

Ductus Thoracicus Injury: A Case Reports

Duktus Torasikus Yaralanması: Bir Olgu Sunumu

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Abstract

Chylothorax usually results from trauma or it is developed iatrogenically during chest surgery procedures. Treatment should be started as soon as diagnosed and surgical treatment should be planned unless drainage is not decreased by conservative treatment for 10-14 days. Primary repair, ductal ligation and anastomosis are preferred during surgical treatment. We presented a case of 27 years old male with ductus thoracicus injury as a result of gunshot. In this case, injury was determined during thoracotomy and ligation was performed. There was not any complication during postoperative following and patient was discharged from hospital as wellfare.

Keywords: **Chylothorax; Treatment; Wounds, Gunshot.**

Özet

Şilotoraks genellikle travmaya bağlı gelişir veya göğüs cerrahisi ameliyatlarında iatrojenik olarak oluşur. Tanı konduğu andan itibaren tedaviye başlanılmalı ve 10-14 günlük konservatif tedaviye rağmen drenajın azalmadığı durumlarda cerrahi tedavi planlanmalıdır. Cerrahi tedavide ise primer onarım, duktusun ligasyonu ve anastomoz tercih edilmektedir. Bu yazıda ateşli silahla yaralanma sonucu duktus torasikus yaralanması olan 27 yaşında bir olgu sunuldu. Torakotomi yapılan olguda duktus torasikusta yaralanma tespit edilerek ligasyon uygulandı. Postoperatif takipte herhangi bir komplikasyon görülmeyen olgu şifa ile taburcu edildi.

Anahtar kelimeler: **Ateşli silah yaralanması; Şilotoraks; Tedavi.**

Introduction

Chylus fluid, *chylus*, means fluid in Latin. Chylus is a lymph-based liquid originating from intestines (1). In esophagus, cardiovascular, and thorax surgeries requiring freeing left subclavian artery, ductus thoracicus (DT) injury may be observed. Resections made during the surgery of pulmonary cancer and mediastinal dissections may lead to postoperative chylothorax. Chylothorax may also be encountered following penetrating neck and thorax traumas (2).

Chylothorax, depending on trauma, can be generally resulted from sudden hyperextension and hyperflexion of thoracic vertebrae after an accident of a motor vehicle (3, 4). In these cases, rupture occurs frequently over the diaphragm. As being in Boerhaave syndrome, it is known that sudden vomiting and cough may cause rupture in DT (5). Penetrating ductus thoracicus injury is rarely seen with firearms and stabbing tools (6).

Traumatic chylothorax is a rare entity. According to Laaveg and Sprague, traumatic chylothorax case reports published in the world between 1965 and 1978 was only 100 cases (7). In ductus thoracicus injury, there are conservative and surgical treatment options. If conservative approach including drainage, less fat diet and parenteral nutrition which last 2 to 4 weeks is failed, surgical approach should be considered. (8).

Ductus thoracicus is bilateral in embryologic period and shows great variations during development. It is reported that, only 65% of population is standard form (9). Crandall and his colleagues (10) demonstrated that lymphatic flow accelerates after meals and that hepatic lymph increases 1-2 times whereas intestinal lymph increases up to 10 times. Lymphatic flow is approximately 1.38 mL/kg/hour in average. This rate shows that lymphatic flow of an adult that is 70 kg is 2300 mL in daily average.

Chylothorax is a condition of free presence of chylus liquid in the thorax. Even though it can be both congenital and traumatic, nowadays chylothorax etiology mostly appears as a complication following a surgical approach and is classified by Bessone (11) in 1971. In chylothorax encountered following a trauma, the trauma can be obtuse, penetrating or surgical. Traumatic chylothorax rate in literature is known to be 2.6% (12).

Case report

A 27-years-old male had admitted to our emergency with a high speed firing weapon injury. In his physical examination, there was bullet entrance under right hemithorax posterior scapula. Respiration sounds were listened to became lighter on the right hemithorax. Examination and laboratory findings included the arterial blood pressure was: 90/50 mmHg, pulse: 100/min, number of respirations: 20/min, pO₂: 85mmHg, pCO₂: 38mmHg, hemoglobin:8,5 g/dL, hematocrit: 25,7%, leukocyte 14.800/mm³, erythrocyte 3.150.000/mm³, thrombocyte 210000/mm³, glucose 190 mg/dL, urea 58 mg/dL, creatinin 1.89 mg/dL, sodium 140 mEq/L, potassium 5.05 mEq/L, calcium 8.4 mg/dL. In direct chest graphy and thorax tomography, it was reported that on the right side with pneumothorax, the cartridge bullet has split into two and settled under manibrium sterni at the left side and in left pulmonary basal (Picture 1 and 2). In right hemithorax, tube thoracotomy and self-contained underwater drainage were applied and the patient was transferred to the intensive care unit. One unit of blood transfusion was given. pO₂ was found to be decreased to 66mmHg and pCO₂ increased to 44mmHg since massive air leakage from chest tube continued. Control pulmonary graph revealed a medium level pneumothorax (20%) at the left side and thereby tube thoracotomy was administered from the basal side. However, oxygen saturation did not increase, carbondioxide saturation was still high, breathing difficulties and vital symptoms deteriorated and massive leakage continued from the right chest tube, and accordingly it was thought that surgical approach should be performed.

Chest cavity was entered from the right posterolateral thoracotomy and it was determined that cartridge bullet entered thorax by fracturing right posterior 4th cost and damaged 4th intercostal artery and caused 1 cm parenchyma laceration of 1 cm in upper right and middle lobes and entered to the left hemithorax from between sternum and heart. After intercostal artery was ligatured, parenchyma lacerations were repaired. Second operation in a single session for removing the cartridge bullets in left hemithorax was abandoned since this might have aggravated the general condition of the patient. This surgical operation was planned to carry out in a later period after stabilization of the patient is achieved. In the intensive care unit, in the 3rd day after the operation, oral nutrition was initiated. After 24 hours, milky fluid was observed leaking from the chest tube on the left side. In the bio-chemical examination of the pleural

drainage fluid, cholesterol was found to be 148 mg/dL and triglyceride 164 mg/dL. Microscopic evaluation of pleural fluid revealed fat globules, dyeing with Sudan III. Patient was diagnosed with chylothorax. In the patient whose oral nutrition was ended, central venous catheter and total parenteral nutrition treatment was started. Daily pleural drainage, weight, blood biochemistry and electrolyte levels were monitored. Fluid volume draining from thorax tube continued in a volume of 1000–1500 cc/day in the following days. Chylus character was also continued. Since there was no expected decrease and as the content continued with chylus character, it was decided to make the surgery on the 9th day after the operation.

Three hours before operation, patient was given 150 cc content with creme and olive oil via nasogastric catheter in order to observe the ductus thoracicus more clearly during operation. It was determined that cartridge bullet was shown on the edge of the left manibrium in direct graphy, was localized under manibrium. The other part, which was shown in left hemithorax basal, had passed from between heart and sternum, fractured by hitting the left 6th cost, and changed direction without causing any laceration in the pulmonary parenchyma and localized on diaphragm. Cartridge bullets were removed.



Resim 1. Direct Pulmonary Graphy (right partial pneumothorax and cartridge bullets at the left basal and manibrium)



Figure 2. Thorax tomography (Partial pneumothorax at the right + cartridge bullet at the left basale).



Figure 3. Perforated ductus thoracicus at the neighborhood of arcus aorta.

It was determined that cartridge bullet located on diaphragm perforated ductus thoracicus at the point where it cross aorta and ascendent aorta throughout its route in the thorax cavity (Fig. 3). Ductus thoracicus was ligatured with nonabsorbable sutures in the laceration area. Two chest tubes were located and thorax was conveniently closed anatomy plan. Oral nutrition was started at 24th hour after operation and drainage tube was removed from apex on the 2nd day. Drainage with 100-150cc/day of chylus content had been continued for five days. After the 8th day, as daily drainage declined below 50cc and lost its chylus character, drainage tube was removed. The patient was discharged on the 12th day.

Discussion

Chylothorax diagnosis is generally made based on clinical evaluation of the cream like liquid in milk color which does not clog and which is obtained via thoracentesis or drainage. Diagnosis is confirmed biochemically or microscopically. Diagnosis is finalized with fat globules seen in microscopic evaluation and also by staining fat globules with Sudan-III dye. Cholesterol and triglyceride levels in liquid may also help to make distinguishing diagnosis. In chylus liquids, cholesterol/ triglyceride rate is generally <1 . In non-chylus liquids, this rate is >1 . Also if the triglyceride rate in the liquid is above 110 mg/100mL, the liquid is accepted as chylus. If triglyceride is below 50 mg/100mL, this probability is very low (13). In the biochemical examination of the pleural drainage liquid in our case, cholesterol was found to be 148 mg/dL and triglyceride to be 164 mg/dL (cholesterol / triglyceride <1). In microscopic evaluation of pleural liquid, fat globules with Sudan III was observed.

One of the indirect findings of the evidence of the liquid in thorax is chylus is the daily amount of the liquid. If there is fistula in DT, this amount is 400- 500mL daily in average and can be above 1000mL. Daily drainage amount in our case was 1000–1500 mL/day.

Another point that should be kept in mind is the time that chylothorax is formed or clinical findings are evident. Following a surgical complication in thorax drainage from the first day chylothorax can evolve. In cases where the cause cannot be explained a history of trauma should be questioned (1).

In the treatment of chylothorax, there is no consensus. However, etiology, age, daily chylus liquid loss and metabolic disorders are important criteria that may play a role in determining the treatment method. Surgical approach may be carried out in cases which conservative treatment fails or is insufficient. In these cases, timing of the surgery is so important and difficult to decide. The most important factors that determine this decision are the factors listed above (14).

In this case, after determination of chylothorax, oral nutrition was finalized and total parenteral nutrition treatment was started using central venous catheter. Daily

pleural drainage volume, weight, blood biochemistry and electrolyte levels were monitorized. In today, stopping use of oral drugs, feeding with medium chain triglyceride diet, central hyperalimentation, drainage of thorax and expansion of lungs are conservative treatment methods.

Selle and his colleagues (15) recommended 14-day-treatment for conservative approach as the result of their studies in 1971. It is known that defect in chylothorax lymphatic ductus is frequently closed spontaneously with conservative treatment (16). In cases where drainage does not decrease within this period, surgery may be considered as an option. On continuing chylus character in drainage, it was decided to take the patient into surgery on the 9th day after operation because of removing cartridge bullets from left side.

In surgical treatment, basic principle is to stop the chylus leakage. The most frequently applied method in adults for ductus injury, ligation and primary repair of ductus (17, 18). Surgical methods to be applied can be listed as direct ligation of DT, “en bloc” ligation of DT with surrounding texture, pleura peritoneal shunt, pleurectomy and chemical pleurodesis (14).

Success rate with thoracotomy is above 90%. In our case, the thorax was entered through the left posterolateral thoracotomy incision and ligatured ductus thoracicus laceration with ‘U’ sutures. Other treatment methods that may be alternative to thoracotomy are video supported thorascopic procedure (VATS) (19), pleura-peritoneal shunt, injection of sclerosant material inside the thorax, chemical material and talc pleurodesis. However, reliability of these methods is still lower than thoracotomy (12, 16).

Consequently, trauma related chylothorax is a rare manifestation that can be diagnosed easily. Since it can lead to serious complications, conservative treatment should be started without any delay. In cases that do not respond to the treatment within two weeks, because of the increased risk of complication, surgical treatment should be performed as soon as possible.

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