

Sub Diaphragmatic Abscess Leading to Empyema Thoracis in a Case of Perforated Appendix: A Rare Case Report

Dr. Rajgopal Totla	MBBS, MS GEN Surgery, MCH Paediatric Surgery, DNB, Associate Professor, Dept of General Surgery and Hospital, Aurangabad.
Dr. Falak Pancholi	Resident, Dept of General Surgery, MGM Medical College and Hospital, Aurangabad.
Dr. Kruttika Singh	Resident, Dept of General Surgery, MGM Medical College and Hospital, Aurangabad
Name of Corresponding Author	Dr. Falak Pancholi, Resident, Dept of General Surgery, MGM Medical College and Hospital, Aurangabad.

Abstract:- Thoracic empyema is an infrequent complication of appendicitis that has rarely been reported in the literature. The case of a 6-year-old girl who was admitted for medical management of a perforated appendicitis is presented. Her clinical course was complicated by the development of an appendicular abscess and a subdiaphragmatic abscess leading to right-sided empyema and how it was managed surgically and medically. Thoracic empyema should be considered a potential cause of respiratory distress in patients with appendicitis. Furthermore, the abdomen should be carefully evaluated as a source of infection in patients with thoracic empyema without an underlying lung disease.

Keyword:- Empyema, Appendicitis, Perforated.

I. INTRODUCTION

Acute appendicitis is the most common condition requiring intra-abdominal surgery during infancy and childhood.[1] For the fortunate patient in whom the diagnosis is made before perforation occurs and for whom early operation is performed, an uncomplicated and rapid convalescence may be expected. When delay in diagnosis results in perforation, one may anticipate a prolonged hospital stay marked by numerous complications, both mild and serious. It is a well known fact that today the mortality of appendectomy for uncomplicated acute appendicitis is almost negligible, whereas in the more advanced cases, when peritonitis of some degree has supervened, the mortality continues to be disturbingly high. [2]For the most part, deaths from acute appendicitis are due to some phase of peritonitis either directly, as from toxemia, severe sepsis and ileus, or indirectly from the later complications of peritonitis, e.g., intestinal obstruction, empyema, etc.

Retrocaecal position of the appendix constitutes 26%-65% of cases. It may be inside of the peritoneal cavity or in the retroperitoneal position. Retrocaecal appendicitis usually

presents with atypical signs and symptoms. Because of atypical presentation of the retrocaecal appendicitis, the diagnosis maybe delayed that may lead to higher incidence of perforation and serious complications.

Perforated appendicitis, as defined by a visible hole in the appendix or an appendicolith free within the abdomen, carries significant morbidity in the pediatric population.[3] Accurate diagnosis is challenging as there is no single symptom or sign that accurately predicts perforated appendicitis. Younger patients and those with increased duration of symptoms are at higher risk of perforated appendicitis. Elevated leukocytosis, high C-reactive protein, hyponatremia, ultrasound, and CT are all useful tools in diagnosis. Distinguishing patients with perforation from those without it is important, given the influence of a perforation diagnosis on the management of the patient.[4] Treatment for perforated appendicitis remains controversial as several options exist, each with its indications and merits, illustrating the complexity of this disease process. Patients may be managed non-operatively with antibiotics, with or without interval appendectomy. Patients may also undergo appendectomy early in the course of their index hospitalization. Factors known to predict failure of non-operative management include appendicolith, leukocytosis greater than 15,000 white blood cells per microliter and CT evidence of disease beyond the right lower quadrant. Here we discuss one such complicated case of perforated appendicitis.

II. CASE STUDY

A 7 Year old female child was brought to the emergency room with complaints of severe abdominal pain, fever, vomiting and loose stools since 4 days. She had tenderness in right iliac fossa with no guarding. Her initial ultrasonography report was suggestive of perforated appendix of diameter 9.3mm. X- ray showed a large abscess in the right sub-diaphragmatic region. Blood investigations showed a picture of severe infection with anemia (HB- 7), leukocytosis (TLC- 15250) and CRP 278, INR value was raised to 2.42.

Patient developed breathlessness post admission due to reactionary right sided pleural effusion and resultant respiratory depression. She had to be put on mechanical ventilator and inotropes. Patient was initially managed conservatively by giving packed cell transfusion, fresh frozen plasma transfusion, stepping up antibiotics (Piperacillin+Tazobactam, Gentamicin, Metronidazole), pigtail insertion for the abscess and Intercostal drain insertion for the pleural effusion.

Once the patient was stabilised and weaned off of ventilator and inotropes, contrast enhanced CT scan was done. Reports were suggestive of acute appendicitis with perforation, right sided empyema thoracis and peritonitis with a pelvic abscess. Hence a decision was taken to perform laparotomy with thoracotomy.

Our team of pediatric surgeons operated on this complex case together. Intraoperatively dense adhesions were found for which adhesiolysis was done. Sloughed off subhepatic appendix was found with appendicolith. Pelvic abscess cavity was ruptured with free pus in the pelvis. Rest of the bowel appeared healthy and hence a thorough wash was given after appendectomy and abdomen closed with drains in situ. Right sided thoracotomy was done in view of empyema. There was thickening of pleura, unhealthy pleura was removed. A small tear was found in the diaphragm which was repaired using Prolene sutures.

Post operatively the patient was managed in ICU for 3 days after which she was shifted to ward. The patient recovered well under thorough antibiotic cover. On post operative day 5 the patient was started on soft diet with protein supplementation. She was soon shifted to a protein rich diet. On post operative day 10 the patient was sent home after removal of all drains and ICD.



Fig 2 Perforated Sloughed Off Appendix

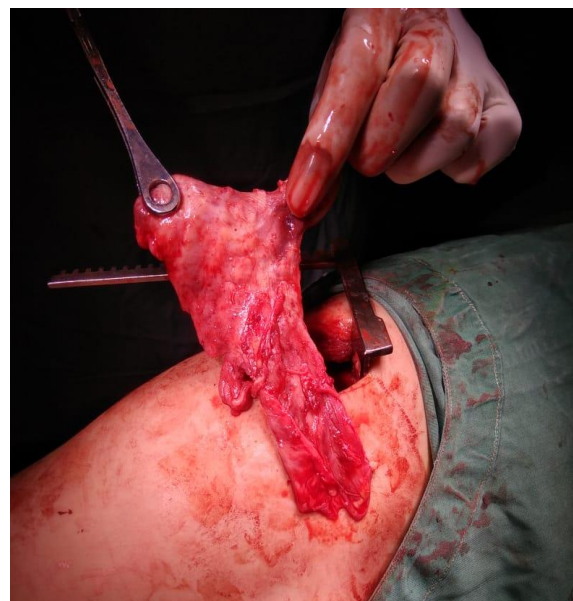


Fig 3 Infected Pleural Peel

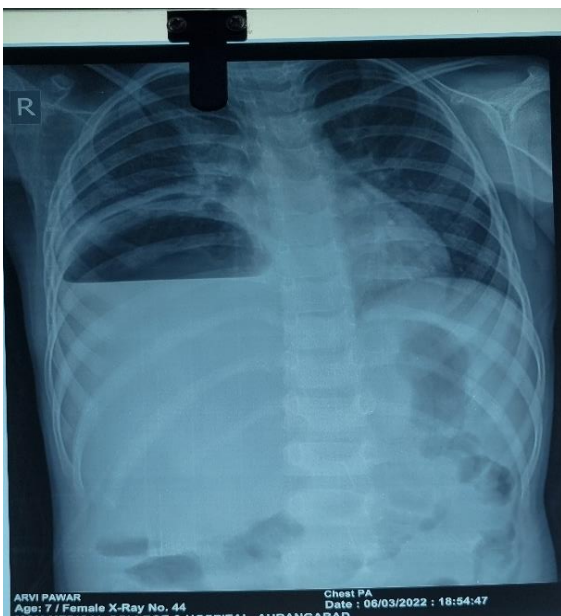


Fig 1 Xray Chest Showing Subdiaphragmatic Abscess

III. DISCUSSION

In this report, we present a female child who was admitted for conservative management of an appendicular mass. Her clinical course was complicated with severe respiratory distress due to a subdiaphragmatic abscess leading to empyema thoracis that was diagnosed preoperatively. This complication may appear despite a relatively early identification of the appendicular mass and prompt initiation of antibiotic therapy.

Thoracic empyema may present in either young or elder individuals (2–68 years). However, pediatric patients are most frequently affected (60%), probably reflecting a difference in

the pathological aspects of this condition between both groups. In children the omentum is underdeveloped and unable to limit purulent leakage [10, 11]. Thus, children are more prone to develop peritonitis compared to adult patients. Furthermore, children have a relatively mobile appendix compared to adults which may explain the increased frequency of nonfocal abdominal abscesses seen in this population [12].

Bacterial passage from the abdomen to the thorax is possible due to several mechanisms. For example, the pressure gradient between both compartments may cause a valve effect that favors the mobilization of intra-abdominal content to the thorax. Additionally, unilateral lymphatic flow is another factor described to play a role in the dissemination of pus across the diaphragm [4, 13]. Therefore, subhepatic, subdiaphragmatic, and more distant abscesses can spread to the thorax not only by contiguity but also by the anatomical and physical properties between these cavities [5, 14–16]. The migration of an appendicolith (dense mixture of stool and mineral deposit) from the abdomen to the thorax can also initiate an infection later in this compartment [9]. In some cases, it can be expelled following the perforation of the appendix and can form an abscess in the Morrison's pouch. Also, in exceptional cases, it can erode the diaphragm and predispose to purulent leakage to the thorax [9].

Although our patient presented with obvious symptoms and signs of appendiceal phlegmon, it is possible that the previous use of oral nonsteroidal anti-inflammatory drugs prevented an early presentation to our Emergency Department. This situation posed the patient at an increased risk for complications such as abscess formation and peritonitis [13]. Also, abdominal findings can vary depending on the severity of the disease and clinical scenario. For example, Wong and Kumar and Tokat et al. reported patients with marked peritoneal signs that were diagnostic for appendicitis but who developed empyema postoperatively. On the other hand, patients with ruptured appendix can present with an inconclusive abdominal evaluation and respiratory distress due to thoracic empyema [4, 5, 6, 14]. In the later scenario, respiratory distress can be the most prominent manifestation of the disease, and surgeons may skip further investigation of the abdomen.

The most frequent organisms isolated in cases of diaphragmatic abscess and empyema, including *E. coli*, *Bacteroides* spp., and *Klebsiella* spp. These organisms can tolerate significant oxygen concentrations and proliferate in the lung. According to the guidelines, appendiceal masses can be treated with antibiotic therapy when the mass is <5 cm, and there is no evidence of pus [15]. This is especially important as medical therapy may be as effective as percutaneous treatment (level of evidence IIB). In this report, our patient complicated her course with ruptured appendix, abscess formation, and infection of the pleural space despite the prompt use of broad-spectrum antibiotics. This is consistent with some studies that show that 19% of the patients with an appendiceal mass may fail to improve despite the appropriate use of antibiotics [16].

More invasive therapies such as early appendectomy are technically challenging, especially at the time of manipulating inflamed tissues or closing the appendiceal stump [20]. Therefore, the gold standard for the management of an appendiceal mass includes medical therapy with interval appendectomy [17]. Nonetheless, those patients who fail to improve within the next 24–48 hours or who persist with fever or present worsening abdominal pain (worsening mass size) should undergo immediate surgery [18]. Our patient presented episodes of fever during the first 48 hours after starting antibiotics, which could be expected as the effect of antibiotics increase progressively. However, his worsening abdominal pain and respiratory distress during the third day of hospitalization was pathological and prompted emergent surgery with abscess removal.

IV. CONCLUSION

Survival rate of patients with an appendiceal mass or abscess who develop thoracic empyema is 94%. This could be related to the aggressive surgical management and abscess washout once the patient begins to deteriorate [19]. However, short- and long-term complications such as empyema necessitans, bronchopleural fistulas, and lung abscess have not been studied in this population and should not be overlooked. They may increase the risk of readmissions, prolonged hospital stay, and mortality rates, as reported elsewhere [20–25].

To the best of our knowledge, this is one of the few cases that present an appendiceal mass complicated with thoracic empyema or subdiaphragmatic abscess. It can arise despite early identification and management of an appendiceal mass or abscess. Surgeons should be aware of this complication during the perioperative state of appendicitis.

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