

## **MORGAGNI HERNIA IN CHILDREN: NINE CASES AND A REVIEW OF THE LITERATURE**

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Retrosternal hernia is much less common than congenital posterolateral diaphragmatic hernia, and is a benign diaphragmatic defect, apart from associated trisomy or severe cardiac malformations. It is embryologically related to a congenital developmental anomaly or a defect between the sternal and costal origin of the diaphragm. This defect was first described by Morgagni in 1761<sup>1</sup> and by Larrey in 1829<sup>2</sup> and has many names, though it is most commonly referred to as Morgagni hernia.

### **Patients and Methods**

The charts of nine patients who underwent surgical repair from January 1989 to December 1998 were reviewed. The diagnosis of retroxyphoidal hernia was obtained for all patients by gastroscopy of the upper gastrointestinal tract. Details obtained during examination included age at diagnosis, sex, preoperative signs and symptoms, associated malformations, and results of x-ray studies. The diagnosis of Morgagni hernia was achieved in all cases by barium swallow, and the follow-up was based on the clinical picture and the chest x-ray performed every two months postoperatively for six months, and yearly thereafter. The follow-up ranged from six months to five years.

### **Results**

Over the 10-year study period, nine cases of Morgagni hernia were operated upon. They comprised five males and four females. The mean age at diagnosis was 16 months. Six patients were below the age of one year, and one patient was nine years old. Three cases were firstborn children. There was no relevant family history in seven cases, however, two of the cases were the offspring of a consanguineous marriage. All patients were delivered full-term after uneventful gestation.

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The patients were admitted with complaints of chronic cough and repeated chest infections in four cases, and two cases of post-feeding epigastric painful crisis with vomiting. In three patients, the Morgagni hernia was missed on the anteroposterior chest x-ray due to its small size, however, the lateral views were always conclusive, even in very small-sized hernias. The final diagnosis was obtained by barium swallow (Figures 1 and 2).

The left hepatic lobe, or part of it, was herniated into the sac in eight cases, in which one case represented mild abnormal segmentation. The stomach, spleen, part of the small intestine and the cecum were herniated together in one case, nevertheless, part of the transverse colon was always present in the hernia.

Associated malformations were found in four cases: one with Down's syndrome, one with a small ventricular septal defect (VSD) that resolved spontaneously, one with malrotation of the gut, and the last one with bilateral undescended testes.

The defects were repaired using the abdominal approach, and the procedure consisted of a simple reduction of the hernial content and direct closure of the hernia with

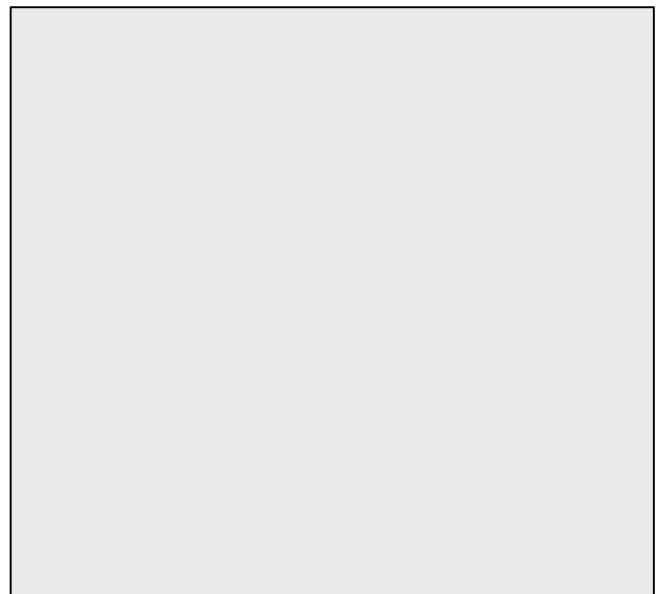


FIGURE 1. Lateral view of a small-sized hernia.



FIGURE 2. A huge hernia discovered at the age of nine months.

non-absorbable sutures without sac resection or drainage. The diaphragmatic defect was on the right side in four children, on bilateral sides in two, and on the left side in the other three cases.

There were no postoperative complications or mortality in these cases and the remaining sac resolved completely before the end of the fourth month. No recurrence was noticed, and only one child continued to have mild pseudo-asthmatic bronchitis. The follow-up ranged between six months to seven years, with a mean of three years.

### Discussion

The foramen of Morgagni is a gap or potential gap lying between the sternal and costal attachments of the diaphragm transmitting the internal mammary artery. A retrosternal hernia is called a parasternal hernia or hernia through the foramen of Morgagni, and arises from a congenital developmental anomaly or defect between the sternal and costal origin of the diaphragm. Unlike Cantrell's pentalogy defect, the parasternal hernias are associated with a hernial sac.<sup>1-3</sup>

Males are usually affected more than females,<sup>4,5</sup> and the etiology is not known. A number of reports of multiple family members or twins having retrosternal hernias raised the possibility that Morgagni hernia may result from an inherited defect,<sup>6</sup> occurring in a ratio of about 1:10 of congenital posterolateral diaphragmatic hernias. The lack of awareness of the delayed presentation of Morgagni hernia in children with uncharacteristic thoracic or abdominal symptoms leads to an undesirable time delay before surgery.<sup>5,7</sup>

Mild to severe symptoms may develop, with the most common symptoms and signs being respiratory, mimicking pulmonary infection, chronic cough, choking, and shortness

of breath or respiratory distress.<sup>8-12</sup> Gastrointestinal symptoms with abdominal pain, nausea and vomiting may be from compression of the bowel, but incarceration of the intestine in Morgagni hernia is unusual, with few reported cases producing obstruction,<sup>13-15</sup> and those mainly in adults.

A wide variety of associated anomalies are present, particularly trisomy 21,<sup>5,6,16</sup> heart defect, mainly ventricular septal defect (VSD),<sup>17</sup> malrotation of the gut,<sup>8,18</sup> cryptorchidia, pyeloureteral stenosis and diaphragmatic relaxation.<sup>5</sup>

The conventional chest x-ray, stressing the importance of lateral films, is the most diagnostic procedure of diaphragmatic hernia, and a gastrointestinal series should confirm the diagnosis. However, other radiological exploration such as CT scan, MR or pneumoperitoneography should be reserved for difficult cases.<sup>5,8,19</sup>

Morgagni hernias appear more frequently on the right side than either the left side or bilaterally. The most common viscera herniated are portions of the liver (without constant abnormal segmentation), small and large bowels, spleen and stomach.<sup>1,5</sup>

Surgical repair is required in all cases, and may be performed by the abdominal or transthoracic approach, whether by open or laparoscopic surgery.<sup>20-22</sup> The postoperative course is usually uneventful, and life-threatening complications are usually related to delayed diagnosis or to an inadequate surgical procedure. The recurrence is no more than 5%.<sup>7,11</sup>

Morgagni hernia is a rare congenital malformation, and surgical treatment should be attempted before the appearance of complications. The resection of the hernia sac is not imperative. The postoperative course is usually uneventful and recurrence is rare.

### References

1. Morgagni JB. The seats and causes of diseases investigated by anatomy. London: Millar and Cadell, 1769.
2. Arizollo G, Ariello D, Priano G, Roggero F, Buluggiu G. Morgagni-Larrey diaphragmatic hernia. Personal case series. *Minerva Chir* 1994; 49:1145-51.
3. Cantrell JR, Haller JA, Ravitch MM. A syndrome of congenital defect involving the abdominal wall, sternum diaphragm, pericardium and heart. *Surg Gynecol Obstet* 1958;107:602-14.
4. Flotter R, Schimpl G, Sorantin E, Fritz K, Landler U. Delayed presentation of congenital diaphragmatic hernia. *Pediatr Radiol* 1992;22:187-91.
5. Lopez Candel E, Castejon-Casado J, Lopez-Candel J, Broncano-Perianez S, Sanchez-Lopez Tello C. Morgagni hernia in childhood. *Rev Esp Enferm Dig* 1993;83:151-5.
6. Harris GJ, Soper RT, Kimura KK. Foramen of Morgagni in identical twins: is this an inheritable defect? *J Pediatr Surg* 1993;28:177-8.
7. Berman L, Stringer D, Ein SH, Shandling B. The late presenting pediatric Morgagni hernia: a benign condition. *J Pediatr Surg* 1989;24: 970-2.
8. Pul M, Pul N. Morgagni hernia in infants and children. *Yonsei Med J* 1995;36:306-9.
9. Sinclair L, Klein BL. Congenital diaphragmatic hernia Morgagni type. *J Emerg Med* 1993;11:163-5.
10. Thomas GG, Clitherow NR. Herniation through the foramen of Morgagni in children. *Br J Surg* 1997;64:215-7.

11. Lin ST, Moss DM, Henderson SO. A case of Morgagni hernia presenting as pneumonia. *J Emerg Med* 1997;15:297-301.
12. Sarihan H, Imamoglu M, Abes M, Soyly H. Pediatric Morgagni hernia: report of two cases. *J Cardiovasc Surg (Torino)* 1996;37:195-7.
13. De Medici A, Cebrelli CF, Cebrelli C, Kabano F, Zucchermagli MT. A rare cause of intestinal occlusion: Morgagni-Larrey hernia. *Chir Ital* 1992;44:69-79.
14. Kimmelstiel FM, Holgersen LO, Hilfer C. Retrosternal (Morgagni) hernia with small bowel obstruction secondary to a Richter's incarceration. *J Pediatr Surg* 1987;22:998-1000.
15. Patole S, Whitehall J, Almonte R, Stalewski H, Lee-Tannock A, Murphy A. Meconium thorax: a case report and review of literature. *Am J Perinatol* 1998;15:53-6.
16. Quah BS, Menon BS. Down syndrome associated with a retroperitoneal teratoma and Morgagni hernia. *Clin Genet* 1996;50:32-4.
17. Baran EM, Houston HE, Lynn HB, O'Connell EJ. Foramen of Morgagni hernias in children. *Surgery* 1967;62:1076-81.
18. Berman L, Stringer DA, Ein S, Shandling B. Childhood diaphragmatic hernias presenting after the neonatal period. *Clin Radiol* 1988;39:237-44.
19. Daou R, Serhal S, Jureidini F, Demian P. Retro-costo-xyphoid hernia in adults: apropos of three cases. *Chirurgie* 1992;118:59-62.
20. Bettili G, Bianchi S, Camoglio FS, Baggio E, Consolaro G, Ottolenghi A. Morgagni's hernia in infancy. *Minerva Chir* 1997;52:295-9.
21. Georgacopulo P, Franchella A, Mandrioli G, Stancanelli V, Perucci A. Morgagni-Larrey hernia correction by laparoscopic surgery. *Eur J Pediatr Surg* 1997;7:241-2.
22. Newman L 3rd, Eubanks S, Bridges WM 2nd, Lucas G. Laparoscopic diagnosis and treatment of Morgagni hernia. *Surg Laparosc Endosc* 1995;5:27-31.