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CASE REPORT

Cardiocutaneous fistula with foreign body in the right ventricle: late and rare complication of the use of peripherally inserted central catheter

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Foreign-body migration,
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Heart.

Abstract

Introduction: Foreign bodies in the heart are rare and a small number of cases are reported about this event. There are different mechanisms by which objects can reach a cardiac chamber and cause myocardial perforation, so an individualized diagnostic approach must be taken to define the management of these cases. **Objectives:** To report the case of a five-year-old pediatric patient with a cardiocutaneous fistula caused by a caused by a fragment of a peripherally inserted central catheter (PICC) in the right ventricle (RV). **Case report:** A 5-year-old male patient with a history of blunt chest trauma due to a fall from his own height a year ago, followd by a chest wall abscess, after 20 days. After drainage, a recurrent outflow of serous and bloody secretion from the lesion persisted. Eleven months after the event, the patient started to present daily high fever, local hyperemia, and increased drainage secretion. The diagnostic investigation showed an Intracardiac foreign body with the presence of a cardiocutaneous fistula. Due to the past of peripherally inserted central catheter (PICC) during the neonatal period, it is believed that the catheter fragmented and remained asymptomatically lodged in the RV, with exteriorization through the skin after 5 years. **Conclusion:** Cardiocutaneous fistula caused by a foreign body in the heart is a rare event and may be caused by fracture and migration of a PICC. The diagnosis must be made through a detailed clinical history, aligned with adequate imaging exams.

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INTRODUCTION

A foreign body (FB) in the heart is a finding seldom described in the literature, which may result from complications from intravenous medical procedures, such as loose or fractured catheters; surgery, such invasive cardiac procedures; or penetrating trauma[1]. In pediatric patients, diagnosis is mainly incidental or the result of investigations of complications related to the foreign body[2]. Treatment, whether surgical or conservative, is prescribed based on present symptoms, risks, and time of diagnosis[3].

This report describes the case of a patient diagnosed with a cardiocutaneous fistula caused by a fragment of a peripherally inserted central catheter (PICC) located in the right ventricle (RV) and contributes to existing knowledge about diagnosis and treatment prescribed to prevent secondary complications.

CASE REPORT

A 5-year-old boy with a history of blunt chest trauma due to a fall from standing height a year before was brought to our clinic. Twenty days after the fall he developed edema and hyperemia in the inframammillary region of the left hemithorax, and underwent drainage of an abscess on the chest wall. He was not taken to the scheduled follow-up visits and developed a persistent recurrent discharge of serohematic secretion through the drainage hole. Eleven months after the event, he began experiencing high fever daily, local hyperemia, and increased secretion discharge, at which time he was brought to the pediatric emergency unit of a tertiary hospital. He was suspected with a foreign body in the heart and diagnostic investigation was initiated.

The admission chest X-ray images revealed a linear radiopaque object in the middle third of the left hemithorax and parasternal line. Cultures were performed and the patient was started on antibiotic therapy with oxacillin. During hospitalization, he remained hemodynamically stable, without symptoms such as palpitations, dyspnea or chest pain. Since his fever persisted and he had changes in inflammatory markers (increased CRP and white blood cell count), despite negative cultures, the patient was switched to antibiotic therapy with vancomycin.

Ultrasound examination of the chest wall showed a hypoechoic image with a fistula-like appearance communicating the skin with deeper planes of the anterior chest wall in close contact with the pericardium. A transthoracic echocardiogram revealed a hypoechogenic, bright image measuring 0.7x0.7cm in the RV, consistent with a foreign body. A computed tomography angiography of the chest showed a catheter inside the RV extending from its end to the left chest wall, traversing through the muscle and fat planes to the skin (potentially a cardiocutaneous fistula associated with a foreign body). (Figure 1)

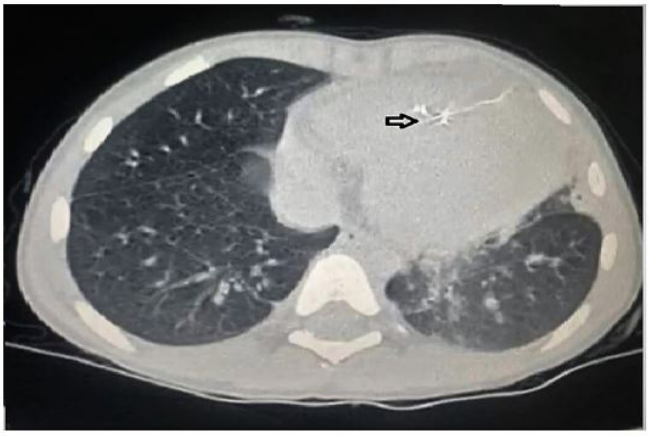


Figure 1: Chest computed tomography angiography
Legend: Catheter inside the RV (arrow) with its end extending to the left chest wall traversing through the muscle and fat planes to the skin (potentially a cardiocutaneous fistula associated with a foreign body). Ground-glass opacities and small foci of consolidation scattered throughout the lungs.

Catheter inside the RV (arrow) with its end extending to the left chest wall traversing through the muscle and fat planes to the skin (potentially a cardiocutaneous fistula associated with a foreign body). Ground-glass opacities and small foci of consolidation scattered throughout the lungs.

A left thoracotomy with pericardiectomy was performed to explore the chest wall and resect the cardiocutaneous fistula and remove the foreign body to the delimited point in the RV. A ventriculorrhaphy was performed with resection of costochondral cartilage. The surgical specimens were sent to the pathologist for analysis and cultures (Figure 2).

Resection of cardiocutaneous fistula and removal of a foreign body to the delimited point in the RV

Surgery was uneventful and the patient remained in the ICU until two days after the procedure. He did not require ventilatory support or vasoactive drugs. Since he still had fever spikes, antibiotic therapy was escalated to meropenem.

No bacterial growth was identified in any of the collected cultures. The pathologist's report described the surgical specimens as fragments of dense fibroconnective tissue and striated muscle (focal) with areas of hemorrhage and the presence of thermal artifact. He was discharged twelve days after the procedure with instructions to attend outpatient follow-up visits with a pediatric cardiology/cardiac surgery team.

DISCUSSION

This report describes the case of a child with a foreign body in the heart with a perforated myocardium and a cardiocutaneous fistula. The patient had a history of prematurity requiring admission to a neonatal ICU. His discharge report described a chest x-ray showing a PICC line.

The PICC line is a device often used in pediatrics, especially in ICUs, to infuse drugs, fluid, blood products and perform hemodynamic monitoring. Although it is deemed safe



Figure 2: Resected material

and stable, the number of complications resulting from its use is significant. Possible complications include catheter migration and breakage, extravasation of substances, perforation of vessels and organs, infection and thromboembolism[4,5].

A fractured intravenous catheter is a complication caused, in most cases, by poor device quality, incorrect insertion or prolonged indwelling time[6,7]. A study conducted with coordinators of 83 Neonatal Intensive Care Units in the United States found that about a quarter (24%) of the participants had seen cases of neonatal death caused by perforation of the myocardium or cardiac arrhythmia related to PICC lines[8].

The intracardiac adhesions observed intraoperatively and the macroscopic appearance of the surgical specimens were consistent with a PICC line that fractured and remained lodged in the RV asymptomatically and eventually moved five years after the procedure.

Symptoms of a foreign body in the heart may appear within hours to years of the originating event[9]. Leitman et al. analyzed 104 cases of cardiac foreign bodies and found symptoms in 56% of the patients, 20% with clinical manifestations appearing within 24 hours of the event originating the foreign body and 30% only years after the originating event[1].

Our patient was first referred to the pediatric cardiology service with suspected recent penetrating chest trauma associated with local infectious complication. The patient remained asymptomatic until he fell from standing height, one year after he was admitted to the cardiology service, at which time a skin lesion with purulent discharge appeared. The patient did not present with syncope, chest pain or palpitation. We believe that the fall from standing height with blunt chest trauma was unrelated to the onset of the symptoms.

Management of a foreign body in a heart chamber varies in the literature and is based on factors that include symptoms, present complications, and time of diagnosis. Choice of procedures is made on an each case basis. Actis Dato et al. evaluated fourteen cases of foreign bodies in the heart and developed guidelines for managing this clinical condition. According to the authors, patients with symptoms of arrhythmia or infection secondary to the presence of a foreign body should be treated with surgery; likewise, asymptomatic patients with risk factors for infection, embolization or erosion should also be treated with surgery; asymptomatic patients with a late diagnosis and without risk factors may be treated conservatively, especially when there is complete insertion of the foreign body into the pericardium or myocardium[3]. A rare, feared complication with a high potential for lethality is cardiac perforation, which may cause cardiac tamponade[10]. Our patient was prescribed surgery on account of cardiac perforation and infection present at diagnosis.

Determining the precise location of the foreign body in the heart, which can be obtained with imaging tests, such as echocardiography and computed tomography, is essential to define the most appropriate surgical strategy[11]. The imaging tests performed showed a metallic object inside the RV with a cardiocutaneous fistula, and an exploratory thoracotomy was proposed to assess the extent of the injury and define the need for a cardiac approach intraoperatively. Due to the adherence of the foreign body to the ventricular wall and the infection in the fistula tract in the anterior mediastinum and the costochondral cartilage without signs of intracardiac infection, we decided to approach the fistula tract and resect the cardiocutaneous fistula and costochondral cartilage, and remove the foreign body to the point delimited in the RV.

CONCLUSION

A cardiocutaneous fistula caused by a foreign body in the heart is a rare event that can be caused by the migration of a fractured PICC. Diagnosis must include a detailed assessment of the patient's medical history, combined with appropriate imaging tests to locate the foreign body. Our patient had a cardiac perforation and infection, which led to the prescription of surgery. Treatment decisions must be individualized based on the findings observed in each patient.

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