A case of diaphragmatic rupture after strenuous exercise (swimming) and jump into the sea

Zorlu bir yüzme ve denize atlama sonrası oluşan diyafram yırtığı: Olgu sunumu

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A 20-year-old male patient with complaints of severe chest pain, difficulty in oral feeding, and a feeling of swelling in the abdomen was admitted to the Emergency Clinic. His complaints had begun 15 days prior to admission after strenuous swimming and a jump into the sea from a height of half a meter. Elevation of the left diaphragm was observed on the chest radiography and computerized tomography revealed a rupture in the left diaphragm. Surgical repair was done. The patient attended regular follow-ups and appeared to have no complications as of the sixth month after the treatment.

Key Words: Diaphragmatic rupture; efforts; swimming.

Yirmi yaşındaki erkek hasta, şiddetli göğüs ağrısı, oral gıda alımında güçlük ve karında şişlik yakınmalarıyla acil servise başvurdu. Hastanın şikayetleri 15 gün önce zorlu bir yüzme egzersizi ve yaklaşık yarım metre yükseklikten denize atlama sonrası başlamıştı. Direkt göğüs radyografisinde sol diyaframda elevasyon ve bilgisayarlı tomografide sol diyaframda yırtık saptandı. Yırtık cerrahi olarak onarıldı. Hasta düzenli olarak takip edildi ve altı aylık kontrolünde herhangi bir komplikasyonu yoktu.

Anahtar Sözcükler: Diyafram yırtığı; efor; yüzme.

Diaphragmatic ruptures (DRs) are usually observed after blunt traumas. Cases are reported to have occurred during delivery or following a heavy coughing episode, heavy weight lifting and severe vomiting.[1-5] To our knowledge, there has been no case reported in the medical literature to date regarding DR formed after a period of strenuous swimming followed by a .5 m jump into the water.

In this case report, we describe a patient with DR that formed after strenuous swimming and a .5 m jump into the sea.

CASE REPORT

A 20-year-old male patient with complaints of severe chest pain, a feeling of swelling in the abdomen and difficulty in oral feeding was admitted to the Emergency Clinic. The patient's complaints had begun 15 days prior to admission, after he jumped into the sea from a height of half a meter following a 15-minute strenuous period of swimming and a 30-minute rest on a floating platform. After the jump, the patient described a stabbing pain in his left chest and he had difficulty breathing followed by swallowing some sea water.

The patient managed to swim to the shore on his own. During the days following the incident, he experienced loss of appetite and a stabbing pain upon laughing. The patient did not apply for medical help immediately after the incident. Later, due to the increased complications, he applied to a medical care center, which directed him to our hospital for further examination. On physical examination, abdominal distension and widespread tenderness, defense and rebound were observed. On auscultation, there were no breath sounds in the left pulmonary base but abdominal sounds were present.

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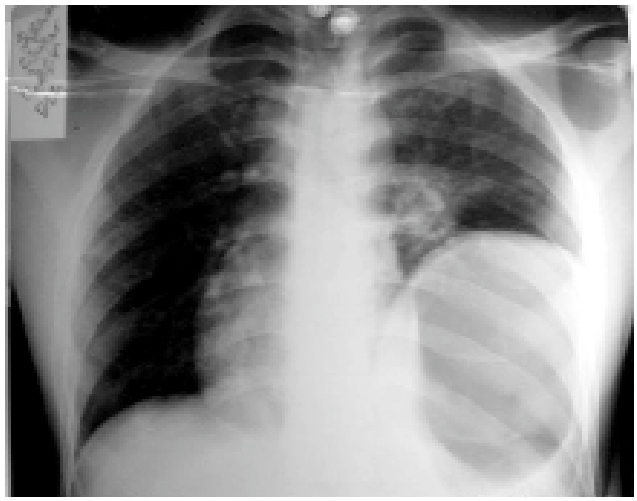

Fig. 1. Elevated left diaphragm was found on chest radiograph.

Fig. 2. Computerized tomography revealed that the stomach and spleen had moved to the left hemithorax.

The patient's blood pressure was 110/80 mmHg, pulse rate 96/min and breath rate 18/min. Chest radiographs (CR) revealed elevated left diaphragm (Fig. 1). Leukocytes were 14,100/dl. Laboratory findings revealed no other pathologies. A nasogastric tube was applied. The patient showed a decrease in his complaints and symptoms after nasogastric decompression. His approval was taken to obtain a thoracoabdominal computerized tomography (CT) scan, which revealed that the stomach and spleen had moved to the left hemithorax (Fig. 2). The patient was operated with the diagnosis of diaphragmatic rupture. A left subcostal incision was made. After the stomach and spleen were pulled to the abdomen, a recent rupture of 5x4 cm was observed in the posterior lateral left diaphragm (Fig. 3). The primary rupture was repaired. Due to the development of pneumothorax on the second day following the surgery, tube thoracostomy was applied. Thorax tube was removed on the fifth day and the patient was discharged on the ninth day. The patient attended regular follow-ups and appeared to have no complications as of the sixth month after the treatment.

DISCUSSION

Diaphragmatic ruptures often occur after severe blunt traumas. In less than 1% of the cases, there is either no apparent cause or there are various precipitating factors elevating the intra-abdominal pressure. There are cases of DRs reported to have occurred after heavy coughing, delivery, vomiting, heavy weight lifting, strenuous efforts and barotraumas.[1-5] It is not clear in those cases, however, whether or not there was a history of a defect, a trauma or an unidentified diaphragmatic anomaly in the area. In our case, the facts that complications commenced immediately after a sports activity and that surgical findings verified the existence of a recent rupture led us to think that the case was a spontaneous rupture following a strenuous sports activity. Although cases of DR following various sports activities have been reported in the medical literature, to our knowledge, there has been no previous report of a case with a rupture occurring after strenuous swimming and jumping into the sea.

The mechanism behind the formation of a DR after an activity as described herein is not clear. The diaphragm is essentially an inspiratory muscle.

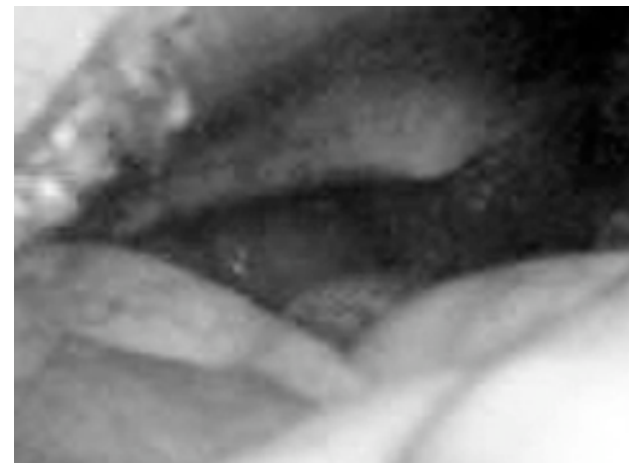

Fig. 3. Diaphragmatic rupture of 5x4 cm was observed in the posterior lateral left diaphragm during the operation.

However, it performs an expiratory muscle function during activities that require high intrathoracic pressure. This expiratory activity is directly related with the intrapleural pressure and is followed by the expiratory activity of the transversus abdominis muscle. Diaphragmatic contractions help stabilize the thoracic pressure during strenuous and sudden efforts. During difficult breathing, the contraction of the abdominal muscles pushes the diaphragm upward and coats inward and outward. Sudden and strong Valsalva maneuvers may lead to a disorder in the coordination of various respiratory muscles. This may be the cause of a DR.[2,6,7]

Despite the diagnostic yield of CR, diagnostic peritoneal lavage, CT and laparoscopy-thoracoscopy have also been investigated. In actual practice, CR is the most valuable simple test, although it can be diagnostic or suggestive of a DR in only 28-70% of cases.[8] CT is the second-choice imaging technique, although the axial-oriented diaphragm is not always well demonstrated on conventional CT. Ranges of sensitivity and specificity are reported to be 54-90%.[9] In our case, CR and CT findings were diagnostic. Although laparoscopy has been reported to be useful in the diagnosis and treatment of diaphragmatic injuries, especially in penetrating traumas to the thoracoabdominal region, this technique was unfortunately not performed due to the inadequate experience and lack of logistic support.[10]

We present herein a case of a DR formed after a period of strenuous swimming and a .5 m jump into the sea. It appears to be the first case of DR reported after such an exercise.

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