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Laparoscopic repair of congenital diaphragmatic hernia in a 6-month-old child

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Abstract. This report describes the laparoscopic approach of closure of a congenital left posterolateral diaphragmatic hernia in a 6-month-old boy. The pros and cons of such an approach are discussed.

Key words: Congenital diaphragmatic hernia — Laparoscopic repair

Congenital diaphragmatic hernia (CDH) often presents as a neonatal emergency with respiratory distress due to lung hypoplasia. Sometimes symptomatology is much milder and occasionally symptoms only start after a long, completely symptom-free interval [1]. Therapy consists of respiratory and hemodynamic support when needed and surgical closure of the defect.

This case report presents the laparoscopic repair of a left-sided CDH in a 6-month-old boy who recently became symptomatic.

Case history

A formerly healthy 6-month-old boy is seen by the G.P. because of vomiting. The initial diagnosis is a viral infection. The following day the child is referred to the hospital because of persistence of the symptoms. A chest x-ray displays a shadow in the lower left thoracic cavity. An upper GI shows superdiaphragmatic localization of small intestinal loops. The diagnosis left diaphragmatic hernia is set and the child is referred for repair of the diaphragmatic hernia.

Upon admission the child has a healthy appearance and is not in distress. On examination, however, the child vomits the feeding from half an hour previous.

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Laparoscopic procedure

The patient is placed on a short table in a supine position with a tilt under the left side. The legs of the patient are placed in a frog position and held by a turned-up table sheet that prevents the patient from sliding from table when tilting the table. The surgeon stands at the lower end of the table with the assistant on his left and the scrub nurse on the right side. A first 5-mm trocar is placed halfway between the xyphoid and umbilicus through an "open" procedure. CO_2 is insufflated into the abdominal cavity with a maximum of 0.5 l/min flow and 5-mmHg pressure under close anesthesiological monitoring. When it is ascertained that CO_2 insufflation has no negative effect on the child's circulation and respiration, a 5-mm endoscope is introduced. The diagnosis of congenital posterolateral left-sided diaphragmatic defect can be easily confirmed. Two additional 5-mm trocars are placed (Fig. 1) and the table is turned in a more right lateral and anti-Trendelenburg position. The spleen has no diaphragmatic attachments and is easily displaced medially, giving clear access to the defect. With the use of two grasping forceps the small intestines as well as the splenic colonic flexure can easily be retrieved from the thoracic cavity (Fig. 2). The defect is ovoid in shape and there appears to be no hernia sac. Retrieval of the intestines

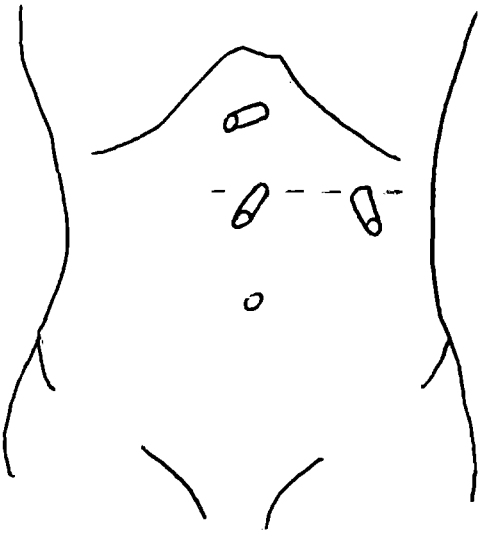

Fig. 1. Schematic placement of three 5-mm trocars. The interrupted line represents the imaginative line of incision in open procedure.

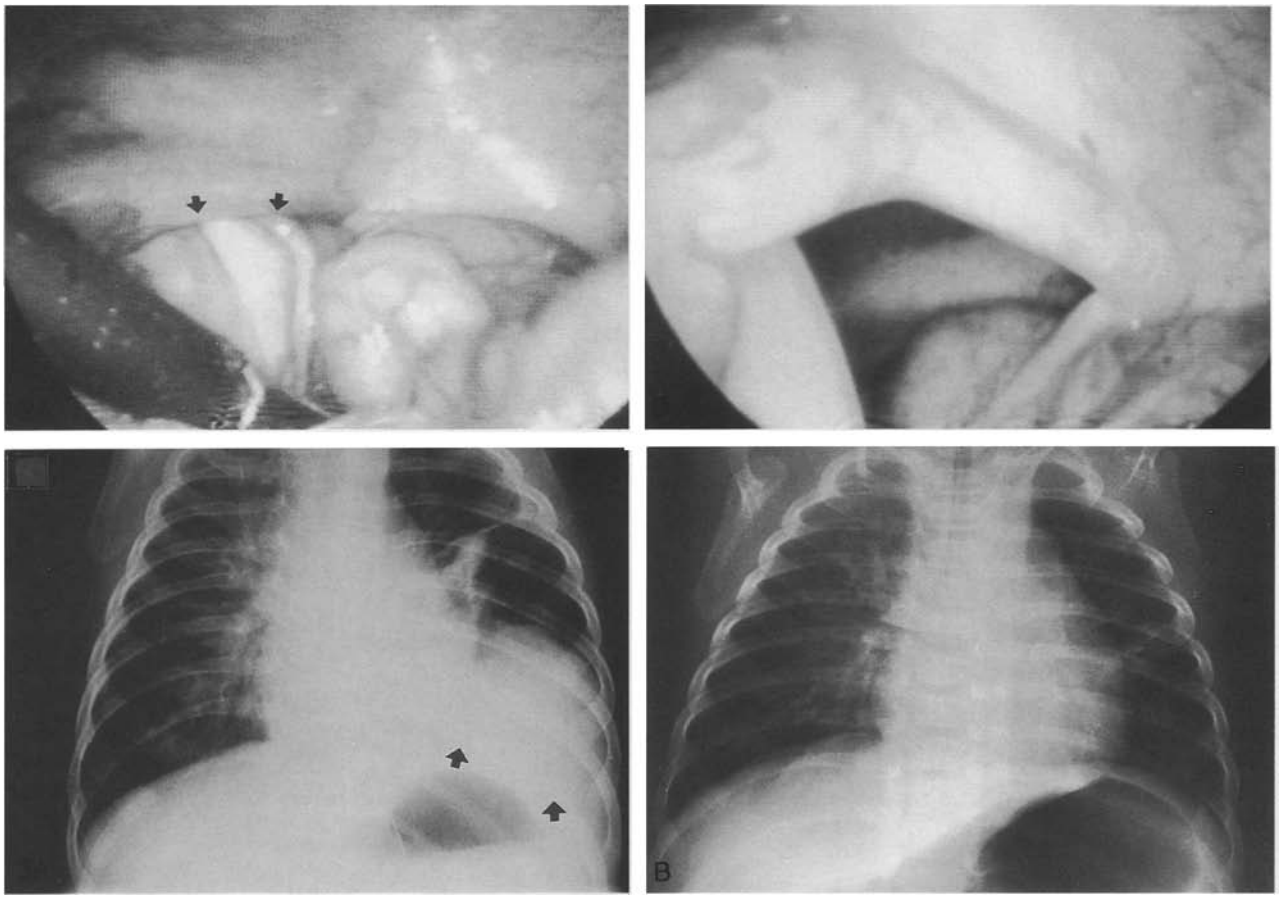

Fig. 2. **A** Laparoscopic retrieval of intestines from congenital diaphragmatic hernia. The *arrows* indicate the border of the defect. **B** Congenital diaphragmatic hernia after retrieval of intestines from the defect. Note there is no hernia sac. In the background, rib and intercostal musculature are visible.

Fig. 3. **A** Thoracic X-ray AP before operation demonstrates left-sided congenital diaphragmatic hernia (*arrows*). **B** Thoracic X-ray AP 1 day postoperative showing restoration of the diaphragmatic dome.

from the thoracic cavity does not alter respiratory conditions. After incision of the peritoneal reflection of the defect the diaphragmatic hernia can be closed with interrupted Ethibond 3 × 0 sutures using the internal knot-tying technique. Trocars are retrieved under direct endoscopic vision and the defects are closed with Vicryl 4 × 0 and Steri-Strips. Retained air in the left thoracic cavity is aspirated. Recovery is uneventful (Fig. 3) and the child is discharged 36 h later.

Discussion

Contrary to the case of congenital diaphragmatic hernia (CDH) with a dramatic course directly after birth, the defect that presents later on has a much less dramatic symptomatology [4, 5], although complications, such as intrathoracic volvulus, do occur [3].

Management consists of surgical closure of the defect, either through a thoracic or abdominal approach. In neonates it is often advantageous to insert a patch [2], but in older children this is not necessary. With the recent development of minimal invasive surgery, these techniques may also be applicable in children with delayed presentation of CDH. The thoracic approach may be better for right-sided defects, as the liver may be in the way if a laparoscopic approach is used. On the other hand, the amount of abdominal viscera in the chest may obscure the defect and may render the reposition of these viscera into the abdomen difficult. The thoracoscopic approach has the advantage that no CO_2 insufflation is required. However, the defect has usually a posterolateral position with minimal or no posterior border and may therefore be difficult to close thoracoscopically. Choosing a laparoscopic approach requires insufflation of the abdominal cavity with CO_2 but causes an ipsilateral pneumothorax through the diaphragmatic defect. When using only low pressures of maximal 5 mmHg, such as in our patient, the risk of adverse effects is minimized. The laparoscopic approach has the advantage of easy reposition of intestines into the abdominal cavity. Also, the closure of the defect, especially when there is little tissue left around the posterolateral aspect of the defect, may be easier from the abdominal side. The child recovered well from the procedure, commenced feedings 12 h after the procedure, and was discharged after 36 h.

We conclude that left-sided CDH can be repaired laparoscopically in children with a delayed presentation. The advantages of the current observation with

quick recovery and discharge will have to be further substantiated in a series of patients.

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