AMERICAN COLLEGE OF SURGEONS
DIVISION OF EDUCATION

Patient Education

Partners in Your Surgical Care©

Inguinal/Femoral Hernia

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 your operation and your role in healing.

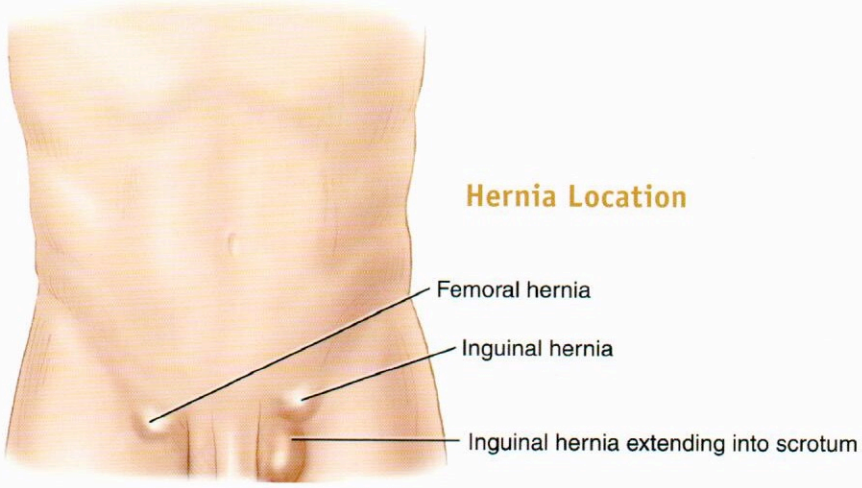
Education is provided on:

The Condition

A hernia occurs when a small 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 naval (umbilical), and a previous surgical incision site.

What Are the Common Symptoms?

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



Treatment Options

Surgical Procedure

Open hernia repair—An incision made over the site and the hernia is repaired with mesh or, less often, by suturing the muscle closed.

Laparoscopic hernia repair—The hernia is repaired with mesh or sutures using instruments placed into small incisions in the abdomen.

Nonsurgical

Watchful waiting is an option for adults with hernias that are not uncomfortable.[1] This is not recommended for femoral hernias or for infants.[2-6]

Benefits and risks

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.

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

Possible complications 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.

Expectations

Before your operation—Evaluation may include blood work and urinalysis. Your surgeon and anesthesia provider will discuss your health history, which home medications you should take the day of your operation, and options for pain control.

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, a high fever (over 101°F), odor or increased drainage from your incision, or do not have bowel movements for 3 days.

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

The Condition, Signs and Symptoms, and Diagnostic Tests

Keeping You Informed

Who Gets Hernias?

There may be no cause for a hernia. Some risk factors are[3-4]:

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.

Pediatric Considerations

Inguinal hernias occur in up to 50 of 1,000 full-term and 300 of 1,000 preterm infants. Inguinal hernias are 5 times more common in boys.[5]

Infants or children always have surgical repair because of the high risk of incarceration. Incarceration, can occur in up to 100 of 1,000 children and up to 400 of 1,000 premature infants. In females, 150 of 1,000 have an ovary in their hernia sac.[5-7]

Other medical disorders that have symptoms similar to hernias include enlarged lymph nodes, cysts, and testicular problems such as scrotal hydrocele.[3-4]

The Condition

The Hernia

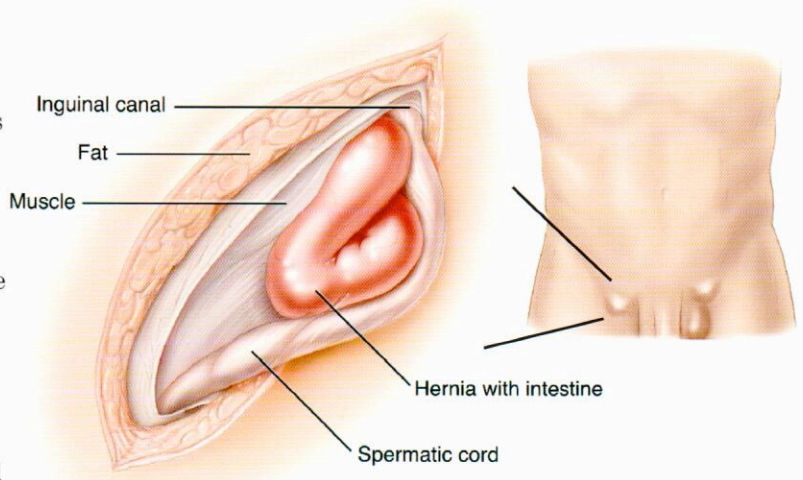
An inguinal hernia occurs when the abdominal cavity bulges through the opening in the muscle. A **reducible hernia** can be pushed back into the opening. When intestine or abdominal tissue fills the hernia sac and cannot be pushed back, it is called **irreducible** or **incarcerated.** A hernia is **strangulated** when the blood supply to the intestine or hernia sac is decreased.[3-4]

There are two types of groin hernias.

- An **inguinal hernia** appears as a bulge in the groin or scrotum. Inguinal hernias account for 80% of all hernias and are more common in men.
- A **femoral hernia** appears as a bulge in the groin, upper thigh, or labia (skin folds surrounding the vaginal opening). Femoral hernias are more common in women. They are always repaired because of a high risk of strangulation.[1-2, 6]

Herniorrhaphy is a surgical term for repair of a hernia.

Inguinal Hernia



Symptoms

The most common symptoms are:

- Bulge in the groin, scrotum, or abdominal area that often increases in size with coughing or straining.
- Hernia pain or pressure
- Sharp abdominal pain and vomiting may mean that the intestine has slipped through the hernia sac and is strangulated. This is a medical emergency and immediate treatment is needed.

Common Diagnostic Tests

History and Physical

The area is checked for a bulge

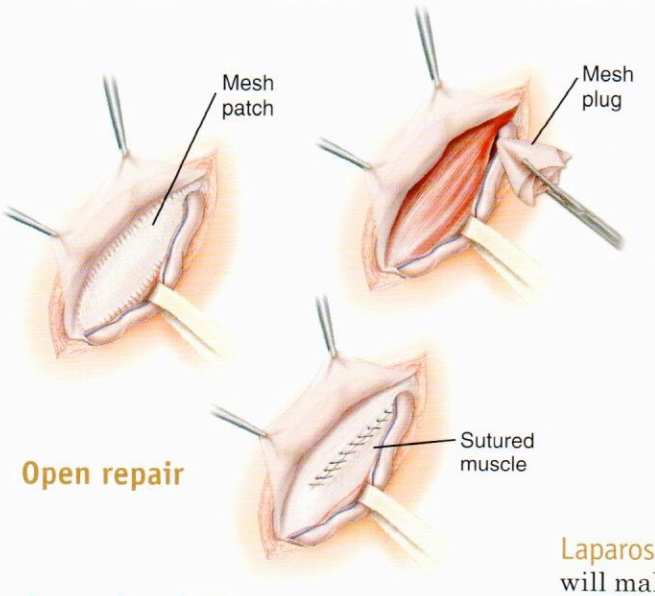
Additional Tests (see glossary)

A physical exam is the best way to determine an inguinal hernia.[3]

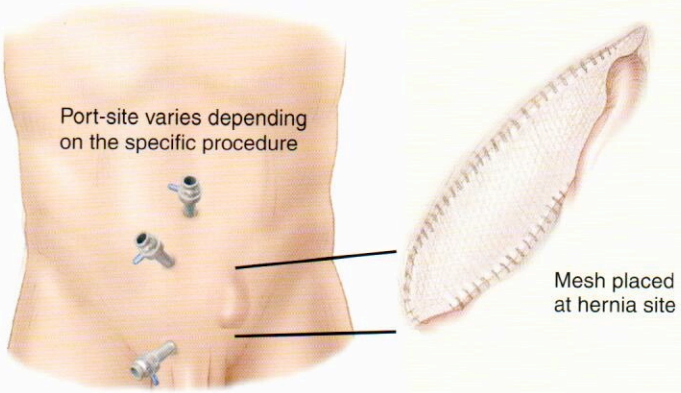
Other tests may include:

- Digital exam
- Blood tests
- Urinalysis
- Electrocardiogram (EKG) only if a high risk for heart problems.
- Ultrasound
- Computerized tomography (CT) scan

Surgical and Nonsurgical Treatment



Open repair



Laparoscopic repair

Surgical Treatment

The type of operation depends on the hernia size and location, your health, age, anesthesia risk, and the surgeon's expertise.

An operation is the only treatment for incarcerated/strangulated and femoral hernias.

Open Hernia Repair

The surgeon makes an incision near the hernia site. The weak muscle area is repaired. An open repair can be done with local anesthesia.

Mesh can be sutured (sewn) or stapled to strong tissues next to the hernia site. Mesh plugs can also be placed into the inguinal or femoral hernia space. The mesh plug fills the open site and sutures may not be needed.

In non-mesh hernia repair the hernia opening is sutured together and the tissue around the site is used to stregthen the weak area. Open repair without mesh is used mainly to repair strangulated or infected hernias, for single small hernias (less than 3 cm), or for simple infant and pediatric hernias. If needed an orchidopexy (moving down the undescended testicle into the scrotum) may be done with infant hernia repair.[3-4]

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 for the surgeon to see the internal organs. Surgical tools and a laparoscopic light are placed into the ports. The hernia is repaired with mesh, sutured or stapled in place. The repair is done as a TransAbdominal PrePeritoneal (TAPP) procedure, meaning the peritoneum (the sac that contains all of the abdominal organs) is entered, or as a Totally ExtraPeritoneal (TEP) procedure.[3-4]

Pediatric variations—Pediatric repair is usually done without mesh. For laparoscopic repair smaller ports are used, and it may be referred to as needlescopic repair.

Nonsurgical Treatment

Watchful waiting is an option if you have an inguinal hernia without symptoms. Hernia incarceration occurred in less than 2% of men who waited longer than 2 years to have a repair.[1-2] Femoral hernias should always be repaired because of the high risk (30–40%) of incarceration and bowel strangulation within 2 years of diagnosis.[1]

Trusses or belts made to apply pressure on a hernia require correct fitting. Complications include testicular nerve damage and incarceration.[4]

Keeping You Informed

Open versus Laparoscopic Repair

Initially there is quicker return to usual activities and less pain and numbness with the laparoscopic procedure. There is no difference in long-term outcomes.

Risk of Complications

The risk of complications increases for both the open and the laparoscopic procedure if the hernia extends into the scrotum.[8]

Risks of This Procedure

The Risk	What Happens	Keeping You Informed
Long-term pain	Pain lasting more than 3 months is reported in 74 of 1,000 patients who have laparoscopic repair and 127 of 1000 for open mesh procedures. Severe pain occurs in 17 of 1,000 adults.[8]	Pain is usually less with laparoscopic procedures than open procedures. Pain continues to decrease over time. Pain can be treated with non-steroidal anti-inflammatory medications.
Recurrence	Recurrence is reported in 37 of 1,000 adults and an average of 24 of 1,000 children. Mesh is not routinely used in infant hernia repair.[3-8] (Recurrence occurs half as often when mesh is used versus non-mesh repair.)	There is no difference between mesh plugs, flat mesh and open mesh. Laparoscopic repair is often recommended for recurrent hernias because the surgeon avoids previous scar tissue.[3-4] There is a higher rate of recurrence in older men with laparoscopic repair.
Urinary retention	Having trouble urinating occurs in 22 of 1,000 patients receiving general or regional anesthesia and 4 of 1,000 patients for local anesthesia.[7-8]	General or regional anesthesia, older age and enlarged prostate are associated with urinary retention. A temporary urinary catheter may be inserted.[3-4]
Seroma	A seromas (collection of clear/yellow fluid) can occur in 80 of 1,000 mesh repairs and 31 of 1,000 for non-mesh procedures.	Seromas can form around the former hernia site. Most disappear on their own. Removal of fluid with a needle may be required.[3-4] Seromas are rare for infants/children.[5, 7]
Injury to internal organs—bowel, bladder, blood vessels	Injury can be caused by instruments inserted with laparoscopic repair. Bowel/bladder injury is reported as 1 in 1,000 and blood vessel injury is less than 1 in 1,000.[7-8]	For bladder injury, a foley catheter remains in place to drain the urine until the bladder is healed, or surgical repair may be needed. For bowel injury, the site is repaired and/or a nasogastric tube is placed to keep the stomach empty. Any injury to a blood vessel is repaired.[3-4]
Infection	Wound infection occurs an average of 5 of 1,000 laparoscopic patients; 25 of 1,000 in open mesh and open non-mesh procedures. Pediatric wound infection is reported as 12 of 1,000 patients.[7-8]	Antibiotics are typically not given for inguinal of femoral hernia repair. Smoking and having other diseases can increase the infection rate.[3]
Hematoma	Hematoma, (collection of blood in the wound site or scrotum) is reported as 122 of 1,000 for mesh procedures and 70 of 1,000 when mesh is not used. There is no difference between open mesh and non-mesh procedures.[7-8]	Hematomas are treated with anti-inflammatory medications, and rest. Rarely blood replacement or further testing for a blood vessel injury is needed.[4]
Testicular pain/ swelling	There is no difference in testicular problems for open vs. laparoscopic procedures. Testicular pain is reported in 8 of 1,000 patients for mesh repair. Less than 1 of 1,000 men reported decreased libido following repair.[7-8]	Postoperative testicular swelling (orchitis) may be due to manipulation of the veins near the testes. The swelling often appears 2–5 days after the operation and can last 6–12 weeks. Treatment includes anti-inflammatory medications.[3]
Hernia at port site	Hernia at the site where the laparoscopic trochar (tube) was inserted occurs in less than 4 of 1,000.[4]	This risk is reduced with the use of smaller trochars and instruments.[3-4]
Nerve pain (tingling or numbness)	Tingling and numbness in the groin or scrotum is reported less for laparoscopic procedures (74 of 1,000) than for open procedures (107 of 1,000). A trapped nerve is reported in 2 of 1,000 patients.[7-8]	Pressure, staples, stitches, or a trapped nerve in the surgical area can cause the nerve pain. Inform 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.[3]
Pediatric risks	Reported risks include: testicular atrophy (decreased size of the testes) 1.6 of 1,000 children; hydrocele (fluid around the testes) 12 of 1,000; wound infection 12 of 1,000; apnea (periods of not breathing) right after the operation 47 of 1,000 for premature infants.[5, 10-12]	The open procedure is more common in pediatric hernia repair. Testicular atrophy is reported only in cases of strangulation. Apnea is associated with premature infants who had a history of apnea and other medical problems prior to hernia repair.[5, 10-12]
Heart/breathing	There are no reports of heart or breathing complications related specifically to a hernia operation.	Other health problems increase the risk for heart and breathing anesthesia related complications. Your anesthesia provider will suggest the best anesthesia option for you.
Elderly risks	Elderly patients experience less chronic pain. Complications related to general anesthesia may be higher because of other diseases/health problems.	If general anesthesia is a concern, an open repair with local anesthesia may be recommended.
Death	No deaths are reported directly related to elective inguinal and femoral hernia repair. Death can occur after treatment of a strangulated hernia or in exceptionally high risk patients.	Stopping smoking and being at the ideal body weight before surgery reduces the risks of complications. Your surgical team is prepared for all emergency scenarios.

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. Most often you will take your morning medication with a sip of water. If you are taking blood thinners (Plavix, Coumadin, aspirin, non-steroidal anti-inflammatory medication), your surgeon may ask you to stop taking these.

Home Preparation

You may go home the same day of your procedure. If you have nausea, vomiting, are unable to pass urine, or if the hernia was incarcerated, you may stay longer. Premature infants may stay overnight.

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), loose teeth, or if you smoke, drink alcohol, use drugs, or take any herbs or vitamins.

If you have a history of nausea and vomiting with anesthesia, an antivomiting drug may be given.

About my anesthesia

For laparoscopic hernia repair, the most frequent option is general anesthesia.

For open repair local or spinal anesthesia is an option. A mild sedation medication is often given (makes you sleepy).

The Day of Your Operation

Don't Eat or Drink

Not eating or drinking for at least 6 hours before the operation reduces your risk of complications from anesthesia.

What to Bring

- Insurance card and identification
- Advance directive
- List of medicines
- Loose-fitting comfortable clothes
- Slip-on shoes that don't require you to bend over
- Leave jewelry and valuables at home

What You Can Expect

An identification bracelet with your name and hospital/clinic number will be placed on your wrist. Your ID should be checked by health care team members before providing any procedures or giving you medication. If you have any allergies, you will also get an allergy alert bracelet.

An intravenous line (IV) will be started to give you fluids and medication.

For general anesthesia, 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 alongside your spinal column.

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.

During Your Operation

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. A hernia procedure is very short and these complications are uncommon.

Preventing Infection

The risk of infection is lowered if your hair is removed with clippers versus shaving around the surgical site. Be sure all visitors wash their hands

Questions to Ask

About my home medications

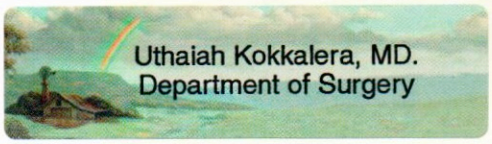
- What medications should I stop taking before my operation?
- Should I take any medicines on the day of my operation?

About my operation

- What are the risks and side effects of anesthesia?
- What technique will be used to repair the hernia—laparoscopic or open; mesh or with sutures?
- 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?

Deep Breathing

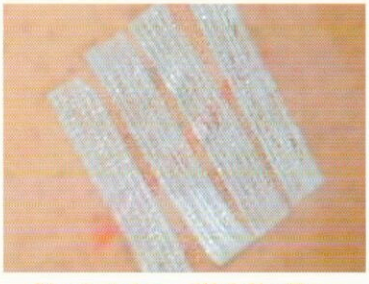
Deep breathing can be done by taking 5–10 deep breaths and holding each breath for 3–5 seconds. Young children can do deep breathing by blowing bubbles.



Your Recovery and Discharge

Keeping You Informed

Avoid driving



Steri-strips will fall off or they will be removed during your first office visit

Wash your hands before and after touching near your incision site

High-Fiber Foods

Food 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.

Your Recovery and Discharge

Thinking Clearly

If general anesthesia is given, it may cause you to feel different for 2 to 3 days. Do 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 fluid per day.
- Eat a high-fiber diet.

Activity

- Slowly increase your activity. Full activity may usually be resumed in 1–2 weeks for laparoscopic and 2–3 weeks for open procedures.
- Persons sexually active before the operation reported being able to return to sexual activity in 14 days (average).
- Do not strain or lift objects over 10 pounds or participate in strenuous activity for at least 2 weeks.

Work and Return to School

You can go back to work when you feel well enough. There is a wide range of time needed for recovery. The average time to return to work is 14–21 days. Discuss the timing with your surgeon.

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, 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.
- For infants, the site will be covered with a waterproof dressing to protect it from urine or stool.

Bowel Movements

- Avoid straining with bowel movements by increasings the fiber in your diet with high-fiber foods or over-the-counter fiber medications such as Metamucil and Fibercon.

Pain

The amount of pain is different for each person. For adults, the average time narcotics were used was 3 days with some patients needing no additional pain medication.[8] You can use throat lozenges if you have pain from the tube placed in your throat during your anesthesia.

Home Medications-Pain

The medicine you will need after your operation is for pain control.

When to Contact Your Surgeon

If you have:

- Pain that gets worse
- Pain that will not go away
- A fever of more than 101°F
- 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 3 to 4 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.

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 your doctor or nurse. It is much easier to control pain before it becomes severe.

Common Medicines to Control Pain

Hernia pain is often controlled with narcotics and often combined with acetaminophen.

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 and codeine.

Non-narcotic Pain Medication

Most nonopioid analgesics are classified as non-steroidal antiinflammatory 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. Examples of NSAIDs include ibuprofen and Aleve.

Pain Control without Medicine

- Distraction helps you focus on other activities instead of your pain. Music, games, or other engaging activities are especially helpful with children.
- Splinting your stomach by placing a pillow over your abdomen with firm pressure before coughing or movement can help reduce the pain.
- 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

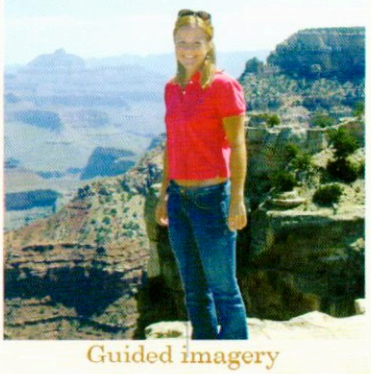
Pain after Inguinal Hernia Repair

Pain that continued one year after inguinal hernia repair is reported as 110 of 1,000 patients, with moderate/severe pain reported in 17 of 1,000. Eighty percent of patients with severe groin pain had severe pain before the operation. The pain decreased by 50% in one year. Pain was higher when heavy versus light-weight mesh was used.[8] Most studies don't report a difference in chronic pain between open versus laparoscopic repair.

Pain in Children

Groin pain is reported occasionally in 28 of 1,000 adults who had hernia repair during infancy or childhood.[9]

For children with a simple hernia repair, 63% reported being pain free the next day. For hernia plus orchidopexy nearly 75% reported pain the next day. More pain medications was needed.



Guided imagery

More Information

For more information on tests and procedures, please go to the American College of Surgeons Patient Education Web site at *www.facs.org/patienteducation/*.

Glossary of Terms

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

Computerized tomography (CT) scan A diagnostic test using 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 physical exam.

Digital Exam The examiner will place a 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 damage to the heart.

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

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

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

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.

References

The information provided in this report is chosen from recent articles based on relevant clinical research or trends. The following research articles do not represent all of the information available about your operation. Ask your doctor if he or she recommends that you read any additional research.

1. 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. *JAMA*. 2006;295:285-292.
2. Gallegos NC, Dawson J, Jarvis M, et al. Risk of strangulation in groin hernias. *British Journal of Surgery*. 1991;78:1611-1673.
3. Malangoni MA, Rosen, MJ. *Hernias*. In: CM Townsend, RD Beauchamp, et al. *Textbook of Surgery*. Philadelphia, PA: Saunders, 2008.
4. Fitzgibbons RJ, Jr., Filipi CJ, Quinn TH. *Inguinal hernias*. In: FC Brunicardi, DK Anderson, et al. *Principles of Surgery* (8th Edition). New York, NY: McGraw Hill, 2005.
5. Ein SH, Njere I, Ein A. Six thousand three hundred sixty-one pediatric inguinal hernias: a 35-year review. *Journal of Pediatric Surgery*. 2006;41:980-986.
6. Zamakshary M, To T, Guan J, et al. Risk of incarceration of inguinal hernia among infants and young children awaiting elective surgery. *Canadian Medical Association Journal*. 2008;179:1001-1005.
7. Schmedt CG, Sauerland S, Bittner R. Comparison of endoscopic procedures vs. Lichtenstein and other open mesh techniques for inguinal hernia repair. A meta-analysis of randomized controlled trials. *Surgical Endoscopy*. 2005;19:188-199.
8. Schwab, JR, et al. After 10 years and 1,903 inguinal hernias, what is the outcome for the laparoscopic repair? *Surgical Endoscopy*. 2002;16:1201-1206.
9. Aasvang EK, Kehleet H. Chronic pain after childhood groin hernia repair. *J Pediatr Surg*. 2007;42:1403-1408.
10. Schier F. Laparoscopic inguinal hernia repair: a prospective series of 542 children. *J Pediatric Surg*. 2006;41:1081-1084.
11. Takehara H, Yakabe S, Kameoka K. Laparoscopic percutaneous extraperitoneal closure for inguinal hernia in children: clinical outcomes of 972 repairs done in 3 pediatric surgical institutions. *J Pediatr Surg*. 2006;41:1999-2003.
12. Murphy JJ, Swanson T, Ansermino M et al . The frequency of apnea in premature infants after inguinal hernia repair: do they need overnight monitoring in the intensive care unit? *J Pediatr Surg*. 2008;43:865-8.

Reviewed by: Robert Fitzgibbons, MD, FACS
Mark Malangoni, MD, FACS
Kathleen Heneghan, RN, MSN

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