CASE REPORT

Pneumonia with a twist: Intravascular Foreign Body – Case Report

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Doi
10.56164/PediatrRespirJ.2026.06

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ABSTRACT

Intravascular foreign bodies (IFBs) are a rare but potentially serious condition in pediatrics, often iatrogenic due to central venous catheterization. We present the case of a girl with history of congenital cytomegalovirus (CMV) infection, who underwent central venous access placement in early infancy. Following the years, during investigations for a respiratory infection, an incidental finding of a hyperdense formation about 15 mm in size was noted at the bifurcation of the right interlobar artery, interpreted as an intraluminal foreign body, likely endothelialized. In the absence of clinical or laboratory signs of infectious or thromboembolic complications, surgical or percutaneous intervention was ruled out, and a clinical-radiological surveillance strategy was adopted. A review of the literature highlights the need for a personalized therapeutic approach, with preference for percutaneous removal in symptomatic patients or when complications are presumable. However, in the presence of stable, endothelialized, and clinically silent foreign bodies, a conservative approach is feasible. This case emphasizes the importance of follow-up in patients with a history of central venous access and contributes to defining criteria for individualized management.

CASE REPORT

G, female, was born at term from an uneventful pregnancy via spontaneous vaginal delivery. Congenital cytomegalovirus (CMV) infection was diagnosed, and she was hospitalized for about two weeks in the neonatal care unit, where blood and imaging investigations were performed. She underwent antiviral therapy with valganciclovir but stopped at around three months of age due to the absence of major symptoms and viral DNA clearance in urine. *During the hospitalization an umbilical venous catheter (UVC) was placed and maintained in situ for 3 days, no complications observed.*

Around one year old, the patient was hospitalized again due to edema of the hands and feet, along with ecchymoses on the lower limbs, without fever, and tested positive for SARS-CoV-2. Due to swelling, warmth and an antalgic posture of the right lower limb, deep vein thrombosis (DVT) was suspected. Doppler ultrasound revealed thickening and increased echogenicity of the subcutaneous soft

KEY WORDS
Case report; intravascular foreign body; Central venous catheter; conservative management.

tissues of the right thigh and leg, with partial collapse and compression of venous branches. A CT angiography was requested but not performed due to difficulties in obtaining peripheral venous access. *Given metabolic acidosis, she underwent surgical and vascular evaluation and had a central venous catheter placed in the operating room to continue diagnostic procedures and left in situ for about a week without any complications.*

At 5 years old, she was evaluated by her pediatrician for cough and diagnosed with pneumonia. She was started on amoxicillin/clavulanate (Augmentin), later switched to azithromycin (Zitromax) due to persistent symptoms. A chest X-ray was performed to rule out complications due to poor clinical response and revealed bilateral bronchial thickening and a filamentous, radiopaque image of about 10 mm at the basal regions of the right lower lobe, not better characterized (**figure 1**).

For further evaluation, a chest CT was performed and revealed a hyperdense formation of about 15 mm at the bifurcation of a vascular branch, likely arterial, with uncertain diagnostic interpretation.

She was subsequently admitted to the Pediatric Unit for Allergy and Pneumology at the "G. Di Cristina" Hospital – A.R.N.A.S. Civico. Upon admission, she was in good general condition, afebrile, with no signs of respiratory distress, and exhibited diffuse coarse breath sounds on lung auscultation. Clarithromycin therapy was initiated, blood tests were performed, including D-dimer and fibrinogen (within normal limits) along with cardiology consultation (which recommended further studies including angio-CT and pulmonology assessment).

Eventually the interventional radiologist specialist evaluation ruled out interventional procedures. Serology for *Mycoplasma pneumoniae* showed positive IgM and IgG, consistent with a recent or ongoing infection.

Chest angio-CT excluded filling defects in the main, segmental, and subsegmental pulmonary arteries and confirmed the previously noted hyperdense image at the bifurcation of a right interlobar arterial branch, supplying the posterior and lateral segments of the lower lobe. There were no indirect signs of distal thromboembolism. Subsequent vascular surgery consultation suggested the hyperdense image corresponded to a likely endothelialized endoluminal lesion at the bifurcation of the right interlobar artery, with no indication for vascular surgery. Pediatric surgery also ruled out the need for lung parenchyma resection, considering the absence of local complications, the deep location, and the non-infective, endothelialized nature of the material. The child was discharged in good general condition with a plan for close clinical and radiological follow-up (**figure 2**).

At 1-year outpatient follow-up, no complications were observed and no indication for surgical intervention was found.

MINI REVIEW

Introduction

Intravascular foreign bodies (IFBs) are rare in children but may be associated with severe complications. Among these, foreign bodies located in the pulmonary circulation are the most common subtype, usually due to iatrogenic causes (1). Catheter fracture with embolization

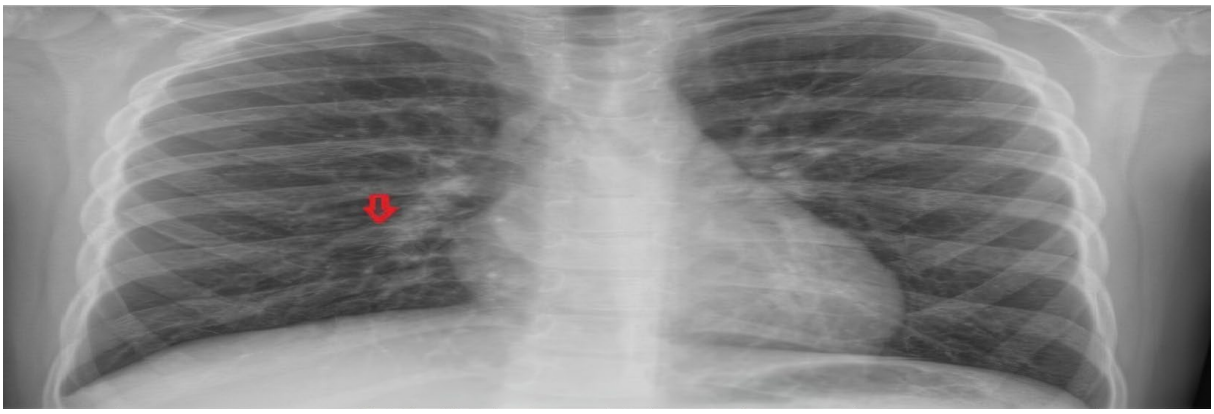

***Figure 1**. Chest X-Ray: the red arrow marks the filamentous, radiopaque image.*

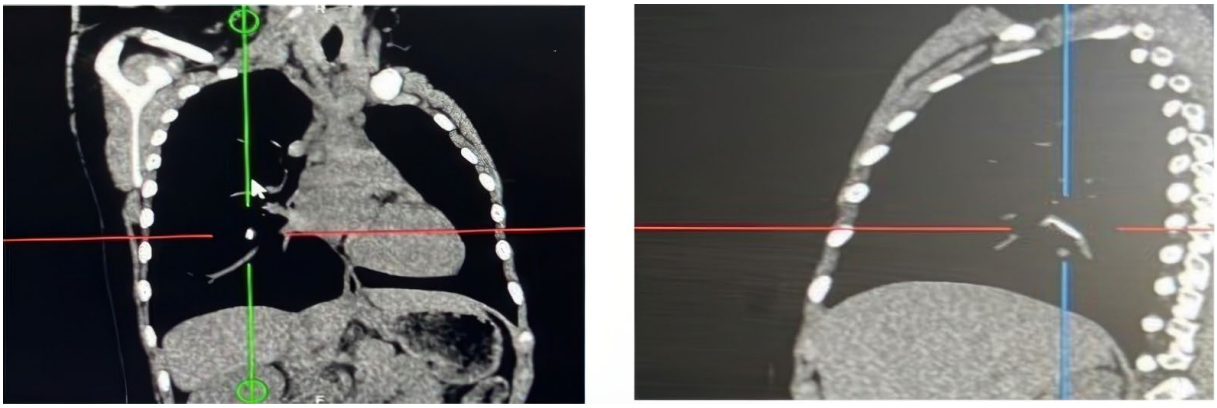

***Figure 2**. Multiplanar reconstrnction (MPR) of TC images.*

is a rare but serious complication, with an incidence in adults ranging from 0.2% to 4.2% (2). This review summarizes the existing literature on pediatric intrapulmonary IFBs, focusing on their etiology, clinical presentation, diagnostic workup, and therapeutic strategies.

Epidemiology and Etiology

In children, the vast majority of IFBs result from complications of central catheterization (e.g. central venous catheters, port-a-caths, umbilical venous catheters, PICCs). The most common migration sites are the right heart chambers and pulmonary arteries (3).

Clinical Manifestations

In the cohort analyzed by Pazinato et al., 77% of patients were asymptomatic at diagnosis, which was often incidental, as in our case. A minority of cases reported symptoms such as fever, systemic infection signs, pulmonary embolism, respiratory distress, or thrombotic complications. No pediatric mortality was directly attributed to the presence of an IFB.

Imaging Diagnostics

The diagnosis of IFBs primarily relies on radiological methods, including (4):

- **chest X-ray**, useful as an initial tool when a radiopaque foreign body is suspected or incidentally discovered;
- **chest angio-CT**, considered the gold standard for characterizing the location, morphology, and relationship of the foreign body with vascular structures;
- **echocardiography**, in cases with suspected cardiac involvement or paradoxicalembolism.

Therapeutic Management

Treatment options for IFBs include percutaneous extraction, surgical removal, anticoagulant therapy, and in selected cases, a conservative approach (“watchful waiting”). The choice should be tailored based on clinical status and risk of complications (1). Most children with catheter migration have complex underlying conditions (e.g. oncology, hematology, cardiology) that make them suboptimal candidates for surgery (8).

Over the years, non-surgical percutaneous techniques have evolved significantly since the first reported case in 1964, becoming the first-line treatment. Devices such as loop-snares, helical baskets, biopsy forceps and hooked guidewires have significantly improved the efficacy and safety of these procedures (5).

A systematic review in adults covering 215 cases reported a 93.5% success rate for percutaneous extraction. Similarly, a pediatric series including 19 IFBs in 18 children showed an 89.5% success rate, supporting the effectiveness of this approach in the pediatric population (6, 7). Another pediatric review of 14 cases reported a 92.8% success rate (1). None of the previous reviews, however, described an endothelialized foreign body.

Various cases of conservative management have been described, either as a primary choice or after failed procedures, with follow-ups of varying duration. Based on literature and known outcomes, Chan *et al*. (**figure 3**) proposed a management algorithm (9). If a device is small and immobile without foreseeable complications, removal may not be necessary (10). In the presence of complications, percutaneous retrieval should always

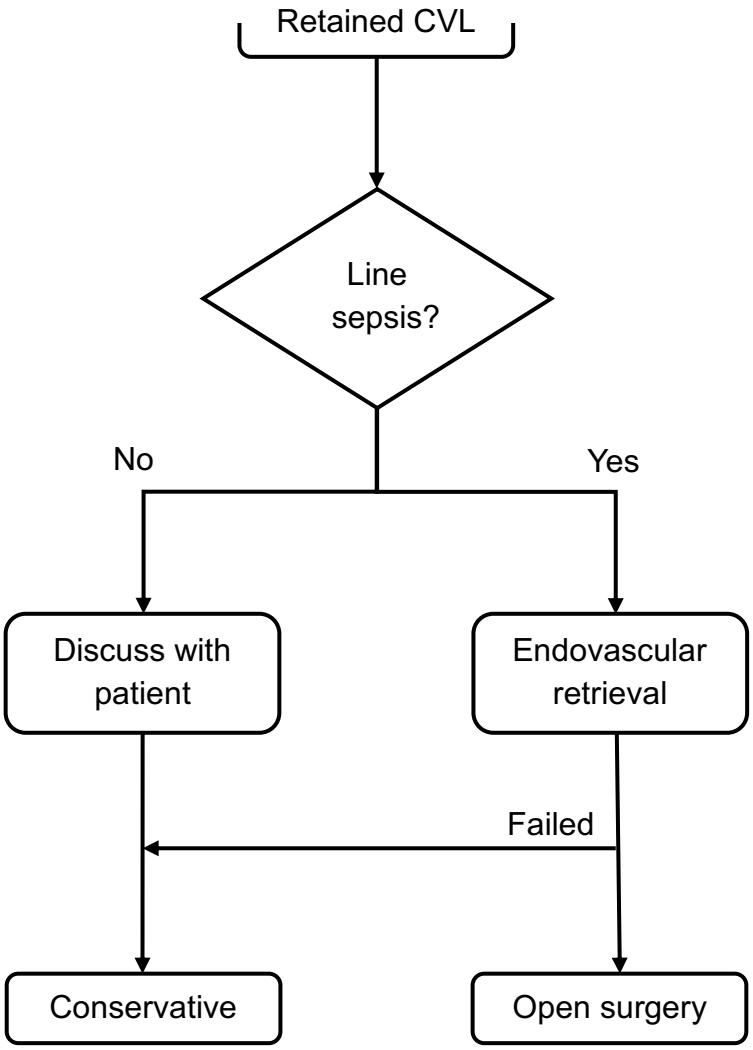

***Figure 3**. Proposed treatment algorithm according to Chen et al.*

be the first option, with surgical intervention as second-line (11).

Conclusions

Endovascular foreign bodies constitute a rare but clinically significant finding that demands careful evaluation and management. In this report, we describe an endothelialized endovascular foreign body — a condition that, to the best of our knowledge, has not much been previously documented in the literature. This observation highlights a potentially emerging nosological entity, particularly relevant as endovascular procedures become increasingly common in the pediatric population. Awareness of this phenomenon is essential, as clinicians are likely to encounter similar cases more frequently in the upcoming years. A multidisciplinary approach and continued research into the mechanisms of endothelialization and retrieval strategies are crucial to improve patient outcomes and broadening our understanding of this evolving clinical scenario.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interests

The Authors have declared no conflict of interests.

Financial support

There was no institutional or private funding for this article.

Author contributions

All the Authors confirmed the contribution to the manuscript's conception and approved its final version.

Ethical approval

Human studies and subjects

This case report was determined not to require Ethics Committee review.

Data sharing and data accessibility

Data are available upon motivated request to the Corresponding Author.

Publication ethics

Plagiarism

Authors declare no potentially overlapping publications with the content of this manuscript and all original studies are cited as appropriate.

Data falsification and fabrication

All the data corresponds to the real.

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