

Innominate artery pseudoaneurysm due to penetrating staple gun injury

Tel zımba tabancası ile penetran innominat arter psödoanevrizması

Naim Boran Tümer,¹ Erkan İriz,² Muhammed Fatih Yılmaz,³ Yusuf Ünal⁴

Institution where the research was done:

Department of Cardiovascular Surgery, Medical Faculty of Gazi University, Ankara, Turkey

Author Affiliations:

¹Department of Cardiovascular Surgery, Ankara Numune Training and Research Hospital, Ankara, Turkey

Departments of ²Cardiovascular Surgery, ⁴Anaesthesiology and Reanimation, Medical Faculty of Gazi University, Ankara, Turkey

³Department of Cardiovascular Surgery, Kayseri Training and Research Hospital, Kayseri, Turkey

Penetrating injuries of isolated innominate artery are very rare. The main causes of such injuries include blunt, penetrating, blast or iatrogenic trauma. In this article, we report a 55-year-old male case with a staple gun injury from the sternum. Helical computed tomography angiography showed an innominate artery pseudoaneurysm and the patient underwent immediate surgery. The patient was successfully treated and discharged in the sixth postoperative day.

Keywords: Innominate artery; penetrating trauma; pseudoaneurysm.

Aortic branch injuries are rare and usually caused by a blunt, penetrating blast or iatrogenic trauma. The most frequently injured branch of the aorta is the innominate artery.^[1] Even so, an isolated pseudoaneurysm of the innominate artery due to penetrating trauma is seldom encountered.^[2] Herein, we present a successfully managed case of an isolated innominate artery pseudoaneurysm due to a staple gun injury through the sternum.

CASE REPORT

A 55-year-old male presented to the emergency room with a staple gun injury through the chest. The patient's blood pressure was 120/80 mmHg on the right arm and 120/70 mmHg on the left arm with a heart rate of 85 beats per minute (bpm). He was conscious and hemodynamically stable, with hemoglobin values of 12.5 g/dL that subsequently rose slightly to

İzole innominat arterin penetran yaralanmaları çok nadir görülmektedir. Bu tür yaralanmaların başlıca nedenleri künt, penetran, patlama veya iyatrojenik travmalardır. Bu yazıda, tel zımba tabancasına bağlı sternum üstünden yaralanan 55 yaşında bir erkek olgu sunuldu. Spiral bilgisayarlı tomografi anjiyografide innominat arter psödoanevrizmasının tespit edilmesi üzerine, hasta acil ameliyata alındı. Hasta başarıyla tedavi edildi ve ameliyat sonrası altıncı günde taburcu edildi.

Anahtar sözcükler: İnnominat arter; penetran travma; psödoanevrizma.

12.7 g/dL (Figure 1). There were two entry points approximately 2 cm below the sternal notch. The pulse exams of the upper and lower extremities were normal, and chest auscultation revealed diminished right lung sounds (Figure 2). In addition, no pneumothorax was detected in the chest X-ray, but the mediastinum was slightly widened. Other examination findings were within normal limits, and no neurological deficit was noted. Helical computed tomography angiography (CTA) revealed a 9 mm lobule-shaped, irregular filling defect elongated to the anterior from the distal part of the ostium of the innominate artery, and we suspected a pseudoaneurysm of the innominate artery. Furthermore, no distinction could be made between pericardial and mediastinal effusion, and the aorta and other branches were intact. The first entrance occurred at the origin of the innominate artery, but the origin of the second entrance could not be determined.



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Correspondence: Naim Boran Tümer, M.D. Ankara Numune Eğitim Araştırma Hastanesi Kalp ve Damar Cerrahisi Kliniği, 06230 Altındağ, Ankara, Turkey.

Tel: +90 532 - 441 92 19 e-mail: naimborantumer@hotmail.com



Figure 1. Staple gun entrance.

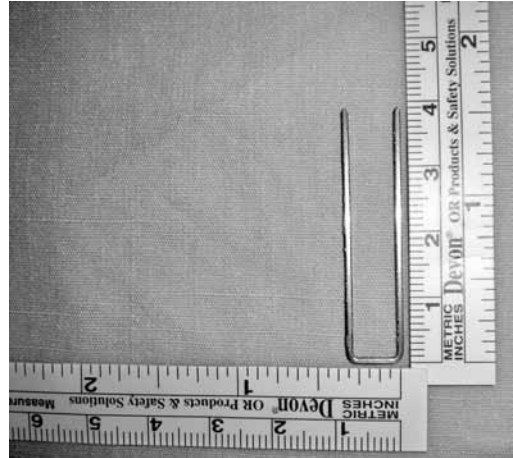


Figure 2. Staple dimensions.

Hence, the endovascular treatment option was not preferable, and the patient underwent immediate surgery knowing that cardiopulmonary bypass (CPB) might be needed. A figure-L unilateral mini-sternotomy was then performed on the right side by transecting the third intercostal space with a skin incision measuring approximately 8 cm. After the accurate dissection of the thymus and hematoma, the aorta and innominate artery were visualized. The pericardium was also opened to explore whether there was any hemorrhage, but we only aspirated the serous fluid. The pseudoaneurysm and entrance holes were found after tracing the ascending aorta to the innominate artery, and CTA located the pseudoaneurysm on the ostium of the innominate artery origin (Figure 3). In addition, a second hole was detected between the innominate artery and the left

common carotid area, which we supposed was the other foot of the stapler. No pseudoaneurysm or bleeding was found around the second hole, with only an injury to the adventia and the media layer of the aorta being noted. Both entrances were closed one by one with Teflon-pledgeted polypropylene sutures (Figure 4). After the bleeding was controlled, one mediastinal and one pericardial drainage tube were inserted, and the operation was completed. The drainage tubes were removed on the second postoperative day, and the patient was discharged on the sixth postoperative day uneventfully.

DISCUSSION

Aorta injuries resulting from penetrating trauma are less common than blunt trauma of the chest,^[3] and isolated



Figure 3. Three-dimensional computed tomography scan of the pseudoaneurysm.



Figure 4. Intraoperative view of the pseudoaneurysm.

innominate artery pseudoaneurysms due to penetrating injuries are extremely rare.^[2] However, innominate artery injuries caused by penetrating trauma are five times more common than blunt traumas of the chest,^[4] and these generally occur more often in the proximal portion (82%) followed by the distal (9%) and mid portions (4.5%).^[5,6] Traumatic aneurysms or pseudoaneurysms can be asymptomatic for months or even years,^[1] but there is always a high risk of enlargement, rupture, thrombus formation, or embolization. Moreover, their clinical manifestations vary from dyspnea, dysphonia, dysphagia, superior vena cava (SVC) syndrome, cardiac tamponade, or a neurological deficit^[7] to massive hemothorax, continuous bleeding, circulatory collapse, a pulse deficit, or bruit.^[8] Therefore, prompt diagnosis is crucial for preventing further complications. The gold standard for detecting innominate artery injuries is angiography. In recent years, magnetic resonance angiography (MRA), CT with three-dimensional (3D) reconstruction, and transesophageal echocardiography (TEE) have also been frequently used.^[9] The advantage is that MRA, 3D-CT and TEE provide information about the lumen and the vascular wall of the vessels.^[9]

Penetrating injuries of the great vessels produce dramatic challenges to surgeons because of the difficulty in exposing these vessels, achieving vascular control, and repairing the injury properly.^[10] Usually a median sternotomy provides an adequate approach since it offers excellent exposure of the innominate artery and the aortic branches; however, sometimes an extension into the right neck is necessary. Furthermore, the surgeon must always keep in mind the need for CPB. Repairs can be performed via a simple suture, a patch closure,

transaction and end-to-end anastomosis, or resection and graft interposition.^[11]

In conclusion, our case was unique because the innominate artery pseudoaneurysm was caused by a single staple, and careful examination was the key to diagnosis in this totally asymptomatic patient. Innominate artery injuries have high morbidity and mortality rates; therefore, early diagnosis and immediate treatment are vital to ensure better results.

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