

ABDOMINAL WALL AND GROIN MASSES

GROIN MASS

Inguinal pain, a new bulge in the groin area, or a chronic bulge that is causing new symptoms are common complaints. The differential diagnoses include inguinal hernia, femoral hernia, reactive or malignant adenopathy, iliac or femoral aneurysm or pseudoaneurysm, sebaceous cyst, epididymitis, testicular torsion, lipoma, hidradenitis, varicocele, hydrocele, ectopic testicle, and undescended testicle.

Anatomic Considerations

The anatomy of the inguinal canal is complex. It is a cone-shaped space running medially through the groin from an opening in the posterior abdominal wall (deep, or internal ring) to the superficial, or external, inguinal ring of the external oblique fascia. It is bounded by the external oblique anteriorly, the internal oblique muscle laterally, the transversalis fascia and transversus abdominis muscle posteriorly, the internal oblique muscle superiorly, and the inguinal ligament inferiorly. The spermatic cord, containing gonadal arteries and veins, nerves, and the vas deferens, runs through the canal.

Depending on the site of herniation, groin hernias are direct inguinal, indirect inguinal, or femoral. A direct hernia originates medial to the inferior epigastric vessels, within the space called Hesselbach's triangle. The borders of Hesselbach's triangle are the inguinal ligament inferiorly, the lateral edge of the rectus sheath medially, and the inferior epigastric vessels superolaterally. Direct hernias are often described as weakness in the "floor" of the inguinal canal. Indirect hernias develop lateral to the inferior epigastric vessel and are protrusions through the deep, or internal, ring. The hernia sac of an indirect hernia is typically found within the spermatic cord.

A femoral hernia originates through the femoral ring which lies below and separate from the inguinal ligament. The boundaries of the femoral ring are the lacunar ligament medially, the femoral vein laterally, the inguinal ligament anteriorly and the pectineal ligament posteriorly.

During normal fetal development, the testes descend from the abdomen to the scrotum via a protrusion of the peritoneum called the processus vaginalis. The processus vaginalis spontaneously closes at the internal ring at 36-40 weeks of gestation. If the processus vaginalis fails to close, an indirect inguinal hernia may develop. This explains the high incidence of indirect inguinal hernias in pre-term infants. Failure of the processus vaginalis to close in term infants may lead to future development, in childhood or as an adult, of indirect hernia. Factors that may increase the risk of indirect hernia are increased strenuous activity, and history of chronic obstructive pulmonary disease (COPD) due to repeated increases in abdominal pressure related to coughing. These risk factors, congenital and acquired, explain the bimodal incidence, with a peak in the first year of life and second peak after age 40. Men have a 27% lifetime risk of developing an inguinal hernia. Women have a much lower rate of 3%. As a result, the majority of inguinal hernia repairs, 90%, are performed in men. In contrast, 70% of femoral hernia repairs occur in women.

Diagnosis

The pain associated with an inguinal hernia is typically vague, or described as discomfort or a sense of heaviness, often experienced at the end of the day or after prolonged or strenuous exercise. A third of patients will not have any symptoms. Numbness or paresthesia, sharp pain, or pain that radiates to the scrotum, testicle, or inner thigh, may indicate compression or irritation of an adjacent nerve. Severe pain is not typical and may be a sign of incarceration or strangulation. A history of altered bowel or urinary habits may indicate the presence of intestine or bladder in the hernia sac. Many patients will describe a bulge in the groin that has been present for a long period of time. They may report initially being able to reduce the hernia by lying down or by applying pressure. As the hernia gradually gets bigger, this may become more difficult or impossible.

Patients should be examined standing and supine. While standing, the patient's groins and scrotum should be fully exposed. The first step is gross inspection for an asymmetrical bulge. The patient should be instructed to cough or perform a Valsalva maneuver to emphasize any small, unapparent, defects. Palpation of both groins while the patient coughs or performs Valsalva can demonstrate asymmetric impulses that would indicate a hernia. Invagination of the scrotal sac on an examining finger allows for exploration of the inguinal canal via the external ring. A bulge in inguinal canal can confirm a hernia. If the bulge moves from lateral to medial, it suggests an indirect hernia. A bulge that moves from deep to superficial suggests a direct hernia. A pulsating mass may indicate the presence of an iliac or femoral aneurysm.

Femoral hernias develop as a bulge below the inguinal ligament and lateral to the pubic tubercle. Obesity can make the identification of inguinal or femoral hernias on exam very challenging.

The intra-abdominal contents of a hernia sac may be able to be pushed back into the abdomen with application of external pressure and placing the patient supine. These hernias are described as reducible. When the contents are no longer able to be placed back in the abdomen, a hernia is described as non-reducible, or incarcerated. Acute incarceration presents with significant pain, a non-reducible mass, and possibly overlying skin changes of erythema and warmth. Acutely incarcerated hernias require prompt attempts at reduction to prevent progression to strangulation. Strangulation occurs when the hernia content's blood supply becomes compromised. Urgent surgery is appropriate for an acutely incarcerated hernia that cannot be reduced, or when strangulation is suspected. Chronically incarcerated hernias are managed non-emergently.

A thorough history and careful physical exam should establish the diagnosis of a groin hernia in the majority of patients. Findings of a pulsatile mass in the groin should raise the suspicion for iliac or femoral artery aneurysm. Firm, rubbery, non-reducible masses may be inguinal adenopathy. This is usually unilateral and may indicate an inflammatory or infectious process that is affecting the leg. The leg should be carefully examined to seek causes of the adenopathy. Firm, hard groin nodes may represent metastatic spread from a cancer in the leg. Common malignancies would be melanoma, squamous cell carcinoma, lymphoma, or

Diagnosis (continued)

sarcoma. The lymphatics of the anal canal drain to the inguinal region, therefore, a history of rectal bleeding or altered bowel habits would raise the suspicion for an anal squamous cell cancer or a distal rectal adenocarcinoma. A rectal exam would be indicated.

Imaging should only be used in patients whose diagnosis remains uncertain. Ultrasound (US) does not expose patients to radiation and allows for dynamic images to be captured while a patient performs Valsalva. The diagnosis is made when intra-abdominal contents are seen moving into the inguinal canal. US has a sensitivity of 86% and specificity of 77%. CT scan performs similarly but only provides a static image and exposes the patient to radiation. US can also be used to confirm the suspicion of an aneurysm.

Management

Patients with symptomatic inguinal hernias should be referred for consideration of surgical repair. Asymptomatic inguinal hernia patients may be safely offered watchful waiting. The overall risk of incarceration during watchful waiting is low, less than 1%. Most patients, up to 70% by 10 years, will have developed symptoms of pain or limitations on activity, and will eventually seek repair. Those patients who are operated on after a period of watchful waiting are not at higher risk of perioperative complication, when compared to those repaired expeditiously upon diagnosis. Patients who select watchful waiting should be educated on the signs of incarceration and strangulation, and when to seek medical attention. Patients with an asymptomatic femoral hernia should be offered repair. This is due to the high risk of strangulation; 45% at 2 years. This is markedly higher than symptomatic inguinal hernias which only carry a risk of strangulation of 4.5% at 2 years.

The majority of hernias are approached anteriorly with a transverse incision over the inguinal canal. Surgery can be safely performed with sedation and local anesthetic. Repair techniques can be separated into tension-free with mesh prosthesis and those using native tissue. Native tissue repairs have a higher rate of recurrence and are generally only used in situations where mesh is contraindicated (i.e., in the setting of strangulation or opening of the GI tract during repair). The most common tension-free mesh repair is the patch and plug modification of the Lichtenstein repair. After exposing and opening the inguinal canal, any indirect hernia sac is dissected free of the spermatic cord and reduced back into the abdomen, or transected and ligated. A non-absorbable mesh plug is then seated in the internal ring. The floor of the inguinal canal is then reinforced with placement of a flat non-absorbable mesh.

Inguinal hernia repair can also be accomplished laparoscopically. Purported benefits include faster recovery, lower postoperative pain, and ability to fix all types of inguinal hernia defects. Critics cite longer operative times, requirement for general anesthesia, higher costs, and risk of injury to intra-abdominal organs. The ability to work in a non-operated plane makes the laparoscopic approach a good choice for recurrent hernias, and the ability to fix both sides with a single set of small incisions also makes it preferable for bilateral hernias.

Outcomes

Recurrence develops in 1-5% of patients who undergo tension-free mesh repairs, with no difference between laparoscopic or open techniques. Chronic pain, defined as pain that persists beyond 3 months, occurs in 10% of patients.

ABDOMINAL WALL MASS

The differential diagnosis for a mass of the abdominal wall includes epigastric hernia, umbilical hernia, incisional hernia, diastasis recti, rectus sheath hematoma, Spigelian hernia, desmoid tumor, and intra-abdominal pathology.

Anatomic Considerations

The anterior abdominal wall is composed of layers of aponeurotic fascia and muscle. The paired rectus abdominal muscles run from the costal margins to the pubis bone. They are enveloped in the rectus sheath or aponeurotic fascias that meet in the midline at the linea alba. A defect in the rectus sheath fascia, through which abdominal or preperitoneal contents can protrude, constitutes a hernia.

Diagnosis

Patients may present with a complaint of an abdominal wall bulge, or mass. A history of how long it has been present, change in size, symptoms of pain, nausea, vomiting or change in bowel habits should be elicited. Whether the mass is reducible (able to be pushed back into the abdomen) should be ascertained. A careful surgical history should be performed. Physical exam should be conducted with the patient in the standing and supine positions and with the patient performing a Valsalva maneuver.

Primary hernias develop in patients without a surgical history. Those above the umbilicus are referred to as epigastric and are usually the result of incomplete fusion of the midline linea alba. They are often small and multiple. This is in contrast to a long bulge that runs from the xiphoid inferiorly along the length of the epigastrium. This may represent a rectus diastasis. In rectus diastasis, the fascia remains intact but the rectus muscles have been displaced laterally, which allows the midline fascia to thin and bulge forward. Risk factors for developing rectus diastasis include older age, obesity and after pregnancy.

Bulging at the umbilicus is an umbilical hernia. These can be primary or acquired. Newborn infants have a bulge at the umbilicus 10% of the time. The incidence of umbilical hernia in African American infants is eight times that of white infants. Adults may develop an umbilical hernia as a result of gradual weakening of the fascial tissues, weight gain, repeated strenuous activity or heavy lifting, and the presence of ascites or pregnancy that increase abdominal pressure.

Diagnosis (continued)

Incisional hernias develop after abdominal surgery. The incidence is between 2-30% and has been associated with postoperative wound infection, obesity, older age, male gender, sleep apnea, COPD, and difficulty urinating or constipation requiring straining.

Rectus sheath hematomas are masses that develop suddenly, most commonly in patients who are on anticoagulation. A history of trauma is present in approximately half of patients. Simple coughing or sneezing can also be a precipitating event. They can also occur spontaneously. Patients complain of sudden onset, unilateral pain overlying the rectus muscles that is worsened by any movement that requires contraction of the rectus muscles. On exam, they are often found to have a mass over the rectus muscle that is tender to palpation. Depending on body habitus and the amount of time that has passed since onset, there may be visible ecchymosis of the abdominal wall, around the umbilicus (Cullen's sign) or tracking posteriorly along the flanks (Grey Turner's sign). Cullen's and Turner's signs can also be seen in the setting of retroperitoneal hemorrhage.

Desmoid tumors are slow growing abdominal wall masses that may occur sporadically or as part of the inherited syndrome, familial adenomatous polyposis (FAP). These benign tumors are composed of fibroaponeurotic tissue and are variable referred to as fibromatosis, aggressive fibromatosis, or desmoid-type fibromatosis. They can also be found in the abdomen associated with the intestinal mesentery or in the soft tissues of the extremities. High levels of estrogen may contribute to their development and they are, therefore, found with a higher incidence during pregnancy or in women taking oral contraceptives. Abdominal trauma or surgery can also precipitate growth and development of symptoms related to mass effect. On physical exam, these tumors are solid, non-tender, and feel fixed and non-mobile.

Spigelian hernias are typically small, one to two centimeter defects that occur laterally at the edge of the rectus muscle, usually below the arcuate line. They allow herniation of tissue deep to the external oblique and, therefore, often present as localized pain without any overlying mass.

Imaging can be quite helpful in the diagnosis of abdominal wall masses. Both CT scan and ultrasound (US) can be used. With upper midline bulging, imaging can distinguish between a hernia or rectus diastasis. With small defects or a large body habitus, imaging helps determine whether more than one hernia defect may be present. The diagnosis of rectus sheath hematoma can be made with CT or US and delineates the extent of the bleeding. CT scan is particularly helpful with desmoid tumors as it allows for precise measurement of size and also the extent of involvement with intra-abdominal organs or the mesentery. Core needle biopsy can confirm the diagnosis of desmoid tumor. US can diagnose the presence of a Spigelian hernia and can be used to mark the exact site of the defect to assist with operative planning.

Management

Rectus diastasis does not require operative repair. Some patients will seek operative repair for cosmetic effect or related to abdominal wall muscular dysfunction. This is accomplished via plication of the midline aponeurosis to re-approximate the rectus muscles to the midline.

The majority of infants born with an umbilical hernia will close spontaneously by the age of 5. Surgical referral is reserved for those that fail to close. Adult patients who have small, asymptomatic epigastric or umbilical hernias do not require repair. Large epigastric or umbilical defects, those that cause symptoms, a history of incarceration, or thin overlying skin should prompt repair. Hernia defects smaller than 3cm are typically repaired primarily with suture alone, while larger ones may be reinforced with a mesh. A Richter's hernia develops when a small fascial defect prevents an entire loop of bowel from herniating, but allows a portion of the bowel wall to become incarcerated. This can also develop in inguinal and femoral hernias and can be difficult to diagnose on exam.

Umbilical hernias in patients with advanced liver disease can be problematic. As ascitic fluid builds up, a hernia may become more protuberant and the size of the fascial ring may enlarge. This can allow for bowel or omentum, as well as ascitic fluid, into the hernia. First steps in management include medical treatment of the ascites including paracentesis. Uncontrolled ascites and increased pressure on the umbilical skin can lead to breakdown and leaking of fluid. This places the patient at risk for bacterial peritonitis. Umbilical hernia repair should not be entertained until ascites are under control.

Incisional hernias can be repaired with or without a mesh, and with an open or a laparoscopic technique. Suture repair without a mesh prosthesis is typically reserved for small (<3cm), isolated hernia defects. With larger, or multiple, defects a prosthetic mesh is placed. Mesh types vary based on material, porosity, density, and strength. Mesh can be placed in a number of different positions, described based on the mesh's placement in relation to the layers of the fascia. An interlay mesh bridges the fascial edges. Onlay mesh is usually placed over, or superficial to, a primary repair of the fascia. Underlay mesh placement refers to placement below the fascia, and is often accomplished laparoscopically. Compared to open repair, the laparoscopic approach has higher operative costs, shorter inpatient stays, lower infection rates, and comparable recurrence rates.

Some patients develop very large fascial defects and can suffer from loss of abdominal domain. Much of the abdominal viscera reside outside of the abdominal cavity. This compromises normal abdominal wall function. Incisional hernia repair with mesh is often not adequate for these patients. The technique of abdominal wall component separation was developed to address these large defects. With a series of incisions the layers of the abdominal wall are released laterally to allow for approximation in the midline. These repairs may be reinforced with prosthetic mesh.

Rectus sheath hematomas rarely require surgery. Large hematomas require admission to the hospital to monitor patient's hemodynamic status and hemoglobin levels. Depending on the indication for anticoagulation, it should be stopped, and any coagulopathy reversed. In

Management (continued)

severe settings of hemodynamic compromise or failure of the bleeding to stop, angiographic embolization can be used. Surgery is a last resort to be used in the setting of failed angiographic embolization and ongoing bleeding.

Surgical resection with widely negative margins can be curative for desmoid tumors. However, this approach carries significant risk of morbidity, and often leads to large tissue defects that require reconstruction with tissue flaps and/or prosthetic mesh. Therefore, surgery is saved for the patient who has failed all other treatment options or has significant compromise related to mass effect from the tumor. Medical treatment options for desmoid tumors include estrogen receptor antagonists (tamoxifen), nonsteroidal medications (sulindac or indomethacin), systemic chemotherapy, and radiation.

Spigelian hernias typically have a small neck and are, therefore, at risk for incarceration. They should be repaired. In order to make a correctly positioned incision, the exact site of the hernia should be marked preoperatively based either on the location of the patient's pain or with the assistance of US. Small defects are typically repaired by re-approximating the transversus abdominis and internal oblique muscles, and closing the external oblique with suture. Larger defects may require a mesh. Spigelian hernias can be approached with an open or a laparoscopic approach.

GROIN PAIN – SPORTS HERNIA

Sports hernia is chronic groin pain that lasts more than 6-8 weeks in a patient who engages in athletics or strenuous activity. The exact pathophysiology has yet to be determined. Some favor a torn external oblique aponeurosis, torn conjoint tendon, without a true fascial defect. Others feel a defect in the transversalis fascia that forms the posterior wall of the inguinal canal, hence, an incipient hernia, is to be blamed.

What is clearer is the mechanism of injury that leads to the pain. It is usually seen in athletes engaged in sports requiring sudden turning and pelvic rotation. Soccer, hockey, and football players seem to be at high risk.

Diagnosis

Patients will complain of unilateral groin pain on exertion. A specific episode of injury that prompted the onset of pain can often be recalled. Most patients will have stopped playing sports or will report limitations to their ability to play. On physical exam, there will not be a bulge. Patients will experience tenderness at the insertion of the rectus abdominis at the pubic tubercle. The tenderness is more pronounced during a resisted sit-up. The list of differential diagnoses for groin pain without a mass is long and requires careful consideration. Luckily, most of the patients presenting with sports hernia will be otherwise healthy and the location of the pain, exacerbating factors, and exam findings will help to eliminate most diagnoses.

Diagnosis (continued)

When the diagnosis is not made with a careful history and physical, imaging can be helpful. Ultrasound of the groin with the patient coughing or bearing down can help to rule out a true inguinal hernia. MRI can evaluate for muscle or tendon tears, osteitis pubis, and stress or avulsion fractures.

Management

First line treatment is non-operative. Patients are asked to rest and avoid the sport or movement that causes the pain. This may be combined with non-steroidal anti-inflammatory medications and perhaps a short tapering course of steroids. Core strengthening exercises build the ability to rotate the pelvis against resistance. Most patients respond to non-operative management.

When the pain is felt to be related to a weakness of the transversalis fascia and an incipient hernia, the patient may be offered surgical repair. Mesh reinforcement of the posterior wall of the inguinal canal can be accomplished with a laparoscopic or an open technique.

GROIN HERNIAS - PEDIATRIC HERNIAS

The great majority of groin hernias in children are indirect inguinal hernias, due to a patent processus vaginalis. Direct inguinal and femoral hernias have also been described in children, but are far more rare. Repair should be done expeditiously, as the rate of incarceration in younger children is high. It is estimated that 90% of complications of inguinal hernia in young children would be avoided with early repair.

Repair of the pediatric hernia is performed with a high ligation of the peritoneal sac. Typically, there is no floor weakness in young children. The patent processus vaginalis allows the abdominal contents to fall into the sac. Once ligated, there typically is no further herniation of abdominal viscera.

The child is given general anesthesia or regional anesthesia (caudal or spinal). The groins are prepped and draped. An incision is made in the groin on the affected side. The subcutaneous tissue and Scarpa's fascia are divided. The external oblique fascia is opened, beginning at the external ring. The cremaster muscle fibers are divided. The hernia sac is identified and separated from the cord structures. The sac is divided and inspected for visceral contents. The sac is ligated above the internal ring, at the peritoneal reflection, using permanent suture, typically silk. The internal ring is approximated in female patients. The external oblique fascia and Scarpa's fascia are closed with absorbable suture. The skin is closed with dermal stitches of absorbable suture.

Questions

1. A 55-year-old man has noticed a bulge in the right groin. The bulge developed after he spent a day lifting furniture, and has been present for 3 months. It has not gotten any bigger. He denies any groin pain, abdominal pain, change in bowel habits, nausea, or vomiting. On physical exam there is a visible, palpable bulge at the inguinal crease. It is non-tender and reduces with gentle pressure. He is concerned that he has a hernia and it might get "stuck." The best next step in management would be:
 - A. Counselling on signs and symptoms of incarceration
 - B. CT scan of the abdomen and pelvis
 - C. Application of a hernia belt
 - D. Surgical repair

2. An elderly woman is on warfarin for a history of atrial fibrillation. Two days ago, she fell in her kitchen and struck her abdomen on a chair. Since then, she has noticed a painful bulge on the right side of her abdomen. It has gradually grown bigger. She denies any other complaints. On exam, she has a tender, firm mass on the right side of the umbilicus. It does not change with standing or lying down and cannot be reduced. The best diagnostic test would be:
 - A. Abdominal x-ray
 - B. Ultrasound of the abdomen
 - C. CT scan of the abdomen
 - D. MRI of the abdomen

3. A 4-year-old male presents with acute swelling in the right inguinal area just above the inguinal ligament. The area described is red and hard. The patient has no nausea, emesis or abdominal pain. There are cats and dogs in the home. On examination, the abdomen is flat and soft. There is swelling that is egg-shaped in the right inguinal area which is firm with overlying erythema and is not able to be reduced into the abdomen. The testicle is in the normal position and there is no scrotal erythema or tenderness. There are scratches on the right leg with scabs falling off. In addition to an incarcerated hernia, what should be considered in the differential?
 - A. Testicular torsion
 - B. Undescended testicle
 - C. Lymphadenitis
 - D. Reducible inguinal hernia
 - E. Epididymitis

4. A 6- year old female presents with swelling at the umbilicus. The parents state that this has been present since birth. The patient has no other symptoms. Physical examination is normal with the exception of a protrusion at the umbilicus which is reducible with a defect of approximately 1.5 cm at the fascia. What is the best recommendation for management of this patient?
 - A. Continued observation
 - B. Operative repair as an outpatient electively
 - C. Emergency admission and operation

ACS/ASE Medical Student Core Curriculum
Abdominal Wall and Groin Masses

- D. Placement of a truss over the umbilicus
 - E. Ultrasound to rule out intra-abdominal mass
5. A 22-year-old female presents to the office with a pea-sized protrusion in the midline of the abdomen approximately 5 cm above the umbilicus. The patient initially had pain at the time of presentation, but now just notices that the mass is still present. She has no other symptoms. Her examination is consistent with the history with a 5 mm non-reducible mass present at the midline, non-tender with no skin changes. How should this patient be managed?
- A. Elective repair of epigastric hernia is reasonable
 - B. Wide local incision is required
 - C. These are always single
 - D. Plication of the entire midline aponeurosis is required
6. A 26-year-old male presents with persistent pain in the left groin area. This has not been associated with any bulging, emesis, constipation, or other abdominal pain. The patient has recently joined an adult hockey league and has played weekly for the last several months, but has avoided playing for the last 2 weeks. The pain improves with ibuprofen. There is tenderness on palpation of the rectus muscle at the pubic tubercle. Which of the following is recommended?
- A. MRI is required to rule out other sources of pain
 - B. Repair of transversalis fascia is first line therapy
 - C. Management should consist of rest, avoidance of sports, and nonsteroidal anti-inflammatory medications
 - D. Core strengthening exercises should be avoided
7. A 30-year-old male presents with a mass gradually enlarging at one of the port sites from his laparoscopic colon resection for familial polyposis. This is not painful and he has noticed the mass over the last year. On examination, there is a firm 1.5 cm mass present at the port site which was not appreciated at an examination a year ago. The best initial therapy for this lesion is:
- A. Immediate wide local incision and reconstruction
 - B. Incisional biopsy
 - C. CT scan of abdomen and pelvis
 - D. Line placement and initiation of chemotherapy
8. A 4-month-old male is sent for evaluation after presenting to the pediatrician with a bulge in the right groin which was not reducible. The patient was transported by car and fell asleep during the drive. By the time of evaluation, the mass has disappeared. The child is otherwise healthy and has no abdominal distension. When he cries, a mass appears in the right groin and extends to the scrotum but reduces with gentle compression. Both testicles are descended and in normal position. The next step in the management of this patient is:
- A. Emergent operative repair
 - B. Repair of right inguinal hernia
 - C. Ultrasound of the abdomen and scrotum
 - D. Orchiopexy of the right testicle with hernia repair

ACS/ASE Medical Student Core Curriculum
Abdominal Wall and Groin Masses

9. A 50-year-old woman presents with pain in the upper thigh and swelling in this area. The patient notes that the swelling has gotten worse and the area is painful to touch. The patient has also developed nausea and emesis over the last few days. On examination, there is a mass near the femoral vessels with tenderness and overlying erythema. The mass cannot be reduced. A radiograph of the abdomen demonstrates dilated intestine. The most likely diagnosis is:
- A. Liposarcoma
 - B. Enlarged lymph node
 - C. Hematoma
 - D. Femoral hernia
10. A 65-year-old male has intermittent swelling in the left inguinal area. The patient has no other symptoms and is able to perform all activities. On examination, the patient has a reducible inguinal hernia. Counseling the patient should include the following:
- A. This patient has a high risk of complications and should have urgent surgery
 - B. Patient should be reassured and discharged from clinic
 - C. Patient may be offered observation with clear description of how to watch for incarceration or strangulation
 - D. Patient should be advised to limit activities

Answers

1. **A.** By history and physical exam, this patient has an asymptomatic inguinal hernia. Imaging studies are not needed to make the diagnosis. Hernia belts may provide some symptomatic relief to patients with pain and discomfort but would not be beneficial for the asymptomatic patient. The risk of incarceration with an asymptomatic inguinal hernia is low, less than 1%. Surgical repair is reserved for those patients who do develop symptoms of pain or limitations in activity due to their hernias.
2. **C.** This patient's history and physical exam are most consistent with a rectus sheath hematoma. An abdominal x-ray can be used to evaluate for bony abnormalities or when there is concern for bowel obstruction. Rectus sheath hematoma can be diagnosed with ultrasound or CT scan. In the clinical setting, for a recent fall, a CT scan would be preferred as it will also evaluate for any other injuries. MRI would show a rectus sheath hematoma but takes longer to perform and may require sedation for patients who are claustrophobic.
3. **C.** The mass is firm and not reducible, so it is not a reducible inguinal hernia. The scrotum is without discoloration or tenderness so it would not be consistent with testicular torsion or epididymitis. The testicle is palpable in the scrotum so this would not be consistent with an undescended testicle.

4. **B.** Most pediatric umbilical hernias will close on their own. At the age of 6 this hernia is unlikely to close and should be repaired surgically. This is asymptomatic and not incarcerated so emergency operation is not indicated. Umbilical hernias are congenital and not usually associated with abdominal masses so there is no need for imaging. Trusses over the umbilicus are not helpful and may lead to skin erosion.

5. **A.** This is a classic epigastric hernia, and elective repair is reasonable even if incarcerated. Since this is likely an epigastric hernia, there is no need for wide local excision. Epigastric hernias are frequently multiple and may present either synchronously or in an asynchronous pattern and patients should be warned about this. Plication of the midline aponeurosis is reserved for only rare cases of diastasis recti.

6. **C.** Most patients with sports hernias respond to non-operative therapy with rest, avoidance of sports, and use of pain medications. Core exercises may help to improve the strength of the pelvic muscle with rotational movements. Surgery should be reserved for those failing non-operative therapy.

7. **C.** CT scan of the abdomen and pelvis is indicated to allow for measurement and define extent of tumor and identification of any intraabdominal or retroperitoneal desmoids. Core needle biopsy is the biopsy of choice rather than incisional biopsy. Local excision is reserved for tumors which have mass effect or are not responsive to medical therapy. Medications helpful for the treatment of desmoid tumors include estrogen receptor antagonists and nonsteroidal medications which do not require IV access, so initial line placement is not necessary.

8. **B.** The hernia is now reduced and reduced spontaneously so there is no need for emergency operation. The hernia was readily diagnosed by examination so there is no need for ultrasound. Orchiopexy is not indicated for a testicle in appropriate position. Repair of the symptomatic hernia is indicated, and current guidelines recommend evaluation of the contralateral side in children less than 2 years of age although this is slightly controversial.

9. **D.** While sarcoma and lymph nodes can be located in this area, this is more likely to be a femoral hernia with the dilated intestine on the abdominal radiograph.

10. **C.** The patient has an asymptomatic inguinal hernia and watchful waiting is a safe option, but the patient must be informed about the risks and needs to know when to seek urgent attention. Limitation of activities is one of the reasons to proceed with hernia repair.

**ACS/ASE Medical Student Core Curriculum
Abdominal Wall and Groin Masses**

References

1. P. Wagner J, Brunicardi F, Amid PK, Chen DC. Inguinal Hernias. In: Brunicardi F, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE. eds. *Schwartz's Principles of Surgery*, 10e. New York, NY: McGraw-Hill; 2014. <http://accessmedicine.mhmedical.com/content.aspx?bookid=980&Sectionid=5961087> 9. Accessed December 01, 2016.
2. Malangoni MA, Rosen M. Hernias. In: Townsend C, Beauchamp R, Evers B, Mattox K eds. *Sabiston Textbook of Surgery*, 20e. Chapter 44, 1092-1119. Philadelphia, PA: Elsevier; 2017
3. Seymour NE, Bell RL. Abdominal Wall, Omentum, Mesentery, and Retroperitoneum. In: Brunicardi F, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE. eds. *Schwartz's Principles of Surgery*, 10e. New York, NY: McGraw-Hill; 2014. <http://accessmedicine.mhmedical.com/content.aspx?bookid=980&Sectionid=5961087> 7. Accessed December 13, 2016
4. Ramshaw B, Mirmehdi I. In: Cameron J, Cameron A eds. *Current Surgical Therapy*, 11e. p 553-557. Philadelphia, PA: Saunders Elsevier; 2014 <https://www.clinicalkey.com/#!/content/book/3-s2.0-B978145574007900265X> Accessed Dec 30, 2016

Authors/Contributors

Loretto Glynn, MD, FACS (Section Editor)
Parkview Regional Medical Center, Fort Wayne, IN

Dimitrios Stefanidis, MD, FACS (Goals & Objectives Author)
Indiana University, Indianapolis, IN

Jesse Moore, MD, FACS (Content Author)
University of Vermont Medical Center, Burlington, VT

Mary C. Santos, MD, FACS (Assessment Consultant)
Penn State College of Medicine, Hershey, PA