Non-surgical treatment of a right ventricle puncture during diagnostic pericardiocentesis

Tanısal perikardiyosentez sırasında gelişen sağ ventrikül ponksiyonunun ameliyatsız tedavisi

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Summary– Pericardiocentesis is a life-saving procedure performed in cardiac tamponade cases occurring in infective, inflammatory or malignancy conditions, or following percutaneous coronary intervention, cardiac device implantation or catheter ablation. In spite of advanced imaging methods, a substantial risk of complication persists. Emergent surgical intervention may be required, in particular during advancement of the catheter into the heart chambers or in cases of wall rupture. Furthermore, in all these cases, patients have a high risk of surgery because of existing comorbidities. This case presents a patient suspected of tuberculous pericarditis who underwent diagnostic pericardiocentesis complicated by right ventricular puncture. The catheter in the right ventricle was withdrawn via a second catheter placed in the pericardial cavity. Spontaneous blood control was established, and with no increase in pericardial effusion surgical intervention was not required. This method can be applied in certain conditions, including cardiac injury caused by pericardiocentesis or intracardiac manipulations, thus eliminating the need for high-risk surgical intervention.

Özet– Perikardiyosentez, enfektif, enflamatuvar veya malignite nedenli kalp tamponadı veya kalp cihazı yerleştirilmesi, perkütan koroner girişim, kateter ablasyonu benzeri işlemler sonrası uygulanan hayat kurtarıcı bir işlemdir. Artan görüntüleme yöntemlerine rağmen komplikasyon riski az değildir. Özellikle kateterin kalp boşluklarına ilerletilmesi veya duvar rüptürü sonrası acil cerrahi müdahale gerekli olabilmektedir. Ancak bu hastaların mevcut komorbiditeleri sebebiyle acil cerrahi riski yüksektir. Bu yazıda sunulan olguda, tüberküloz perikardit ön tanısı ile takip edilen bir hastada tanı amaçlı perikardiyosentez sırasında sağ ventriküle yerleştirilen kateteri, perikart boşluğuna yerleştirilen ikinci bir kateter yardımı ile geri aldık. Spontan kanama kontrolü sağlandığı için perikart sıvısında artış izlenmedi ve cerrahi girişim gerekmedi. Bu yöntem perikardiyosentez gibi kalbe dışardan müdahale veya intrakardiyak manipülasyonlar sebebiyle görülebilecek kardiyak hasarlar sonrasında uygulanabilir ve hasta cerrahinin olası yüksek riskinden korunabilir.

Pericardiocentesis is a commonly-used procedure for diagnostic or therapeutic purposes, especially in cardiac tamponade.[1] While most procedures are currently performed under the guidance of advanced imaging methods,[2] there still exists a complication risk. Inadvertent cardiac puncture during introduction of the needle or sheath is a serious complication and, unless appropriately managed, is associated with high mortality and surgical risk due to patient comorbidites.[3]

This case report presents a patient with a preliminary diagnosis of tuberculosis pericarditis in whom cardiac puncture through the right ventricle occurred during diagnostic pericardiocentesis, and who was successfully treated by withdrawal of the catheter by a second catheter placed in the pericardial cavity.

CASE REPORT

A 52-year-old female patient with a progressive cough and shortness of breath was admitted to the pulmonary disease outpatient clinic. She was scheduled for echocardiography for increased cardiac size on chest X-ray. Echocardiography revealed normal

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left ventricular systolic function, mild mitral regurgitation and pericardial effusion (1.8 cm in posterior, 1.2 cm in right ventricle adjacency, 1.3 cm in apex and 2.7 cm in lateral segments). The patient had a history of tuberculosis, and diagnostic pericardiocentesis for sampling was planned. Informed consent was obtained and preparation for subxiphoid access was made.[4,5] Following sedation and local anesthesia, the needle was gently advanced under echocardiography guidance and hemorrhagic fluid was aspirated. Agitated saline was infused for confirmation, but no intramyocardial bubble was observed. A 6 Fr pigtail-catheter was advanced over a 0.035" guiding wire. In order to confirm appropriate location of the catheter, an insecure method with indefinite results was used, in which hemorrhagic fluid was tested several times on gauze-pad for coagulation control. The results were coagulation in some, but failure to coagulate in others, which caused doubt about appropriate catheter location. The agitated saline test was repeated and showed bubbles in the right ventricle. The patient was asymptomatic, with blood pressure 132/75 mmHg, heart rate 98/min and oxygen saturation 96%. Cardiovascular surgery was consulted and operative preparations were initiated. It was decided to withdraw the first catheter immediately after placement of a second catheter in the pericardial cavity and perform pericardiocentesis via this second catheter to avoid cardiac tamponade in the event of any increase in pericardial effusion during follow-up. In comparison to the first puncture, the second was performed more medially towards the right atrium, which was contiguous with a greater amount of fluid. When the second catheter was advanced into the pericardial cavity, serous fluid was aspirated. After obtaining samples for LDH, protein, albumin, cytology and culture, 550 mL fluid was drained. Following completion of emergency surgery preparations, the first catheter was gently withdrawn under guide wire control, and the second catheter left in place for back-up purposes in the pericardial cavity (Figure 1). Follow-up echocardiography revealed no increase in effusion and the patient had stable hemodynamic parameters. No fluid drainage was observed through the second catheter during 24-hour follow-up. The catheter was removed after follow-up and the patient discharged.

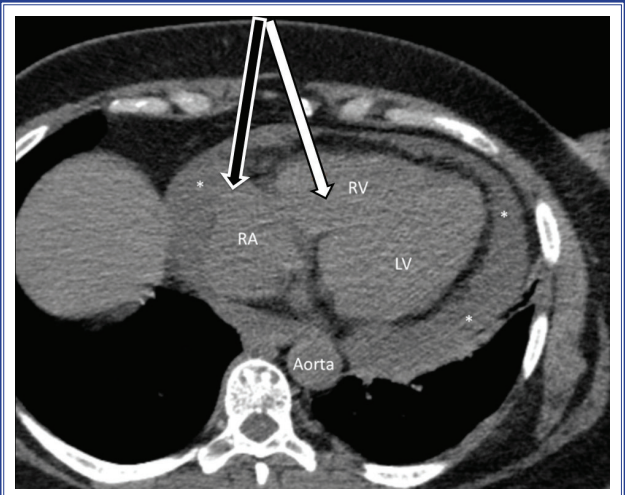

Figure 1. Computed tomography image showing pericardial effusion and catheters placed in right ventricle (white arrow) and pericardial cavity (black arow). RA: Right atrium; RV: Right ventricle; LV: Left ventricle; (*) Pericardial effusion.

DISCUSSION

This case demonstrates the possibility of treating inadvertent right ventricle puncture during diagnostic pericardiocentesis without cardiac surgery by placement of a second catheter support in the pericardial cavity.

Cardiac tamponade may sometimes occur following infections, malignancy or cardiac interventions, and pericardiocentesis is a life-saving procedure in its occurrence.[6] Major and minor complication rates for pericardiocentesis under echocardiography guidance are 1.2% and 3.5% respectively.[7] Complications include right atrium or ventricle laceration, coronary artery injury, injury to the mammary or intercostal arteries, hypotension, arrhythmia, pneumothorax, pericardial decompression and death.[8,9] A larger amount of fluid in cardiac tamponade facilitates the procedure and decreases complication rates. However, diagnostic pericardiocentesis is associated with increased complication rates. In the present case, despite larger amounts of regional fluid accumulation, there was a smaller amount at the access site, and the right heart was in a closer position to the pericardial border. Catheter introduction following needle access into the right ventricle prevented bleeding into the pericardial space, so hemodynamics parameters were stable. Absence of bleeding into the pericardial space following withdrawal of the catheter may be related to both fibrillary structures in the pericardium and lack of anticoagulation in the patient. The gelatinous characteristics of the fibrillary structures on the heart

surface may have acted as a size-limiting and anticoagulative factor.

In our opinion, even though echocardiographic guidance was used in this case, the main cause of complication was the smaller amount of fluid at the puncture site. In contrast to the more commonly performed subxiphoid approach, large pericardial effusions should be drained through an apical or left ventricle lateral wall puncture when appropriate. In a study including 32 patients undergoing apical pericardiocentesis with echocardiographic guidance, the procedural success rate was reported as 96%, with only 4 patients having serious complications (hemopneumothorax requiring tube drainage, vasovagal reaction, nonsustained ventricular tachycardia, and frequent ventricular extrasystoles). As a result, the authors of the study suggested apical pericardiocentesis, particularly in cases of anterior fluid accumulation.[10]

Inadvertent cardiac puncture during pericardiocentesis is conventionally treated with surgery. Appropriate selection of puncture site under echocardiographic guidance may reduce complication risks. However, withdrawal of the catheter with the support of a second catheter placed in the pericardial space and observation of spontaneous bleeding control may be an alternative method.

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Anahtar sözcükler: Kalp tamponadı; perikardiyosentez; yırtık.