Case Report	
	
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Title	**Epigastric hernia**
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Keywords
Epigastric hernia – Li
alba hernia – Ventral hernia - Children

Abbreviatios

pathology in the pediatric population. The aim of this study is to report the management of epigastric hernia in a tertiary center.

Method: We conducted a retrospective study of patients treated for epigastric hernia between January 2012 and December 2022 at Albert Royer National Children's Hospital Center. Variable of interest were the treatment and the outcomes. Forty-two patients were enrolled, with an average treatment age of 52.8 months. Hernias were present since birth in 69% of the cases. Abdominal pain was the only clinical symptom isolated in twelve patients. Associated pathologies were umbilical hernia (31%), inguinal hernia (2%), and cryptorchidism (2%).

Results: All patients underwent laparotomy. The epigastric defect was measured between 5 and 40mm. The hernia sac was empty in most cases (79%). The supraumbilical arcuate approach was the most used in 71% of patients, followed by the median (24%) and transversal (5%) approaches. A complication rate of 24% was noted, and 14% of recurrences were noted. No patient died during the study.

Conclusion: The epigastric hernia is barely symptomatic. The supraumbilical arcuate incision is the standard. The surgical treatment leads to complications, and the rate of recurrences is high in our context.

Introduction

Epigastric hernia (EH) or linea alba hernia is a rare disease belonging to ventral hernias. It is a protrusion of abdominal viscera through a fascial defect of the linea alba between the xiphoid process and the umbilicus (1). That's an uncommon disease representing just 4% of the children's hernias (2). Its diagnosis is easy, with a clinically accessible median swelling above the umbilicus, and for most cases, the pathology has been present since birth (2). The natural history of EH is yet to be fully known. Differently to umbilical hernia, which has its defect located in the umbilical ring, which can naturally progressively contract and make possible a natural closure of the defect, EH is situated on the linea alba, which surrounding connective tissues have no contraction properties (3). Therefore, many authors recommend their surgical repair as they tend to increase in size (1,2).

Recent studies advocate for laparoscopic repair, which improves cosmesis and reduces postoperative pain (1). However, open surgery is quicker and less expensive. For resource-constrained settings, open repair is the most used and, by time, the only available treatment option (1).

Worldwide and in Africa, EH is studied with other ventral hernias, mainly in adults from whom conclusions are extrapolated to children (4–6). Few studies have been done on this topic in children, and in Africa, no published study on specifically EH in children was retrieved, as most authors secondarily reports EH when associated with umbilical hernia (7). This justifies this study, whose aim is to report the treatment and outcomes of EH in a tertiary center in Senegal.

Material and methods

Study design and setting

This is a descriptive cross-sectional study. We enrolled patients treated for EH in our department for 11 years (from January 2012 to December 2022). It was conducted within Albert Royer National Children's Hospital Centre in Dakar, Senegal. The pediatric surgical department was founded in 2010 and constitutes the country's reference center for pediatric surgery.

Population study

We included in the study all patients who underwent surgical repair of EH. We did not take into account patients with incomplete medical records (no sociodemographic, operative note, or follow-up information). We registered 42 patients.

The mean age at surgery was 52.8 months, ranging from 5 months to 14 years. The series comprised 15 boys and 27 girls, representing a sex ratio 0.55. For 29 patients (70%), the EH was discovered at birth and later for the 13 others patients (30%). The EH was asymptomatic for 71% of patients, when abdominal pain was a unique symptom and accounted for 29% of cases. An umbilical hernia was associated in 14 patients (33%) (Figure 1); inguinal hernia and cryptorchidism each had one case.

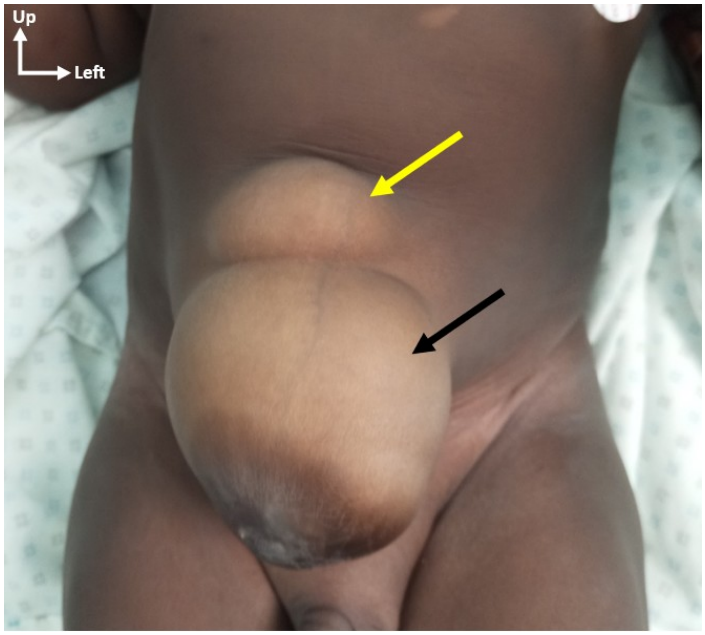

Figure 1. Association of epigastric hernia (yellow arrow), with huge umbilical hernia (black arrow) in an infant.

Data source and collection

Data was collected from patient medical folders, operative note registers, and telephone interviews. We used a survey sheet. To reduce the risk of information and recording bias, only one person collected the data on an Excel spreadsheet (Microsoft Office 2016).

Variables

The parameters collected were treatments and results. The therapeutic items were the surgical approach, the size of the defect, the content of the sac, the type of sutures used, and the kind of stitches. For outcomes, we registered recurrence, morbidity, and mortality.

Statistical analysis

Data was entered and stored using Excel software (Microsoft Office 2016). The results are presented as text, tables, and figures. Missing data were excluded when analyzing the concerned variable.

Observations

For operative management under general anesthesia, the supra umbilical arcuate incision was used in 71% of cases. Other approaches were the median longitudinal incision for 24% of patients and the transversal over the bulging for 5%. The median defect size was 15 mm (5 - 40 mm). The sac was empty in 79% of patients; in 21%, it contained the omentum (Figure 2). Absorbable sutures were used for 25 patients, non-absorbable sutures in 17 cases. In 88% of cases, continuous sutures were performed, and interrupted sutures in 12%.

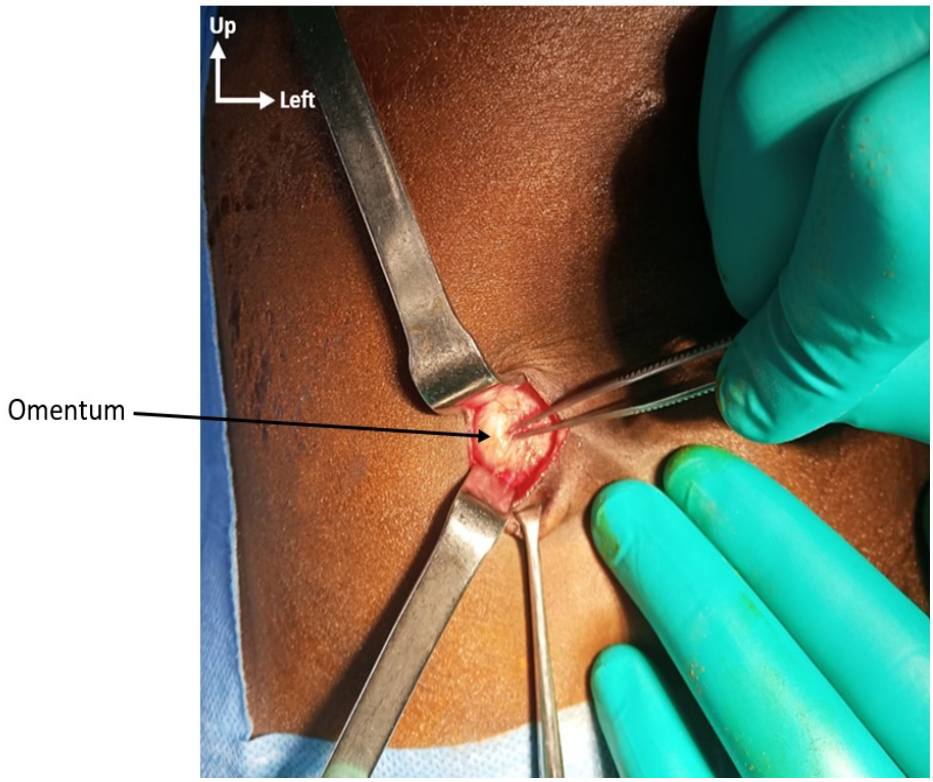

Figure 2. Intraoperative findings of an upper umbilical crease approach demonstrating epigastric defect with omental content (shown by the forceps).

No early postoperative complication was reported in 32 patients. With follow-up, the morbidity was 24%, including recurrence in 6 patients (14%). Abnormal skin healing was observed in 4 cases (1 inaesthetic and three hypertrophic scars). Granulomas were seen in 2 patients, and non-absorbable sutures were used in both cases. No mortality was recorded.

Discussion

The natural history of epigastric hernia is still poorly understood, leading to surgery as the first line of treatment. Some authors recommend waiting for symptoms to appear before proceeding with the treatment (1). However, studies suggest an increase in the size of HLB when it is not treated (2).

Our study reports a mean age of 52.8 months at surgery, corresponding to 4.4 years. Nearly half of our patients are operated before the age of 3 and more than 80% before their seventh year of life. This result is similar to the data found in one of the most extensive series in the literature reported in New Zealand (1) and the USA (8). While some series report a similar prevalence in girls and boys in the pediatric population, others suggest a male or female predominance (1). Our series finds a predominance among girls (Table I).

Table I: Sex-ratio for chiildren's EH in litterature

Study	Country	Sex-ratio	Number of patients
Bugenstein and Phibbs (1975) (9)	USA	1,00	2
Coats et al (2000) (2)	USA	0,6	40
Albanese et al (2006) (10)	USA	0,86	13
Moreira-Pinto and Correia-Pinto (2015) (11)	Portugal	1,00	10
Deie et al (2016) (12)	Japan	1,00	2
Jun et al (2019) (13)	China	1,66	8
Tinawi et al (2022) (1)	New Zealand	1,12	36
König et al (2023) (14)	Germany	1,07	60
Our study	Senegal	0,55	42

Although it can be acquired, especially in older children, EH is most often congenital (15). This is evidenced by its presence from birth in most patients (2). In our study, it is present at birth in nearly three-quarters of children. This percentage of presence at birth is superior to the 22% or 30% in the literature (1,2). This result could be due to the wider neck of our EH, which should a priori make the identification of the swelling easier.

Nearly 80% of our children have asymptomatic EH, as in the literature (1). In symptomatic children, abdominal pain is the only individualized clinical sign in our series. In the literature, other signs are found, such as an increase in size, spontaneous pain, or localized pain on palpation (2).

An umbilical hernia is the most common surgical comorbidity of EH found in our study. Other studies also report many associations (1,2).

This may be linked to the commonness of umbilical hernia in children, as reported in the literature particularly in Africa (7,16,17).

Systematic treatment is indicated in our patients. Concerning the predominant surgical technique, the supraumbilical arcuate approach is one of the most practiced approaches for EH repair (18). It was performed for almost three-quarters of our patients. It offers an alternative between transverse and median incisions. The supraumbilical arcuate incision, like the transverse incision, allows for easier

transverse closure of the defect, which is most often oval. In addition, its transverse widening offers the possibility of closing multiple orifices while maintaining an excellent cosmetic result. Finally, the operator can, in the same time, repair an associated umbilical hernia (Figure 3). The blished in children are generally brief and do not allow us to define the classical most used surgical technique in children. Currently, the trend is towards laparoscopy, so most series are only oriented towards this approach (1).

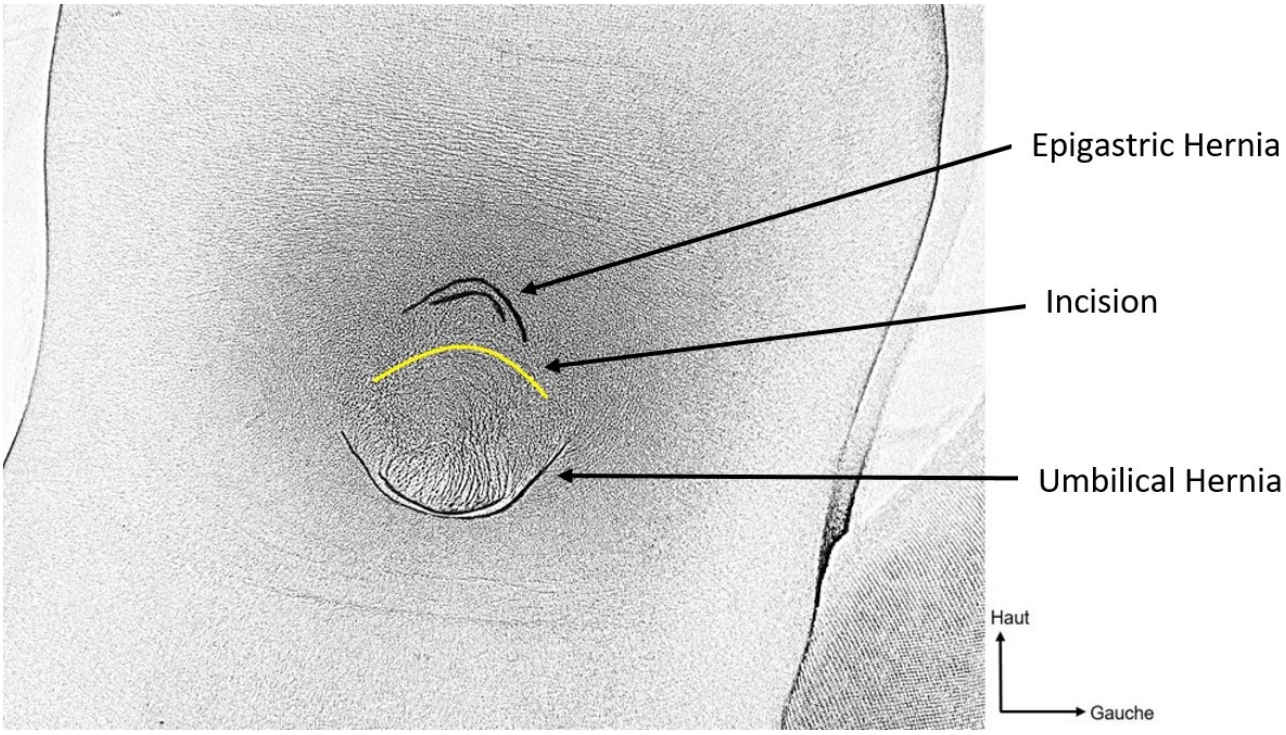

Figure 3: The yellow line marks the supraumbilical arched incision between the epigastric hernia above and the umbilical hernia below

Most authors report omentum as the most typical content (2,8–13). This is similar to our results. Concerning the size of the defect, a study in the USA reports an average collar of 7mm (2); in New Zealand, they obtained 3mm (1), and in Germany, found 7mm they found (14). To our knowledge, we are the first study to report intraoperative defect size in children with an average defect of 15mm.

McCaughan (19) 1956 stated that the quality of the fascial closure is related more to the quality of the surgeon than to the closure technique and the suture. Decades later, based on published studies, no closure technique (continuous or interrupted sutures) nor any suture material (absorbable or non-absorbable) seems to prevail (20). Nevertheless, it is recommended to use rapid absorption sutures, regardless of the closure technique (21). In our patients, only conventional absorbable and non-absorbable sutures are used.

Epigastric hernia has been reported to have few complications in literature (2,8–13). The outcomes were unremarkable for three-quarters of our patients. Most studies, apart from the studies of König (14) (3% complications) and Tinawi (1) (5% complications), fund zero morbidity and mortality but with a follow-up sometimes not specified or rarely exceeding one year and especially with low numbers for the most part (2,8–13). Our study found complications in a quarter of the population. The learning curve for open repair of EH is estimated at 30 surgical procedures under the supervision of a senior surgeon in adults (20,22). Our high rate of complications may relate to residents in pediatric surgery performing some EH repairs.

In adults, a recurrence rate of 15% was found for open surgery with interrupted suture closure of the defect. This rate of complications is similar to our study (23). The placement of prostheses and the use of laparoscopy have been described as factors preventing recurrence in adults (15,20,24).

Cissokho's study on umbilical hernia (25) reports delayed healing. In fact, the high phototype would be a breeding ground for keloid scars (25). This is the most observed complication after recurrence in our series. Regarding the occurrence of granuloma on non-absorbable suture, Cissokho (25) reported this aspect in the treatment of umbilical hernias. This is the material used in all cases of granulomas in our population.

Conclusion

In our setting, epigastric hernia is treated only with open repair, using a supra-umbilical approach and continuous sutures. Recurrence is not rare, and no mortality was registered.

Editorial comment : Umbilical hernias are common in children, epigastric hernias uncommon. Authors have successfully treated this small series of children with a uncommon condition.

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