Teaching Case Report

Abdominal crunches as an unusual cause of empyema

The case: A 28-year-old woman, previously healthy, came to our emergency department after 2 days of progressive left-sided chest pain. The onset had been sudden, in the midst of her doing a few abdominal crunches. She described the pain as sharp, nonradiating and pleuritic. Physical examination found her to be afebrile, with stable vital signs and no evidence of respiratory distress. Faint crackles could, however, be heard on the left side of her chest.

Two hours after her arrival, the patient developed fever and worsening chest pain. Re-examination revealed decreased air entry into the left lobes of the lung. Chest radiography showed a 7.5-cm mass arising from her left posterior mediastinum (Fig. 1). This later progressed to a large left-pleural effusion (Fig. 2); upon thoracentesis, it was found to be empyematous.

CT scans revealed a left-sided, posterior, heterogeneous, multicystic mass with punctate areas of calcification (Fig. 3). Via angiography, the blood vessels feeding it were identified as branches of the inferior phrenic and left gastric arteries; drainage was via both the systemic and portal venous systems. The patient was admitted to hospital and administered ciprofloxacin and clindamycin intravenously. A chest tube was inserted into her left pleural space. After consultation about exploration and mass excision, our thoracic surgery service recommended surgical management. Forty-eight hours before the operation, the vessels feeding the mass were embolized with angiographic guidance.

A multicystic extralobar sequestration was uncovered and resected from the left lower lobe of her lung. This mass was found to be perforated; when

Fig. 1: Radiographic views of the chest — lateral (left) and posteroanterior (right) — showing the pulmonary sequestration arising from the left posterior mediastinum.

Fig. 2: A posteroanterior chest radiograph showing the evolution of the left pleural effusion.

Fig. 3: CT scan of the patient’s chest, showing a left-sided, posterior, heterogeneous, multicystic mass with punctate areas of calcification.
Described is a case of empyema secondary to rupture of a pulmonary sequestration induced by abdominal crunch exercises. A rare congenital malformation, the incidence of these pulmonary “cysts” has been reported as being about 1.5–17 per thousand population—an underestimate, given that they are usually asymptomatic. A pulmonary sequestration (also called a bronchopulmonary sequestration) is a segment of lower-respiratory-tract parenchyma that is nonfunctional, with no communication with the rest of the tracheobronchial tree. Its arterial supply derives from the systemic vasculature of the developing embryo. Pulmonary sequestration may arise in the womb from traction of the lung bud by migrating abdominal organs, from caudal migration of a tracheobronchial bud along with its blood supply, or from accessory lung buds.

Pulmonary sequestrations are classified as intralobar or extralobar, with a respective relative prevalence of 6:1 (Table 1). They have several clinical manifestations, which may appear at any age. They may be discovered during prenatal ultrasound; upon investigation of postnatal respiratory distress, recurrent pneumonia and bronchitis, or hemoptysis; and incidentally in radiologic findings, even when asymptomatic. Cases of intraabdominal pressure changes during various activities

| Activity                        | Pressure generated, mm Hg |
|--------------------------------|---------------------------|
| Lying supine                   | -1 to 6                   |
| Coughing                       | 40 to 127                 |
| Abdominal crunches             | 14 to 130                 |
| Bench presses                  | 2 to 34                   |
| Valsalva’s manoeuvre           | 20 to 64                  |
| Jumping jacks                  | 43 to 140                 |

*Data sources: J Surg Res 2005;129:231-5 and Obstet Gynecol 2006;107(2 Pt 1):305-9.*

Intraoperative exsanguination from anomalous vasculature, rates of complications, illness and death are low if the resection is done before infections have become recurrent. The postoperative prognosis is uniformly good. Patients with incidentally discovered cysts that are asymptomatic should be warned away from activities that can raise intraabdominal pressure.

Omar Abouzzeddine
Naveed Tangri
Department of Medicine
McGill University
Montréal, Que.

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