are ten times more common in women.[2] They are always repaired because of a high risk of strangulation.[1-3]

Herniorraphy is the surgical repair of a hernia. **Hernioplasty** is the surgical repair of a hernia with mesh.

Symptoms

The most common symptoms are:

- Bulge in the groin, scrotum, or abdominal area that often increases in size with coughing or straining.
- Mild pain or pressure at the hernia site.[2]
- Numbness or irritation due to pressure on the nerves around the hernia.[2]
- Sharp abdominal pain and vomiting can mean that the intestine has slipped through the hernia sac and is strangulated. **This is a surgical emergency and immediate treatment is needed.**

Common Tests

History and Physical exam[2]

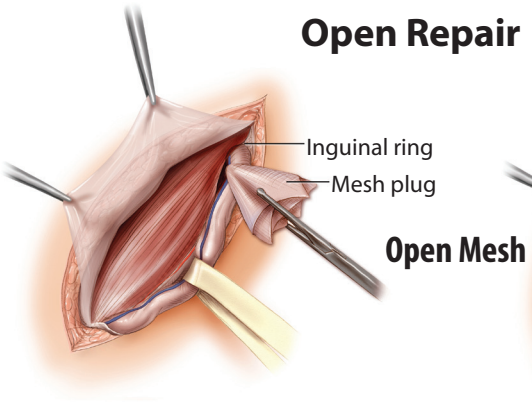
The site is checked for a bulge.

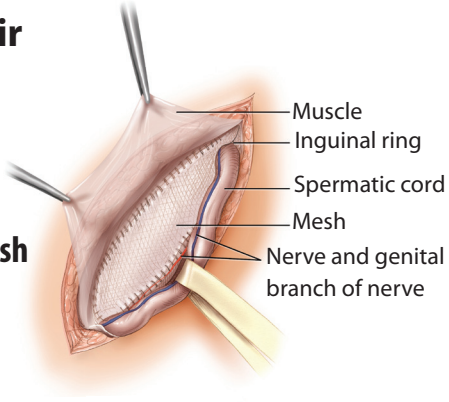
Other tests may include **(see glossary)**:

- Digital exam
- Blood tests
- Urinalysis
- Electrocardiogram (ECG)—for patients over 45 or if high risk of heart problems
- Ultrasound
- Computerized tomography (CT) scan

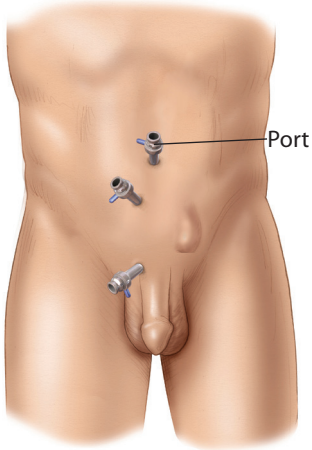
Surgical and Nonsurgical Treatment

Open Repair

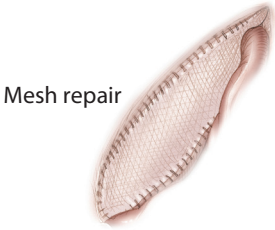




Laparoscopic Repair



Port sites will vary



Surgical Treatment

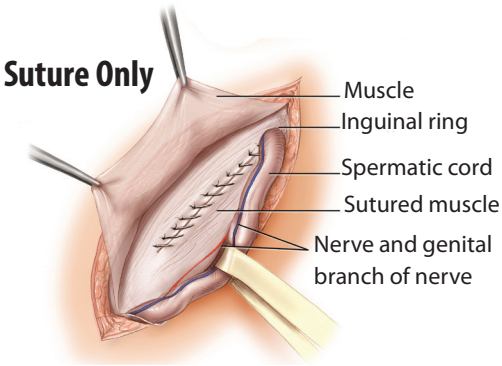
The type of operation depends on hernia size and location, and if it is a repeat hernia. Your health, age, anesthesia risk, and the surgeon's expertise are also important. An operation is the only treatment for incarcerated/strangulated and femoral hernias.

Your hernia can be repaired either as an **open or laparoscopic approach**. The repair can be done by using sutures only or adding a piece of mesh.

Open Hernia Repair

The surgeon makes an incision near the hernia site and the bulging tissue is pushed back into the abdomen. Most inguinal hernia repairs use mesh to close the muscle.[5] An open repair can be done with local anesthesia.

- **For an open mesh repair:** The hernia sac is removed. Mesh is placed over the hernia site. The mesh is attached using sutures sewn into the stronger tissue surrounding the hernia site. Mesh plugs can also be placed into the inguinal or femoral hernia space. The mesh plug fills the open site and is sutured to the surrounding tissue. An additional mesh patch is applied and may or may not be sutured.[2] Mesh is often used for large hernia repairs and may reduce the risk that the hernia will come back. The site is closed using sutures, staples, or surgical glue.
- **For a suture-only repair:** The hernia sac is removed. Then the tissue along the muscle edge is sewn together. This procedure is often used for strangulated or infected hernias or small defects (less than 3 cm).



Laparoscopic Hernia Repair

The surgeon will make several small punctures or incisions in the abdomen. Ports (hollow tubes) are inserted into the openings. The abdomen is inflated with carbon dioxide gas to make it easier to see the internal organs. Surgical tools and a laparoscopic light are placed into the ports. The hernia is repaired with mesh and sutured or stapled in place. The repair is done as a TransAbdominal PrePeritoneal (TAPP) procedure, which means the peritoneum (the sac that contains all of the abdominal organs) is entered, or the repair is done as a Totally ExtraPeritoneal (TEP) procedure.[2-4]

Nonsurgical Treatment

Watchful waiting is an option if you have an inguinal hernia with no symptoms.[1] Hernia incarceration occurred in 1.8 per 1,000 men who waited longer than 2 years to have a repair.[2] Femoral hernias should always be repaired because of the high risk (400 of 1,000) of incarceration and bowel strangulation within 2 years of diagnosis.[2]

Trusses or belts can help manage the symptoms of a hernia by applying pressure at the site. A truss requires correct fitting and complications include testicular nerve damage and incarceration may result.[4]

Keeping You Informed

Open vs. Laparoscopic Incisional Repair

A laparoscopic repair of inguinal hernia may result in less pain and numbness, lower infection rate, and faster return to normal activity when compared with open surgery.[6] Laparoscopic repair may lengthen the operative time and may cost more.[5] A recurrence from a previous open hernia repair is best repaired laparoscopically because you avoid scar tissue from previous incisions.[7] Laparoscopic repair of a bilateral (both sides of the groin) inguinal hernias also resulted in earlier return to work than open repairs.[8]

The risk of complications increases for both the open and laparoscopic procedure if the hernia extends into the scrotum.[9]

SAMPLE

Risks of this Procedure

Risks Based on the ACS Risk Calculator

Open and Laparoscopic Inguinal and Femoral Hernia Surgery from the ACS Risk Calculator—July 17, 2018

Risks	Percent for Average Patient	Keeping You Informed
Wound Infection: Infection at the area of the incision or near the organ where the surgery was performed	**Open** 0.3% **Laparoscopic** 0.2%	Antibiotics and drainage of the wound may be needed. Smoking can increase the risk of infection.
Complications: Including surgical infections, breathing difficulties, blood clots, renal (kidney) complications, cardiac complications, and return to the operating room	**Open** 1.5% **Laparoscopic** 1.2%	Complications related to general anesthesia and surgery may be higher in smokers, elderly and/or obese patients, and those with high blood pressure and breathing problems. Wound healing may also be decreased in smokers and those with diabetes and immune system disorders.
Pneumonia: Infection in the lungs	**Open** 0.1% **Laparoscopic** 0.1%	Movement, deep breathing, and stopping smoking can help prevent respiratory infections.
Urinary tract infection: Infection of the bladder or kidneys	**Open** 0.1% **Laparoscopic** 0.1%	Drinking fluids and catheter care decrease the risk of bladder infection.
Venous thrombosis: A blood clot in the legs that can travel to the lungs	**Open** 0.1% **Laparoscopic** 0.1%	Longer surgery and bed rest increase the risk. Getting up, walking 5 to 6 times per day, and wearing support stockings reduce the risk.
Death	Less than 1%	Your surgical team is prepared for all emergency situations.
Risks from Outcomes Reported in the Last 10 years of Literature	**Percent for Average Patient**	**Keeping You Informed**
Chronic (long-term) pain	10% to 12% may have pain one year after surgery; possibly less with lapraoscopic[10-12]	Factors contributing to chronic pain include emergency hernia repair, scrotal hernia, or recurrent hernia repair.[1] Pain may be less with laparoscopic procedures than open procedures.[2] Pain caused by compression or tension may gradually decrease with time as a result of tissue rearrangement.[13]
Recurrence: A hernia can recur after the repair	**All patients** 1% to 17% [14] **Open** 4.9% **Laparoscopic** 10.1%	Recurrence occurs half as often when mesh is used versus non-mesh repair.[2] Laparoscopic repair is recommended for recurrent hernias because the surgeon avoids previous scar tissue. There is a higher rate of recurrence in older men with laparoscopic repair.
Neuralgia: Nerve pain causing tingling or numbness	**Open** 10.7% **Laparoscopic** 7.4%	Pressure, staples, stitches, or a trapped nerve in the surgical area can cause nerve pain. Tell your doctor if you feel severe, sharp, or tingling pain in the groin and leg immediately after your procedure; an operation may be required if the nerve is trapped.[2]
Seroma: A collection of clear/yellow fluid	**Mesh repairs** 8% **Nonmesh repairs** 3.1%	Seromas can form around the former hernia site. Removal of fluid with a sterile needle may be required.[2-4]
Hematoma: a collection of blood in the wound site or scrotum	**Mesh repairs** 2.2% **Nonmesh repairs** 7%	Hematomas are treated with anti-inflammatory medications, elevation, and rest. Rarely blood replacement or further testing for a blood vessel injury is needed.[4]

The data have been averaged per 1,000 cases

The ACS Surgical Risk Calculator estimates the risk of an unfavorable outcome. Data is from a large number of patients who had a surgical procedure similar to this one. If you are healthy with no health problems, your risks may be below average. If you smoke, are obese, or have other health conditions, then your risk may be higher. This information is not intended to replace the advice of a doctor or health care provider. To check your risks, go to the ACS Risk Calculator at *http://riskcalculator.facs.org.*

Expectations: Preparation for Your Operation

Preparing for Your Operation

Home Medication

Bring a list of all of the medications and vitamins that you are taking. Your medication may have to be adjusted before your operation. Some medications can affect your recovery and response to the anesthesia. Most often you will take your morning medication with a sip of water.

Anesthesia

Let your anesthesia provider know if you have allergies, neurologic disease (epilepsy, stroke), heart disease, stomach problems, lung disease (asthma, emphysema), endocrine disease (diabetes, thyroid conditions), or loose teeth; if you smoke, drink alcohol, use drugs, or take any herbs or vitamins; or if you have a history of nausea and vomiting with anesthesia.

If you smoke, you should let your surgical team know and you should plan to quit. Quitting before your surgery can decrease your rate of respiratory and wound complications and increase your chances of staying smoke-free for life. Resources to help you quit may be found at *www.facs.org/patienteducation* or *www.lungusa.org/stop-smoking*.

Length of Stay

If you have local anesthesia, you will usually go home the same day. You may stay overnight if you had a repair of a large or incarcerated hernia, laparoscopic repair with a longer anesthesia time, postanesthesia issues such as severe nausea and vomiting, or you are unable to pass urine.

The Day of Your Operation

- Do not eat or drink for at least 6 hours before your operation.
- Shower and clean your abdomen and groin area with a mild antibacterial soap.
- Brush your teeth and rinse your mouth out with mouthwash.
- Do not shave the surgical site; your surgical team will clip the hair nearest the incision site.

What to Bring

- Insurance card and identification
- Advance directives (see glossary)
- List of medicines
- Loose-fitting, comfortable clothes
- Slip-on shoes that don't require that you bend over
- Leave jewelry and valuables at home

What You Can Expect

An identification (ID) bracelet and allergy bracelet with your name and hospital/clinic number will be placed on your wrist. These should be checked by all health team members before they perform any procedures or give you medication. Your surgeon will mark and initial the operation site.

Fluids and Anesthesia

An intravenous line (IV) will be started to give your fluids and medication. For general anesthesia, you will be asleep and pain-free. A tube will be placed down your throat to help you breathe during the operation. For spinal anesthesia, a small needle with medication will be placed in your back near your spinal column. You will be awake and pain-free.

After Your Operation

You will be moved to a recovery room where your heart rate, breathing rate, oxygen saturation, blood pressure, and urine output will be closely watched. Be sure that all visitors wash their hands.

Preventing Pneumonia and Blood Clots

Movement and deep breathing after your operation can help prevent postoperative complications such as blood clots, fluid in your lungs, and pneumonia. Every hour take 5 to 10 deep breaths and hold each breath for 3 to 5 seconds.

When you have an operation, you are at risk of getting blood clots because of not moving during anesthesia. The longer and more complicated your surgery, the greater the risk. This risk is decreased by getting up and walking 5 to 6 times per day, wearing special support stockings or compression boots on your legs, and, for high risk patients, taking a medication that thins your blood.

Questions to Ask

About my operation

- What are the risks and side effects of general anesthesia?
- What technique will be used to repair the hernia—laparoscopic or open; mesh or with sutures?
- Ask your surgeon how frequently they perform laparoscopic hernia repairs?
- What are the risks of this procedure?
- Will you be performing the entire procedure yourself?
- What level of pain should I expect and how will it be managed?
- How long will it be before I can return to my normal activities—work, driving, lifting?

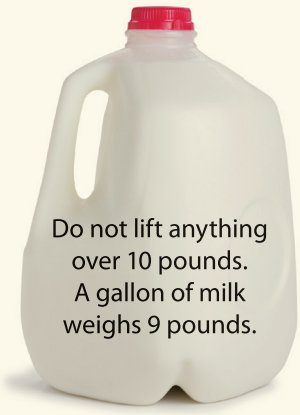
Your Recovery and Discharge

SAMPLE

Keeping You Informed

High-Fiber Foods

Foods high in fiber include beans, bran cereals and whole-grain breads, peas, dried fruit (figs, apricots, and dates), raspberries, blackberries, strawberries, sweet corn, broccoli, baked potatoes with skin, plums, pears, apples, greens, and nuts.



Do not lift anything over 10 pounds. A gallon of milk weighs 9 pounds.

Your Recovery and Discharge

Thinking Clearly

If general anesthesia is given, or if you are taking narcotic pain medication, it may cause you to feel different for 2 or 3 days, have difficulty with memory, and feel more fatigued. You should not drive, drink alcohol, or make any big decisions for at least 2 days.

Nutrition

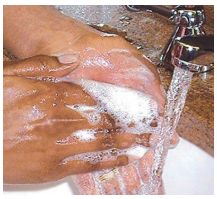
- When you wake up from the anesthesia, you will be able to drink small amounts of liquid. If you do not feel sick, you can begin eating regular foods.
- Continue to drink about 8 to 10 glasses of water per day.
- Eat a high-fiber diet so you don't strain while having a bowel movement.

Activity

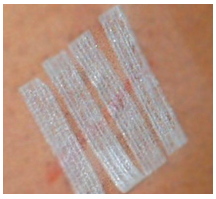
- Slowly increase your activity. Be sure to get up and walk every hour or so to prevent blood clot formation.
- Patients usually take 2 to 3 weeks to return comfortably to normal activity.[7]
- You may go home the same day after a simple repair. If you have other health conditions or complications such as nausea, vomiting, bleeding, or difficulty passing urine, you may stay longer.
- Persons sexually active before the operation reported being able to return to sexual activity in 14 days (average).

Work and Return to School

- You may return to work after 1 to 2 weeks after laparoscopic or open repair, as long as you don't do any heavy lifting. Discuss the timing with your surgeon.
- Do not lift items heavier than 10 pounds or participate in strenuous activity for at least 4 to 6 weeks.
- Lifting limitation may last for 6 months after complex or recurrent hernia repairs.



Handwashing



Steri-Strips®

Wound Care

- Always wash your hands before and after touching near your incision site.
- Do not soak in a bathtub until your stitches, Steri-Strips®, or staples are removed. You may take a shower after the second postoperative day unless you are told not to.
- Follow your surgeon's instructions on when to change your bandages.
- A small amount of drainage from the incision is normal. If the dressing is soaked with blood, call your surgeon.
- If you have Steri-Strips in place, they will fall off in 7 to 10 days.
- If you have a glue-like covering over the incision, just allow the glue to flake off on its own.
- Avoid wearing tight or rough clothing. It may rub your incisions and make it harder for them to heal.
- Protect the new skin, especially from the sun. The sun can burn and cause darker scarring.
- Your scar will heal in about 4 to 6 weeks and will become softer and continue to fade over the next year.

Bowel Movements

Avoid straining with bowel movements by increasing the fiber in your diet with high-fiber foods or over-the-counter medicines (like Metamucil® and FiberCon®). Be sure you are drinking 8 to 10 glasses of water each day.

Pain

The amount of pain is different for each person. The new medicine you will need after your operation is for pain control, and your doctor will advise how much you should take. You can use throat lozenges if you have sore throat pain from the tube placed in your throat during your anesthesia.

When to Contact Your Surgeon

Contact your surgeon if you have:

- Pain that will not go away
- Pain that gets worse
- A fever of more than 101°F or 38.3°C
- Continuous vomiting
- Swelling, redness, bleeding, or bad-smelling drainage from your wound site
- Strong or continuous abdominal pain or swelling of your abdomen
- No bowel movement by 2 to 3 days after the operation

Pain Control

Everyone reacts to pain in a different way. A scale from 0 to 10 is used to measure pain. At a "0," you do not feel any pain. A "10" is the worst pain you have ever felt. Following a laparoscopic procedure, pain is sometimes felt in the shoulder. This is due to the gas inserted into your abdomen during the procedure. Moving and walking helps to decrease the gas and the right shoulder pain.[2-3]

Extreme pain puts extra stress on your body at a time when your body needs to focus on healing. Do not wait until your pain has reached a level "10" or is unbearable before telling you doctor or nurse. It is much easier to control pain before it becomes severe.

Non-Narcotic Pain Medication

Most non-opioid analgesics are classified as non-steroidal anti-inflammatory drugs (NSAIDs). They are used to treat mild pain and inflammation or combined with narcotics to treat severe pain. Possible side effects of NSAIDs are stomach upset, bleeding in the digestive tract, and fluid retention. These side effects usually are not seen with short-term use. Let your doctor know if you have heart, kidney, or liver problems. Examples of NSAIDs include ibuprofen, Motrin®, Aleve®, and Toradol® (given as a shot).

Narcotic (Opioid) Pain Medication

Narcotics or opioids are used for severe pain. Possible side effects of narcotics are sleepiness, lowered blood pressure, heart rate, and breathing rate; skin rash and itching; constipation; nausea; and difficulty urinating. Some examples of narcotics include morphine, oxycodone (Percocet®/Percodan®), and hydromorphone (Dilaudid®). Medications can be given to control many of the side effects of narcotics.

Pain Control without Medication

Distraction helps you focus on other activities instead of your pain. Listening to music, playing games, or other engaging activities can help you cope with mild pain and anxiety.

Guided imagery helps you direct and control your emotions. Close your eyes and gently inhale and exhale. Picture yourself in the center of somewhere beautiful. Feel the beauty surrounding you and your emotions coming back to your control. You should feel calmer.

OTHER INSTRUCTIONS:

_____

_____

FOLLOW-UP APPOINTMENTS

WHO:

_____

DATE:

_____

PHONE:

_____

Keeping You Informed

Pain after Inguinal Hernia Repair

Pain that continues one year after inguinal hernia repair is more common in women, patients younger than 40 years, and those who have had previous groin surgery. Pain may be higher when heavy versus light-weight mesh is used.[13] Other causes of pain should be ruled out, such as lower back, spine, or hip pain. Treatment options may include non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, oral medications or injections (gabapentin or pregabalin) for nerve pain, or procedures to remove the nerves.

Distraction

Guided imagery

SAMPLE

More Information

For more information, please go to the American College of Surgeons Patient Education website at facs.org/patienteducation. For a complete review of hernia repair, consult Selected Readings in General Surgery, "Hernia" 2015 Vol. 41 No. 7 at facs.org/SRGS.

GLOSSARY

Advance directives: Documents signed by a competent person giving direction to health care providers about treatment choices.

Computerized tomography (CT) scan: A diagnostic test X ray and a computer to create a detailed, three-dimensional picture of your abdomen. A CT scan is commonly used to detect abnormalities or disease inside the abdomen. It is sometimes used to find a hernia not obvious during the physical exam.

Digital exam: The examiner will place their gloved index finger gently into the scrotal sac and feel up to the inguinal ring in the groin. Then the patient is asked to strain.

Electrocardiogram (ECG): Measures the rate and regularity of heartbeats and any damage to the heart.

General anesthesia: A treatment with certain medicines that puts you into a deep sleep so you do not feel pain during surgery.

Hematoma: A collection of blood that has leaked into the tissues of the skin or in an organ, resulting from cutting in surgery or the blood's inability to form a clot.

Incarceration: The protrusion or constriction of an organ through the wall of the cavity that normally contains it.

Local anesthesia: The loss of sensation only in the area of the body where an anesthetic drug is applied or injected.

Nasogastric tube: A soft plastic tube inserted in the nose and down to the stomach which is used to empty the stomach of contents and gases to rest the bowel.

Seroma: A collection of serous (clear/yellow) fluid.

Strangulation: Part of the intestine or fat is squeezed in the hernia sac and blood supply to the tissue is cut off.

Ultrasound: Sound waves are used to determine the location of deep structures in the body. A hand roller is placed on top of clear gel and rolled across the abdomen. An ultrasound may be used to find a hernia that is not obvious during the physical exam.

Urinalysis: A visual and chemical examination of the urine, most often used to screen for urinary tract infections and kidney disease.

DISCLAIMER

The American College of Surgeons (ACS) is a scientific and educational association of surgeons that was founded in 1913 to improve the quality of care for the surgical patient by setting high standards for surgical education and practice. The ACS endeavors to provide procedure education for prospective patients and those who educate them. It is not intended to take the place of a discussion with a qualified surgeon who is familiar with your situation. The ACS makes every effort to provide information that is accurate and timely, but makes no guarantee in this regard.

Reviewed 2016 and 2018 by:
David Feliciano, MD, FACS
Mary Hawn, MD, FACS
Nancy Strand, MPH, RN

REFERENCES

The information provided in this report is chosen from recent articles based on relevant clinical research or trends. The research below does not represent all that is available for your surgery. Ask your doctor if he or she recommends that you read any additional research.

1. Fitzgibbons RJ, Giobbie-Hurder A, Gibbs JO et al. Watchful waiting vs. repair of inguinal hernia in minimally symptomatic men. *JAMA.* 2006:295(3):285-292.
2. Malangoni MA, Rosen MJ. Hernias. In: CM Townsend, RD Beauchamp, et al. *Sabiston Textbook of Surgery*, Philadelphia, PA: Elsevier, 2012:chap 46.
3. Sarosi G, Yongliang W, Gibbs J, Reda D, McCarthy M, Fitzgibbons R, Barkun, J. A clinician's guide to patient selection for watchful waiting management of inguinal hernia. *Annals of Surgery.* 2011;253(3):605-610.
4. Fitzgibbons RJ Jr., Filipi CJ, Quinn TH. Inguinal Hernias. In: FC Brunicardi, DK Andrson, et al. *Principles of Surgery* (8th edition). New York: McGraw Hill, 2005.
5. Gould, J. Laparoscopic versus open inguinal hernia repair. *Surgical Clinics of North America.* 2008;88(5):1073-1081
6. Abbas AE, Noaman N, Amin M, Patient-perspective quality of life after laparoscopic and open hernia repair: A controlled randomized trial. *Surgical Endoscopy.* 2012;26:2465-2470.
7. Takata MC, Duh QY. Laparoscopic inguinal hernia repair. *Surgical Clinics of North America.* 2008;88(1):157-178
8. Mahon D, Decadt M, Rhodes M. Prospective randomized trial of laparoscopic (transabdominal preperitoneal) vs. open (mesh) repair for bilateral and recurrent inguinal hernia. *Surgical Endoscopy.* 2003;17:1386-1390.
9. Schwab JR et al. After 10 years and 1.903 inguinal hernias, what is the outcome for the laparoscopic repair? *Surgical Endoscopy.* 2002;16:12011206.
10. Niebuhr H, Wegner F, Hukauf M, et al. What are the influencing factors for chronic pain following TAPP inguinal hernia repair: An analysis of 20,004 patients from the Herniamed Registry. *Surgical Endoscopy.* 2018 Apr;32(4):1971-1983. doi: 10.1007/s00464-017-5893-2. Epub 2017 Oct 26.
11. Öberg S, Andresen K , Tobias W, et al. Chronic pain after mesh versus nonmesh repair of inguinal hernias: A systematic review and a network meta-analysis of randomized controlled trials. *Surgery.* 2018 May;163(5):1151-1159. doi: 10.1016/j.surg.2017.12.017. Epub 2018 Mar 13.
12. Matthews RD, Anthony T, Kim LT, et al. Factors associated with postoperative complications and hernia recurrence for patients undergoing inguinal hernia repair: A report from the VA Cooperative Hernia Study Group. *American Journal of Surgery.* 2007 Nov;194(5):611-617.
13. Inaba T, et al. Chronic pain and discomfort after inguinal hernia repair. *Surgery Today.* 2012;42:825-829
14. Itani K, Fitzgibbons R, Awad S et al. Management of recurrent inguinal hernias. *Journal of the American College of Surgeons.* 2009 Nov;209(5):653-658. doi: 10.1016/j.jamcollsurg.2009.07.015. Epub 2009 Aug 20.