Case Report of Diaphragmatic Hernia with Small Hernia Sac Orifice

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Case report

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Abstract

Background：Congenital diaphragmatic hernia(CDH) is an embryonic stage in which the abdominal organs enter the thoracic cavity under the action of pressure difference between the thoracic and abdominal cavity, resulting in pulmonary hypoplasia due to the dysplasia of the diaphragm and the failure to heal the posterolateral pleura and peritoneum during the development of the diaphragm.

Case presentation: A 7-month-old girl was admitted to hospital with the chief complaint of repeated vomiting for 1 day. Diagnosis was established by chest and abdominal radiographs and computerized tomography(CT). During the operation, it was found that there were many contents of intrathoracic hernia, and the hernia sac orifice was small. It was difficult to return them by thoracoscopy,then they were transferred to laparoscopic-assisted content return of diaphragmatic hernia.The patient had a good postoperative result.

Conclusion: This is a very rare case of Congenital diaphragmatic hernia with small hernia sac orifice, and it emphasizes the significance of preoperative computerized tomography.

Background

Congenital diaphragmatic hernia is a congenital disease caused by unilateral or bilateral diaphragm defect, which leads to abdominal internal organs hernia into the thoracic cavity. The incidence of congenital malformations is 1/2000～1/5000,often complicated with other congenital malformations, easy to occur on the left[1,2]. Thoracic and abdominal hiatus hernia after neonatal period is called delayed diaphragmatic hernia in children. Often due to shortness of breath, vomiting, abdominal pain and other symptoms, it is easy to be misdiagnosed as pulmonary cysts, pneumothorax,lobar pneumonia,enteritis,etc.,delayed treatment,serious life-threatening.We report a case of delayed small hernia sac orifice with left diaphragmatic hernia.After sufficient preoperative preparation, the patient underwent laparoscopic-assisted remediation of left diaphragmatic hernia contents and diaphragmatic repaired, with a satisfactory clinical result.**Case presentation**

A 7-month-old girl was admitted to hospital with repeated vomiting for 1 day. 1 day before admission, the patient had no obvious inducement of recurrent vomiting. The vomiting was yellow-green. The volume of vomiting was about 10 ml/time, 5 times/day. Abdominal color Doppler ultrasonography showed that left diaphragmatic hernia was possible, thoracic and upper abdominal CT scan suggested:(1)left diaphragm showed hypoclarity and mixed density shadow in left middle and lower thoracic cavity, considering left diaphragmatic hernia (hernia contents were intestinal canal, spleen, pancreas possibility); (2) left pulmonary inflammation and compression swelling were not altered completely, the volume of left lower lobe was reduced, and the lung dysplasia was not completely excluded;(3)gastric dilatation and displacement(Fig. 1). On admission, her blood pressure was 126/72 mmHg,pulse rate 120 beats per minute, and respiratory rate 48 per minute.She was febrile with temperature of 37.6 °C. Her reaction was still acceptable, breathing was slightly short, left thorax was full, breathing movement was slightly weaker

than right, left breathing sound was slightly weaker than right.Chest auscultation was thick, phlegm sounds and moist rales were not heard, though cardiac sounds were normal. Abdominal evaluation was soft and nontender.

The patient had been growing well, received routine physical examinations and blood workup, and biochemical tests showed each index was normal. After admission, oxygen, gastrointestinal decompression, anti-infection and other treatments were given. Chest and abdominal radiographs showed multiple patchy and saccular shadows in the left thoracic cavity, blurred left diaphragm and left costal diaphragm angle. These findings were suspicious for CDH(Fig. 2). Upper gastrointestinal radiography also considered left diaphragmatic hernia. Because the hernia entered the thoracic viscera and squeezed the heart and lungs, causing a similar tension pneumothorax state. If the compression was not removed immediately, the child would die soon. Therefore, once diagnosed, the abdominal viscera should be returned as soon as possible to reduce the thoracic pressure, thereby improving the respiratory and circulatory functions.

After sufficient preoperative preparation, the patient underwent laparoscopic-assisted remediation of left diaphragmatic hernia contents and diaphragmatic repaired. After anesthesia, Trocar was sutured and fixed after thoracic cavity was confirmed by endoscopy.Inform anesthesiologists before pressurization that it might affect anesthesia. Pressure to 12 mmHg was about 1.5-2 minutes. During this period, the end-expiratory partial pressure of carbon dioxide could not be measured (waveform was straight), balloon pressure resistance was large, even could not be pressed, oxygen saturation gradually dropped to 50%-60%. When thoracic cavity was observed by endoscopy again, only a few intestinal tubes were admitted, and a large number of intestinal tubes were still located on the left side. In the lateral thoracic cavity, the colour of the thoracic intestinal tube was slightly purple. Due to the accumulation of intestinal tubes in the thoracic cavity, the defect of diaphragm was not clearly displayed. Many attempts were made to push the intestinal tubes into the abdominal cavity, and no significant progress was made in the return. Consider a smaller hernia sac(Fig. 3). The herniated intestinal tract was entrapped for a long time and could not be returned by thoracoscopy. Laparoscopic-assisted repair of left diaphragmatic hernia was performed. Oxygen inhalation, anti-infection and intravenous nutrition support were given after operation. Chest radiograph showed that the diaphragm was smooth on both sides, the angle of costal diaphragm was sharp, and there was no obvious pathological change in heart and lung on post-operative day two(Fig. 4). A small amount of liquid diet was ordered. On the third post-operative day, closed thoracic drainage tube was clamped and removed on the fifth day.The patient was discharged eight days after her operation.

Discussion

Congenital diaphragmatic hernia is a serious congenital malformation that endangers infants and children. Early diagnosis and treatment are needed. Ultrasound is the most common and effective method for prenatal diagnosis of congenital diaphragmatic hernia. It is noninvasive, safe and repeatable. It is convenient for early diagnosis and follow-up. Usually, congenital diaphragmatic hernia is diagnosed

by ultrasonography, which determines the presence of abdominal contents in the thoracic cavity and the contralateral displacement of the heart or mediastinum. If there are obvious hypoxia and dyspnea after birth, mediastinal shadow displacement, and bowel sounds can be heard in the chest of the newborn, the possibility of diaphragmatic hernia should be considered first. Chest and abdominal examinations, such as chest X-ray, chest and abdominal CT, should be performed in time to make a definite diagnosis.

The main pathological mechanism of congenital diaphragmatic hernia is pulmonary hypoplasia and pulmonary hypertension, not the defect itself[3]. Emergency surgery can not improve the survival rate. If emergency surgery is performed before respiratory and circulatory function is stable, it can further reduce the compliance of maldeveloped lung, aggravate the damage of lung function, and further reduce the gas exchange function. Therefore, delaying the operation time properly and actively improving its respiratory and circulatory functions before elective surgery can not only increase the tolerance of surgery, but also improve the survival rate[4–8]. Pulmonary hypoplasia and pulmonary hypertension are still the main causes of diaphragmatic hernia death.

There are three surgical methods for repairing CDH: open abdominal surgery, thoracoscopic surgery and laparoscopic surgery.Transabdominal surgery is characterized by deep lesion, difficult exposure, large incision and severe pain. Abdominal breathing is the main form of abdominal breathing in children. Larger incision results in cuts of body wall nerves and muscles, which affects the recovery of respiratory function after operation. The length of hospitalization is long. Although transthoracic surgery is easy to repair diaphragm defect, it can not detect and deal with abdominal visceral malformations. If it is omitted, laparotomy should be performed again. The shortcomings of open surgery are the difficulty of intraoperative exploration, large incision, severe post-operative pain and aesthetic impact.

In recent years, with the development of endoscopy equipment and technology, endoscopy technology has been introduced into the treatment of diaphragmatic hernia. It has been proved that it has good surgical effect. Minimally invasive operation makes diaphragmatic hernia treatment not only show the characteristics of light pain, beautiful appearance of wound, but also has the advantages of rapid recovery after operation[9–12]. For CDH in infants and older children with definite diagnosis, thoracoscopic repair is recommended on the right side, and laparoscopic or thoracoscopic repair is recommended for left diaphragmatic hernia. Laparoscopy can observe the whole abdominal viscera. It can deal with the coexisting abdominal deformities, and the effect of transabdominal approach on respiratory function is small. Therefore, laparoscopic repair is still a good surgical method. However, laparoscopic treatment of CDH has its shortcomings, first of all, recurrence, followed by hemodynamics. Thoracoscopic treatment of diaphragmatic hernia has the following advantages: First, smaller chest inflation can make the hernia and its contents into the abdominal cavity, and it is not easy to hernia into the thoracic cavity.Second, because diaphragmatic hernia is mostly accompanied by ipsilateral pulmonary dysplasia and is in a state of atrophy, after the content of the hernia is returned, it can obtain a larger operating space, which can better reveal the diaphragm defect and facilitate suture repair.Third, the pneumothorax can be removed after repair diaphragm muscle,and the operative field can also be exposed under the natural tension of the thorax. It can check whether the diaphragm surface is smooth

after repair and whether the suture is missing, so as to avoid the recurrence caused by incomplete operation.

Conclusion

If preoperative examination indicates that intrathoracic hernia has more contents, smaller hernia sac orifice and difficult to return via thoracoscopy, laparoscopy-assisted diaphragmatic hernia content return may be considered.

Abbreviations

CDH
Congenital diaphragmatic hernia;CT:Computerized tomography

Declarations

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Authors' contributions

WYJ, ZZM designed the study, collected the clinical data, performed the statistical analysis,participated in the operation,and drafted the manuscript.CL,ZCM participated in the operation and revised the article. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Ethical approval and consent to participate

The hospital ethics committee approval was granted of this case report.

Consent for publication

Written informed consent of clinical data and image publication was obtained from the patient.

Competing interests

The authors declare that they have no competing interests.

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Figures

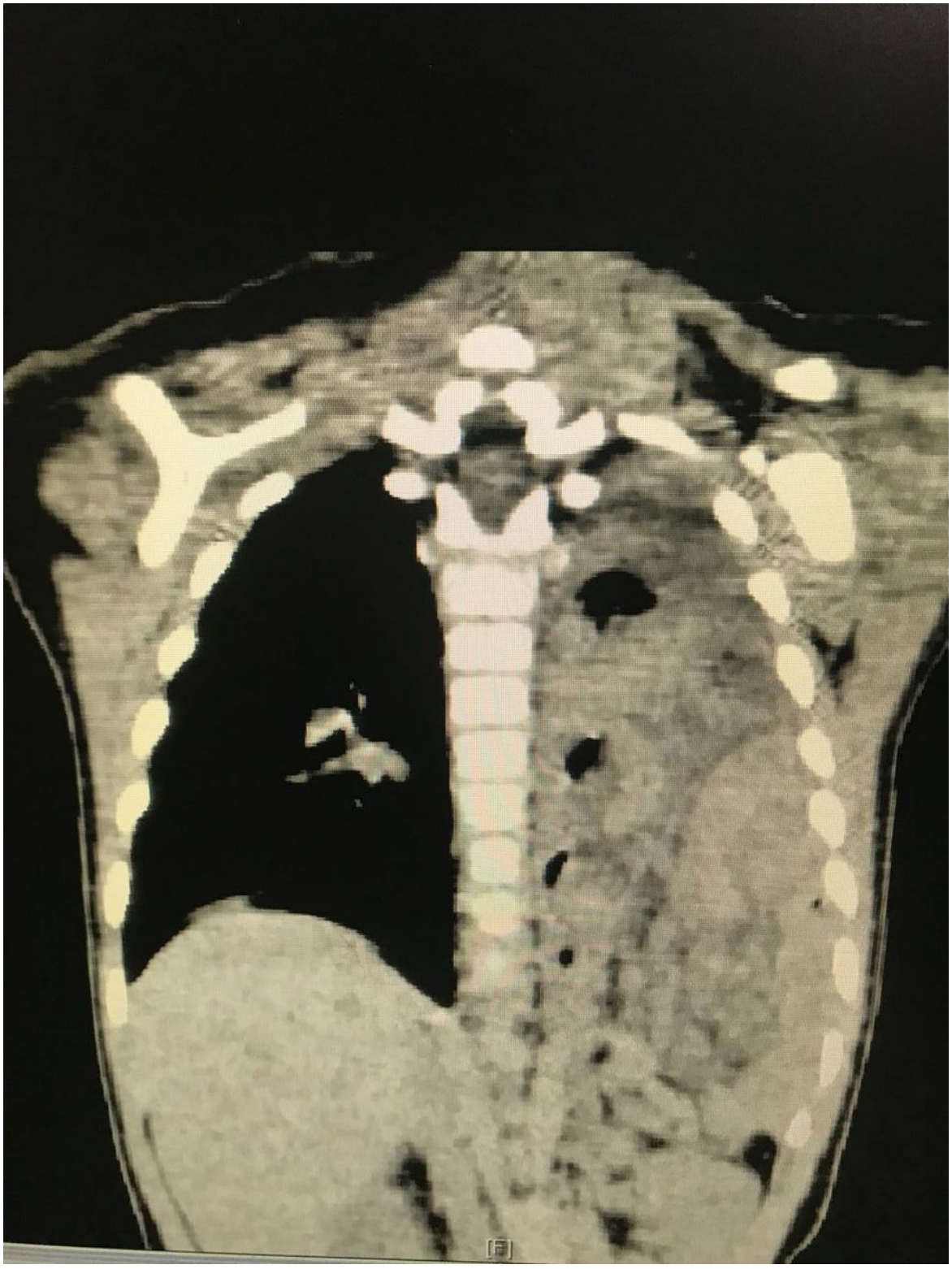

Figure 1

Preoperative CT showed that the left diaphragm was underclear with mixed density shadow in the left middle and lower thoracic cavity. Left diaphragmatic hernia should be considered.

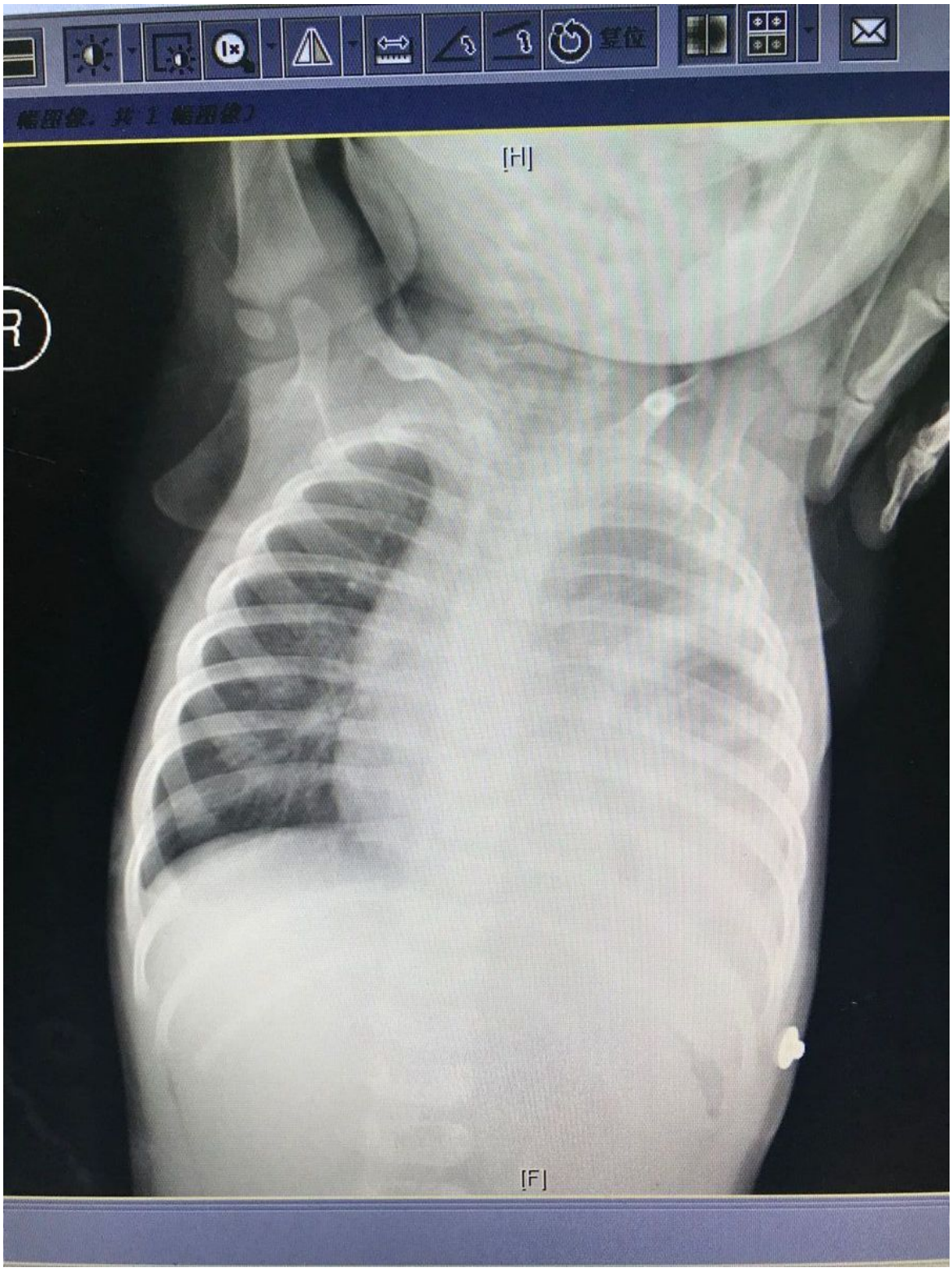

Figure 2

Chest and abdominal radiographs showed multiple patchy and cystic shadows in the left thoracic cavity, blurred left diaphragm and left costal diaphragm angle. Left diaphragmatic hernia should be considered.

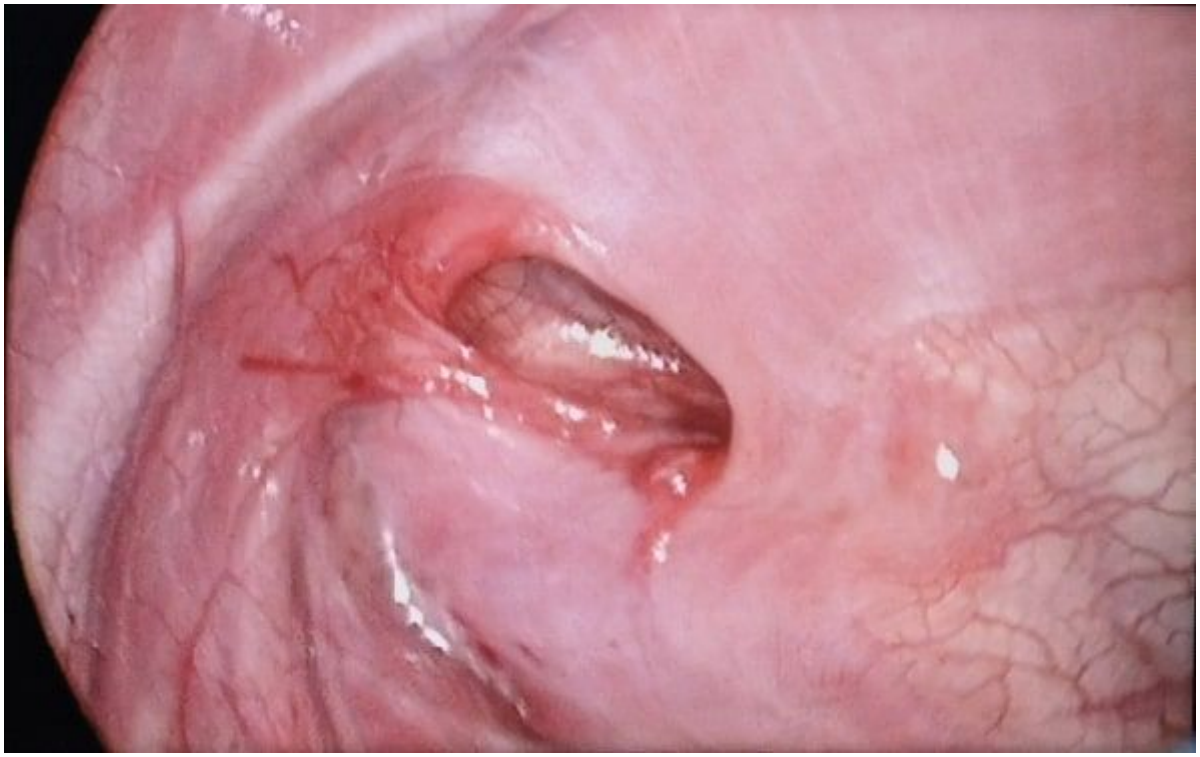

Figure 3

Small hernia sac orifice was found during operation.

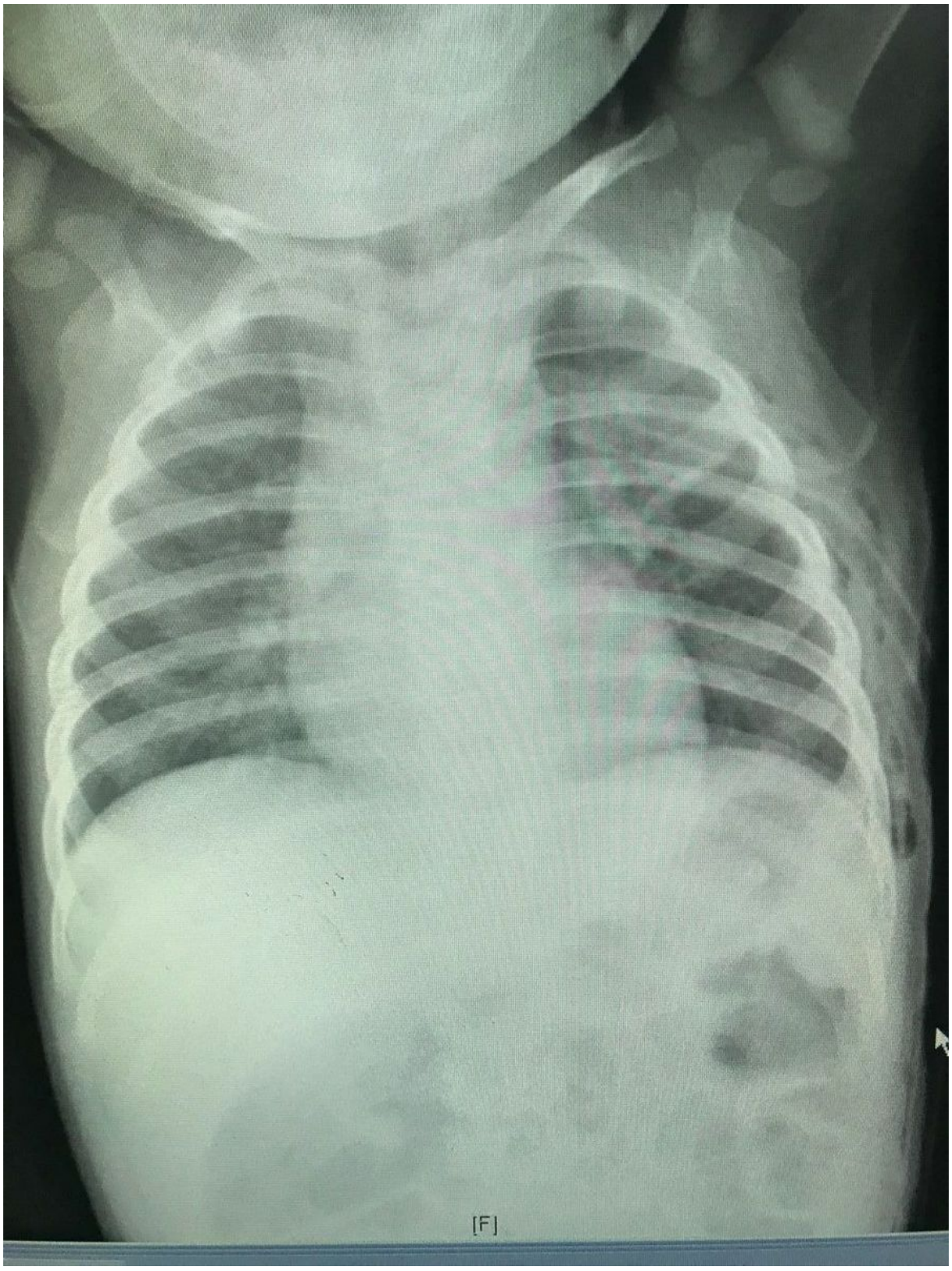

Figure 4

Postoperative chest radiographs showed no obvious cardiopulmonary lesions.

Supplementary Files

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