

Research Article

Versatility of Ultra Sound Scan in Paediatric Epigastric Hernia Repair

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Abstract

Introduction: The purpose of this study is to look at performance and competency of USS prior to epigastric hernia repair under GA.

Materials and Method: The medical record of 12 patients, presented with epigastric hernia (fatty hernia of linea alba) in paediatric age group during 2015 and 2016 was reviewed prospectively for patient's demographics, presentation, findings of preoperative USS under GA, management and outcome.

Results: Ten boys (83 %) out of total 12 cases of congenital epigastric hernia have been included. Patients have been reviewed at paediatric surgery clinic. All patients underwent surgical repair. No postoperative complications have been reported. No local recurrence on follow up.

Conclusion: Using USS prior to epigastric hernia repair is feasible. Usually it is available with no further burden on hospital resources and could relieve the pressure on radiology department. It is competent and helpful in cases with multiple defects, obese and non-cooperative children. At current knowledge and experience, this technique is considered a novel and first time to be advocated in paediatric age group intra-operatively.

Keywords: Childhood; Epigastric Hernia; USS; Surgical Repair

Introduction

Epigastric hernia repair is a common surgical procedure in children. Anatomically, epigastric hernia presents as small masses of preperitoneal fat protruded through small defects in the linea alba between the umbilicus and xiphoid. These hernias can be multiple. These hernias may be presented with local discomfort. However, detection of the herniated extra peritoneal fat is troublesome particularly in supine position under general anaesthesia with obese children. Some surgeons adopted marking the skin prior to surgery. This could be a challenging mission with non-cooperative and obese young children. The purpose of this study is to look at performance and competency of USS prior to epigastric hernia repair under GA.

Materials and Method

Prospective study involving 12 children (10 boys). All patients were diagnosed to have epigastric hernia clinically at outpatient clinic. Everyone had USS under general anaesthesia in supine position prior to procedure repair of epigastric hernia after formal consent. Exclusive M mode USS with 7-12 MHz probe was used for all patients. Initial end point of the study is to image the herniated extra peritoneal fat through a defect of the abdominal wall fascia. This will facilitate skin incision marking site precisely. Secondly, associated defects non-clinically presented could be picked up. All demographic patients' details, operative findings and surgical procedures, follow up for recurrence and missed defects have been collected. Article review for similar technique across published researches have been performed.

Results

12 patients were diagnosed clinically by paediatric surgeons with epigastric hernia. Boys to girls' ratio is 5:1. The median age at surgery is 5-year-old with range of 2-9 years. All patients have scar free anterior abdominal wall. All of them are fit and well with no associated connective tissue diseases. All patients have been reviewed by the surgeon prior to surgery and consented for epigastric hernia repair including using USS to visualise the deep fascia under GA. All patients were placed in supine position and defects were marked on skin directly with USS guidance and skin incisions have been made just on top. Other tiny non-clinically detected defects have been visualised by USS and considered for repair. Formal epigastric repair using simple interrupted absorbable sutures have been performed after reduction of the herniated extra peritoneal fat. The median distance from the umbilicus to the epigastric defect was 4 cm. Operative time ranged from 15 to 35 min (including scan time). Follow up review at outpatient clinic was carried out at 3-6 months' post-surgical repair. No postoperative complications have been reported. Minimal scarring and no local recurrences or missed epigastric hernias. Good feedback was received from majority of parents.

Discussion

The linea alba is a well-defined, thick layer of aponeurosis that separates the rectus abdominis muscles. It is formed by fusion and interlacing of fibers of the anterior and posterior sheaths of the right and left rectus muscles. It is hyperechoic, and easily recognized on ultrasound in most patients. However, the degree of decussation of fibers from the right and left sides varies. Most patients have three layers of interlaced fibers, but a minority of patients may show only a single layer of interlaced fibers. In the latter group the linea alba is weaker and more predisposed to stretching (diastasis recti abdominis) and tearing (epigastric linea alba hernia)[1]. Epigastric hernias are ventral hernias in midline of anterior abdominal wall between xiphoid and the umbilicus. Epigastric hernias result from defects in the linea alba and are more likely congenital. At the final stage of abdominal wall development, both recti muscles are approximating towards midline. When fails to occur, an extraperitoneal fat might protrude without a peritoneal sac or abdominal viscera and result in epigastric hernia. Most of epigastric hernias are small and asymptomatic. The reported incidence in childhood varies from <1% to as high as 5%. Epigastric hernias may be single or multiple. It is 2-3 times more common in boys [2].

Epigastric hernias typically present in children as a visible or palpable mass in the midline, between the umbilicus and the xiphoid. It is noted by the parents or primary care practitioner at times of straining or increased intraabdominal pressure. The mass is usually (<1 cm) and asymptomatic and typically remains always. Occasionally the child relates discomfort and mild pain to the site

of the hernia. Epigastric hernias are usually superficial enough in location that they are best shown with 10- to 12-MHz linear array transducers. With these transducers, the defect through the linea alba is usually quite conspicuous because it is either isoechoic or hypoechoic compared with the extremely hyperechoic linea alba. The defect is usually very near the midline, but it may occur eccentrically toward the right or left side of the linea alba. The herniated fat will appear as a slightly hyperechoic mass. The most frequent reason for missing an epigastric linea alba hernia is that the examination for abdominal pain was performed with the standard 3-MHz curved linear array transducer, focused too deep in the elevation axis to identify any structures except large hernias in obese patients [3] (Figure 1).

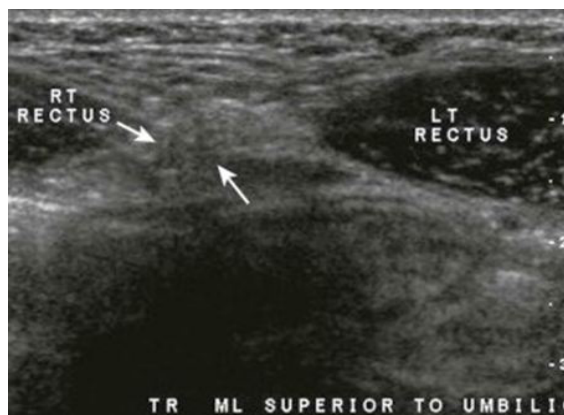


Figure 1: Epigastric linea alba hernia: appears on transverse view as small, fat-containing, nonreducible hernia arising from tear that is eccentrically located near the right edge of the linea alba (arrows).

Physical examination demonstrates a firm mass, directly in midline between the umbilicus and the xiphoid. Epigastric hernias characteristically contain only preperitoneal fat and are not reducible because of the small size of the fascial defect. Rarely, a fascial defect is noted without a palpable mass. Herniation of intestines or abdominal viscera in an epigastric hernia would be exceptionally rare. The mass may be tender on examination, but strangulation of the hernia contents is uncommon. The natural history of epigastric hernias is gradual enlargement over time if left untreated. Epigastric hernias do not resolve spontaneously, and therefore operative repair is the recommended treatment [4].

Surgical site should be carefully marked preoperatively because the mass and defect can be difficult to localize under general anesthesia and patient asleep in supine position. A limited transverse incision is made over the mass and dissection is performed to delineate the edges of the fascial defect. If herniated fat is present, it can be reduced or ligated and excised. The defect is closed using absorbable suture. The skin is closed with an absorbable subcuticular suture. Postoperative complications are rare and the recurrence rate is low [1,5]. Laparoscopic approach is adopted recently to avoid multiple incisions for numerous defects [6].

The Novel Technique

Relevant medical history has been reviewed and physical examination has been elicited on all patients at the out-patient clinic. Clinical diagnosis has been confirmed and consent for epigastric hernia repair as a day case surgery under General anesthesia has been taken that included use of ultra sound scan to mark the site of the herniated fat. On the day of procedure, all patients have been reviewed by anesthetist and ultra sound machine has been checked. Exclusive M mode USS with 7-12 MHz probe was used for all patients. Images' results have been documented in the operative notes. Initial end point of the study is to image the herniated extra peritoneal fat through a defect of the abdominal wall fascia (linea alba). This will facilitate skin incision marking site precisely above the fascia defect. Secondly, associated defects non-clinically presented could be picked up. Formal epigastric hernia procedure steps have been followed up. All patients have been sent home on the same day. Surgical Follow up appointment at the 3 -6 months has been carried out. No post-operative complications have been reported.

In the current study, authors presented his experience and demonstrated the helpfulness of the USS to precisely localized the fascia defect particularly in cases with multiple defects, obese and non-cooperative children. This case series demonstrated the current technique of USS carried out preoperative to the anterior abdominal wall hernia prior to epigastric hernia repair in children is valuable, safe, quick, competent and technically achievable. It requires ultra sound screen and appropriate probe suitable for the procedure.

Conclusion

Currently, high performance technology is adopted in majority of other surgical procedures. Using USS just prior to surgery to precisely locate the underlying defects is feasible. Usually it is available in fully equipped hospitals providing paediatric surgery service. No extra cost or burden is added on trusts and could relieve the pressure on radiology department for similar imaging study. Technically, it is a competent and straightforward step to minimize the surgical trouble particularly in cases with multiple defects. It is helpful in obese and non-cooperative children. At current knowledge and experience, this technique is considered a novel and first time to be advocated in paediatric age group. Randomised clinical trial is advisable to assess the pros and cons of such technique.

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