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Pseudovicarious Renal Contrast Excretion in a Postoperative Tracheo-Esophageal Fistula patient: Contrast in Pleural Space can be the cause. A Case Report

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Abstract

Background: Iodinated contrast is normally not introduced into the intrapleural space except for detecting diaphragmatic injury in stable patients on Computerized Tomography scans, and these studies are limited. Thus, the literature on pleural absorption of contrast is non-existent. We report a novel case with images of renal excretion of contrast after pleural absorption.

Case presentation: In this case there was inadvertent leakage of contrast into pleural space with subsequent systemic absorption of contrast with renal excretion in a child with a remote history of tracheo-esophageal fistula repair and recent esophageal resection and anastomosis for esophageal stenosis. The child developed a right pleural effusion after the second surgery, proven to be due to anastomotic site leakage. An esophagogram was performed using iodinated contrast, showing the leak and communication with the pleural space. Four hours later, a confusing abdominal radiograph showed excretion of contrast in the kidneys confusing the radiologist reader.

Conclusion: This imaging finding was due to the systemic absorption of iodinated contrast that had leaked from the anastomotic site into the pleural cavity.

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Background

Iodinated contrast is used in medical imaging procedures to enhance the visibility of internal structures in the body. It contains iodine that allows it to be easily seen on imaging tests such as fluoroscopy, CT scans, and angiographies [1]. When iodinated contrast is injected into the body, it is absorbed by the tissues and organs, making them appear more clearly on the imaging test. The contrast is typically injected into a vein, but it can also be given orally or through an enema. One of the main benefits of using iodinated contrast is that it allows for better visualization of the internal organs compared to non-contrast studies. Also iodinated contrast is safer than barium to assess leakage as barium can cause mediastinitis [2]. Iodinated contrast is also superior for better visualization of gastrointestinal tract[3] and is also more palatable due to its better taste [4]. Gastrografin can also cause pneumonitis if aspirated[2]. However, there are some potential risks associated with the use of iodinated contrast. In some cases, it can cause an allergic reaction, which can lead to symptoms such as rash, itching, or difficulty breathing. In rare cases, the contrast can cause more serious reactions, such as kidney damage or anaphylaxis. There are some precautions that should be taken after receiving iodinated contrast. For example, patients should drink plenty of fluids to help flush the dye out of their system, and they may be advised to avoid certain medications that could interact with the contrast. Overall, iodinated contrast is a valuable tool in medical imaging that allows for better diagnosis and treat various medical conditions. While there are some potential risks and precautions associated with its use, the benefits of using contrast typically outweigh the risks.

Iodinated contrast is normally not introduced into the intrapleural space except for detecting diaphragmatic injury in stable patients on Computerized Tomography scans, and these studies are limited. Thus, the literature on pleural absorption of contrast is non-existent. We present a unique case of inadvertent leakage of contrast into pleural space with subsequent systemic absorption of contrast with renal excretion in a child with a remote history of tracheo-esophageal fistula repair and recent esophageal resection and anastomosis for esophageal stenosis.

Case Presentation

An 11-month female came with a history of esophageal atresia with type C trachea-esophageal-fistula that was operated on in the 1st week of life. The patient was doing fine for 11 months when she presented with choking and vomiting during feeds. Initial radiograph demonstrated NG tube in mid esophagus (Fig.1). A subsequent upper gastrointestinal contrast study revealed severe esophageal narrowing (Fig.2). Balloon dilatation of the narrowing was done two times. However, narrowing was not responsive to the dilatation. The patient, therefore, underwent resection of the narrowed esophageal segment after intraoperative fluoroscopic localization, and primary anastomosis of the esophagus was performed. On postoperative day 2, the patient developed moderate-sized right-sided pleural effusion (Fig. 3). A postoperative esophagogram revealed leakage of contrast into the mediastinum and right pleural cavity (Fig. 4). No other contrast study

was performed. The follow-up radiograph, after 4 hours, showed renal excretion of contrast that cleared in follow-up radiographs (Fig. 5-6). Reanastomosis of the esophagus was performed, and the patient did well postoperatively.

Discussion

Pleural lymphatic drainage is the process by which lymphatic fluid is removed from the pleural cavity, a thin space between the lungs and the chest wall. The pleural cavity contains a small amount of pleural fluid, which helps to lubricate and protect the lungs as they expand and contract during breathing [5].

The pleural lymphatic system removes excess pleural fluid from the pleural cavity and returns it to the circulatory system. This is important because too much pleural fluid can cause the lungs to become difficult to expand, making it difficult to breathe. The pleural lymphatic vessels drain into collecting ducts that empty into the subclavian veins that ultimately drain into the superior vena cava and heart.

Pleural absorption of contrast refers to the process by which a contrast medium, such as iodine, is absorbed by the pleural space, the thin fluid-filled cavity between the lungs and the chest wall. Although there are some studies on pleural injection of contrast, there is no published literature on pleural absorption of contrast and its subsequent renal excretion. Absorption of fluid from pleural space occurs via lymphatics. This drains into the right lymphatic duct that drains into the systemic venous system at the junction of the right internal jugular and right subclavian vein or right brachiocephalic vein within the neck. This then reaches the heart. From the heart, it goes into the aorta and then into the renal arteries, finally leading to its renal excretion [6] [7]. The contrast that leaked into the pleural fluid in our patient was likely absorbed via the lymphatics as the renal excretion is noted on radiographs performed 4 hours after the upper gastrointestinal study was performed. This delay is likely due to lymphatic absorption of contrast which is a slow process compared to systemic absorption [8]. Absorption of the iodinated contrast from the gut into systemic circulation is, minimal, if any[9], making that a less likely possibility to produce such significantly visualized renal excretion. Also, upper GI and enema studies using iodinated contrast are routinely performed in children, and we have not observed renal excretion of contrast.

Conclusions

Pleural absorption of contrast with renal excretion has never been published in the literature. This is partly due to the fact that pleural injection of contrast is rare. We report this novel case of inadvertent leakage of iodinated contrast into pleural space with its subsequent renal excretion. This is important for a radiologist to know to avoid confusion during reporting of radiographs post procedure.

List of Abbreviations

- CT: Computed Tomography

Figures

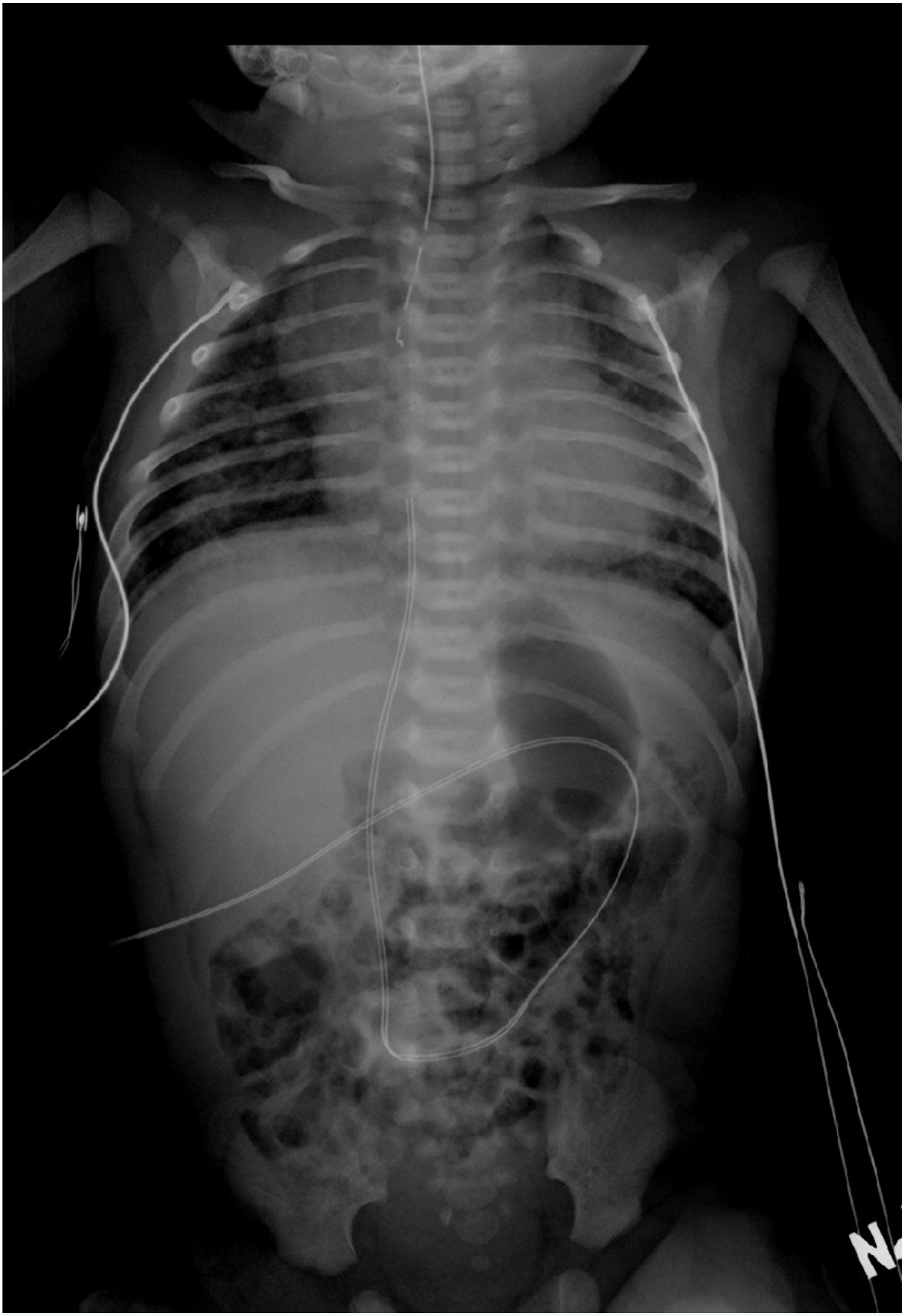

Fig.1. Chest radiograph performed on the first day of life shows the nasogastric tube terminating in the upper esophagus suggesting esophageal stenosis. The presence of bowel gas suggests presence of a distal tracheoesophageal fistula.

Fig.2. Upper gastrointestinal contrast study performed at 11 months of age revealed severe esophageal stenosis.

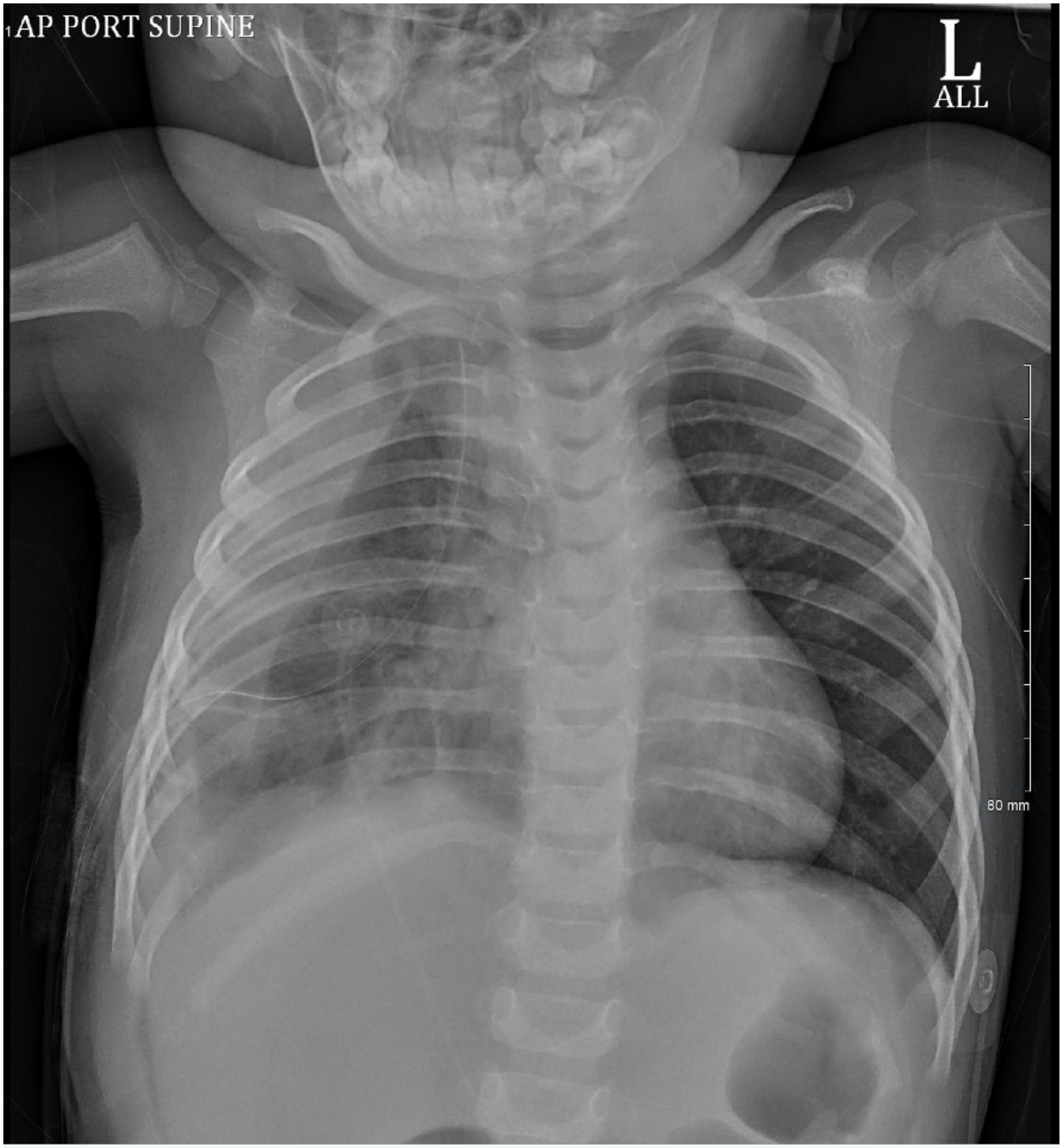

Fig.3. On postoperative day 2 of esophageal resection and anastomosis, a chest radiograph showed moderate right-sided pleural effusion.

Fig. 4. Postoperative upper gastro-intestinal study revealed leakage of contrast into the mediastinum and right pleural cavity.

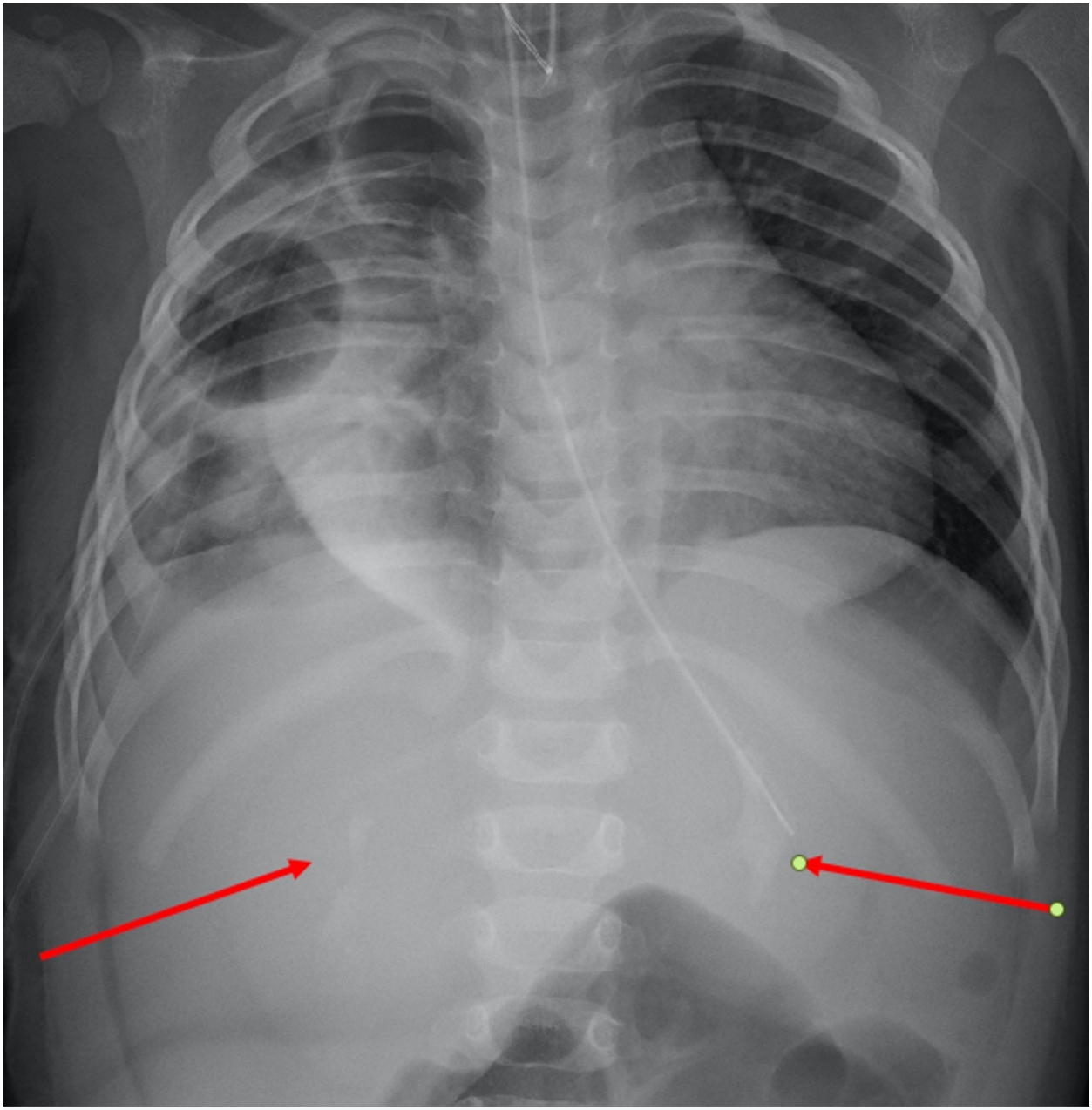

Fig.5. Follow-up radiograph after 4 hours showed renal excretion of contrast (red arrows).

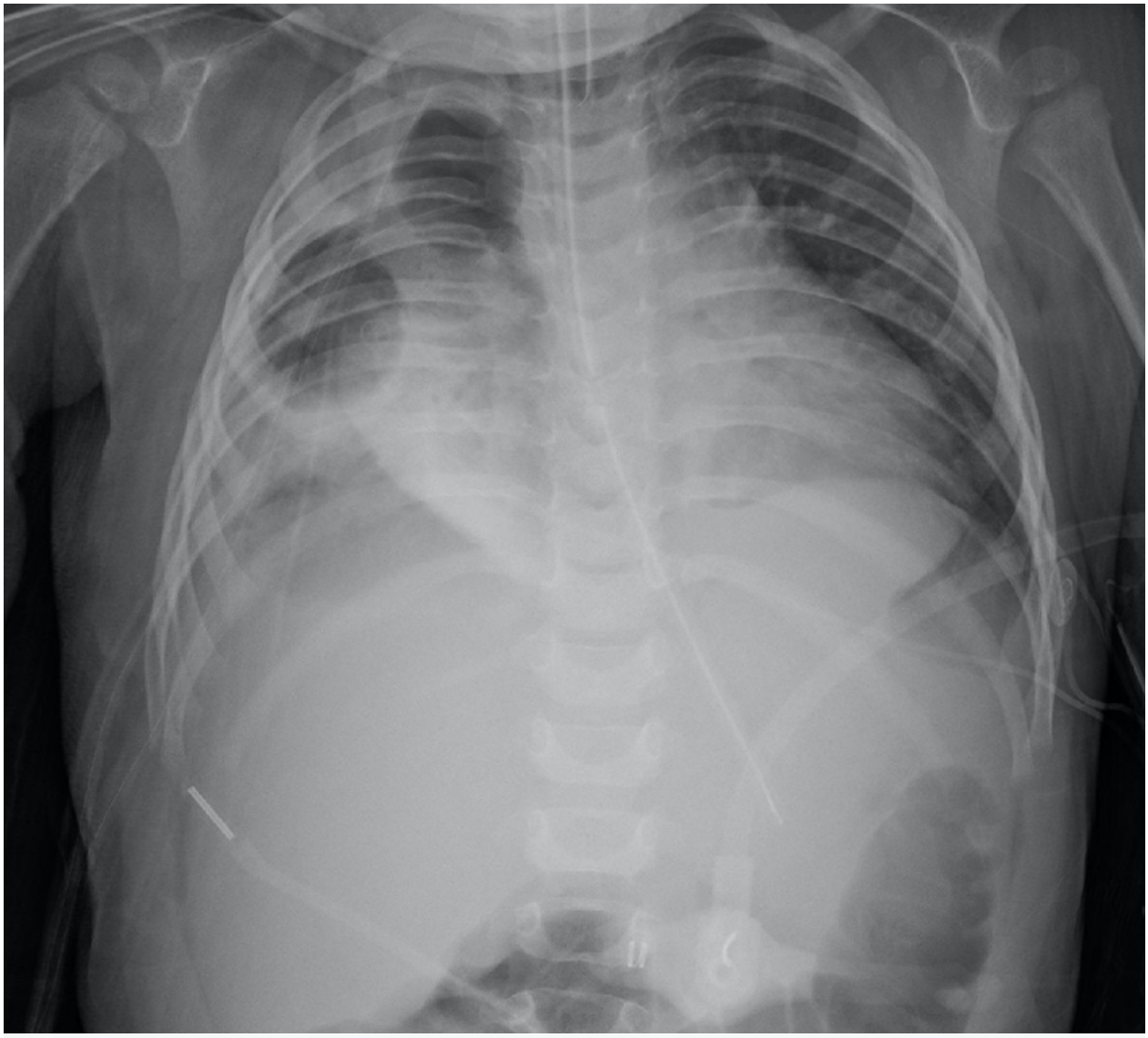

Fig.6. Clearance of renal contrast in the subsequent radiograph.

Statements and Declarations

Ethics approval and consent to participate

Written Informed Consent was obtained.

Consent for publication

All authors read and approved the final manuscript. Patients included in this research gave written informed consent to publish the data & materials contained within this study.

Availability of data and materials

The data and materials supporting the findings of this study are available on request from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Not applicable as no funding or grants were available for this study.

Authors' contributions

All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by Som Biswas, Preet Sandhu, and Harris L. Cohen. The first draft of the manuscript was written by Som Biswas and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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