Intraperitoneal Rupture of Mature Cystic Ovarian Teratoma Secondary to Sit-ups

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A case of general peritonitis caused by sudden perforation of a mature cystic ovarian teratoma is presented. The clinical course consisted of progressive abdominal tenderness after a 1600-m run and 12 subsequent sit-ups. An exploratory laparotomy revealed massive ascites and a 10-cm linear perforation over the dome of the tumor, probably caused by a sharp elevation of intra-abdominal pressure generated during the sit-ups. Neither peritoneal granulomatous reaction nor inflammatory adhesions to adjacent bowel loops were found. A search of the English literature did not reveal any similar case. [J Formos Med Assoc 2009; 108(2):173–175]

Key Words: cystic ovarian teratoma, peritonitis, sit-up

Mature cystic ovarian teratomas are cystic tumors composed of well-differentiated derivations from the germ cell layers. The incidence of perforation varies between 0.2% and 2.5%, and the typical presentation is insidious intraperitoneal leakage that results in granulomatous peritonitis.¹ The description of sudden perforation presenting as an abdominal emergency is rare, and herein we found such a case after the patient had performed some sit-ups.

Case Report

A 17-year-old woman presented with sudden onset of lower abdominal pain and vomiting once after a 1600-m run, followed by 12 sit-ups, during a physical education class. The position of the sit-ups included keeping the feet elevated and crossing the hands on the chest. On arrival at our emergency department about 4 hours after the exercise, abdominal tenderness to deep palpation and rebounding pain over the lower abdomen were found. Total white blood cell count was 11.89 × 10⁹/L and C-reactive protein was 11.73 μg/mL. Abdominal radiography merely revealed marked distension of the sigmoid colon and sparse gas within the rectum, which suggested distal obstruction. Ultrasound examination showed a large, heterogeneous, predominantly solid, pelvic mass. A large collection of fluid was found in the cul-de-sac and Morrison’s pouch. Computed tomography showed a large mass with a fatty component, soft tissue component, and calcification surrounded by a thin capsule, in the lower abdomen. There was no detectable separate left ovary. A large cystic teratoma arising from the left ovary with perforation was diagnosed.

An emergency operation was performed under the diagnosis of peritonitis. At laparotomy, a cystic tumor measuring 12 cm at its greatest diameter was found with 870 mL of bloody ascites. A cystic tumor, originating from the left ovary, with a 10-cm linear perforation over the dome, was found and...
the perforation was a blowout-like lesion (Figure 1). The appearance of the peritoneum was healthy without any granulomatous reaction, and there were no inflammatory adhesions to adjacent bowel loops. The cystic mass was attached to the broad ligament, which suggested that it originated from the left ovary. Left salpingo-oophorectomy was performed.

Pathologic examination showed a mature cystic teratoma composed of brain tissue, respiratory epithelium, intestinal mucosa, bone, cartilage, squamous epithelium with hair follicles and sebaceous glands. Focal necrotizing inflammation with subcapsular neutrophilic infiltrate was found at the area of perforation (Figure 2). Neither chronic inflammatory reaction nor foreign body giant cells were noted. The operation and pathologic findings proved that acute perforation had occurred to the cystic ovarian teratoma. Cytology of ascites was negative for malignancy. The patient was discharged following an uneventful postoperative course and has remained free of symptoms.

Discussion

The most common complication of mature cystic ovarian teratoma is torsion, and rupture is less frequent.\(^1\) The cause of rupture of mature cystic ovarian teratomas can be primary or secondary. Primary perforation occurs spontaneously without external forces. Reported mechanisms of primary perforation include torsion with infarction of the tumor, infection, malignant change, and prolonged pressure from pregnancy or delivery.\(^1\) Secondary perforations might occur following iatrogenic damage or direct trauma.\(^2,3\)

Sit-ups are a strength training exercise. To perform the exercise, the person lies down on his/her back on the floor with the legs flexed, and then raises the body to the vertical position without moving the knees. The hands can be placed behind the head, across the chest, or are straightened out parallel to the body. Even though athletes are commonly taught to exhale with contractions, untrained people usually perform the exercise over-strenuously.\(^4\) When the exercise involves improper Valsalva maneuver during the contractile phase, there may be sharp increases in cerebral blood flow, arterial blood pressure and intra-abdominal pressure.\(^4\) Neurologic complications, such as stroke, spinal epidural hematoma and spinal cord injury, have been reported while doing sit-up exercises.\(^4,5\) In addition, significantly higher intra-abdominal pressure has been shown to be generated when the Valsalva maneuver is performed with the trunk in a forward flexed position, as opposed to standing or flexion with rotation.\(^6\)
Blood pressure also increases through repetitive restrictive exercise. Therefore, the intra-abdominal pressure is elevated sharply during improper repetitive sit-up exercise.

For the above reasons, the possible mechanism of perforation in our case may have been sharp elevation of the intra-abdominal pressure generated during sit-ups. Because the large mass was attached to the broad ligament, it was relatively immobilized. When the patient was doing the sit-ups and raising the body forward to the knees, the cystic mass may have been crushed directly by the impact from contractile abdominal muscle against the lower vertebral column. In addition, the patient’s arterial blood pressure was higher than baseline after a 1600-m run. We believe that the blowout was caused by the Valsalva maneuver, the same as the mechanical force of labor and delivery.1

Acute abdomen may be present as a complication of repetitive improper sit-ups if there is an unrecognized pelvic teratoma. A focal weakness of the capsule secondary to inflammation, accompanied by sudden elevation of intra-abdominal pressure caused by sit-ups may thus be the pathogenesis of spontaneous perforation. A thorough and detailed history taking may be helpful in detecting this rare etiology.

References