



Right Ventricular Perforation during Pericardiocentesis: A Case Report

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ABSTRACT

Percutaneous drainage of pericardial effusion occurring due to Cardiac or non-cardiac causes is a common practice. Percutaneous pericardiosynthesis is an initiative that could lead to catastrophic results and it requires experience. In this paper, we presented surgical repair of a right ventricular injury during pericardiocentesis in the case of a patient with recurrent pericardial effusion.

Keywords: Pericardiocentesis; heart Injuries.

Perikardiyosentez Esnasında Sağ Ventrikül Perforasyonu: Olgu Sunumu

ÖZ

Kardiyak ya da non kardiyak nedenlerle oluşan perikardiyal sıvının perkütan yolla drenajı yaygın bir uygulamadır. Perkütan perikardiyosentez tecrübe gerektiren, katastrofik sonuçlara neden olabilecek bir girişimdir. Biz, bu yazıda idiyopatik, rekürren perikardiyal effüzyonu olan bir vakada perikardiyosentez esnasında meydana gelen sağ ventrikül yaralanmasının cerrahi onarımını sunduk.

Anahtar Kelimeler: Perikardiyosentez; kalp yaralanmaları.

INTRODUCTION

Cardiac trauma requiring immediate surgical intervention is the most important clinical entity in cardiac surgery. Death late intervention is the most common cause of all iatrogenic or non-iatrogenic cardiac injury. Iatrogenic injuries usually occur in health centers. Pericardiosynthesis interventions always carry the risk of cardiac injury. Right ventricular injury is the most common possible injury that could occur during pericardiosynthesis. The most important and significant method for deciding early surgical intervention is transaortic echocardiography with short intervals in urgent tamponade cases. Particularly in emergency diagnosis, transport and early surgical exploration are life-saving in these patients.

CASE PRESENTATION

68-year-old male patient, that underwent pericardiocentesis twice before due to pericardial effusion, presenting with recurrent fluid formation came in the emergency department and interned in order to treat. Patient was monitored via chest X-ray, echocardiography, central venous catheters and urinary catheters and followed. Patient vital values were TA: 90/40, HR: 120, dyspnea, pretibial grade 2 edema and hepatomegaly. Patient's echocardiography showed pericardial thickness and pericardial fluid that covers heart by more than 2 cm. Chest x-ray had massive pericardial effusion (Figure 1).

Etiologic factors in pericardial biochemistry, microbiology and cytology study were not detected. Right ventricle injury, which caused by manipulation of 6F catheter during the last recurrent pericardiocentesis application made for drainage of fluid, was detected (Figure 2).

In echocardiography, it is determined that 6F intraducer sheath were extends from the right ventricle to intraventricular space and septum. Pericardial fluid increased gradually during echoes processed in intervals of 30 minutes. It is also determined that active hemorrhagic fluid was coming from three-way stopcock and it was clotting easily. Due to

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increasing pericardial fluids, evidence of the development of tamponade, the deterioration of hemodynamic parameters patient was operated for emergency surgery based upon the informed consent.

Because of patient was not stable and there be need for ventricular repair under cardio-pulmonary bypass, median sternotomy was preferred, Pericardial opening is implemented and 2000 cc liquid of hemorrhagic characteristics of was drained, Patient's hemodynamic stability was achieved. Local hematoma caused by septal adhesions was removed. 6F catheter caused injury in the form of perforation on sharp edge of the side facing the bottom of the right ventricle was controlled by pressing fingers without the need for cardiopulmonary bypass on beating heart. While heart was beating, active bleeding was stopped by teflon 3/0 plejiti polypropylene purse suture placed (Figure 3). There was no coronary vascular injury. Pericardium's obverse adhesions on the right atrium, right ventricle and left ventricle obverse were dissected. It is

observed that ventricle and atrium structure were quite fragile and pericardium was completely attached to the pleura and right atrium. On those places where dissection is risky, pericardial tissue was left on the atrium, pleural cavity was opened and the dissection is completed. . Finally, placing the drain tube no.28 to right pleural cavity and mediastinum and operation was completed.

Patient, whose post-op followings were stable and had no drainages, was discharged on the fourth day with the arrangement medical treatment.

DISCUSSION

Iatrogenic cardiac injuries can occur due to diagnostic and therapeutic interventions. Cardiac injury may occur during cardiac catheterization, coronary angioplasty, stenting, pacemaker implantation, balloon valvuloplasty, during cardiopulmonary resuscitation of sternum and rib fractures and bone marrow aspiration. Heart can be damaged during new surgical operations by pericardial adhesions that cause infections, radiotherapy or previous operations (1).



Figure 1. Image of massive pericardial effusion on chest x-ray

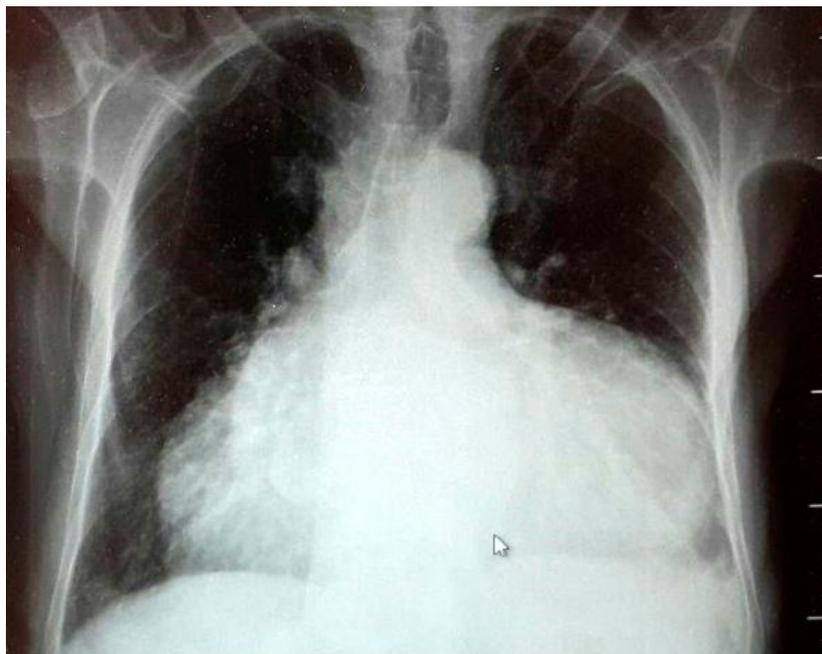


Figure 2. Preoperative image of 6F catheter placed in subxiphoid

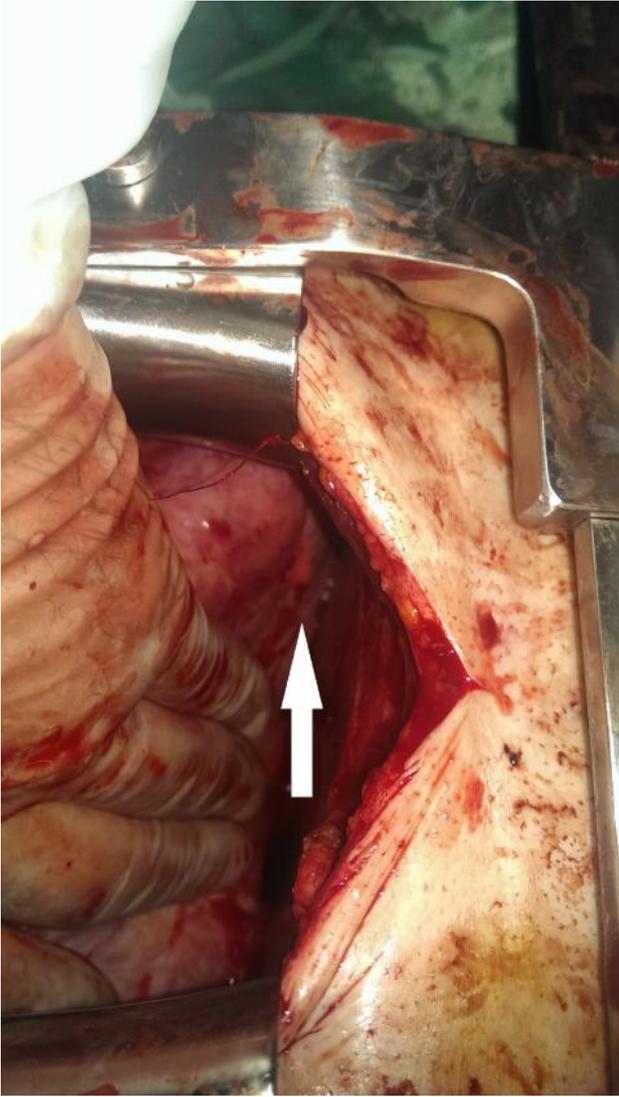


Figure 3. Perioperative image of perforation on the right ventricle repaired with plejiti Teflon sutures (up arrow)

Iatrogenic cardiac injuries, which are a special sub-group of penetrating cardiac injuries, can occur in percutaneous central venous catheter interventions. Generally, during the preference of the left subclavian or jugular vein there would be perforations in the left superior vena cava -atrial junction or junction of superior vena cava in and innominate vein. Injuries in this section generally form of compensated cardiac tamponade injury. It is difficult to be drained pericardiocentesis and requires a median sternotomy. Urgent echocardiography diagnosis is very important for the detection of hemopericardium in penetrated and blunt cardiac injuries. With the help of ultrasound, the period, which starts with the patient's entrance and ends with the start of operation, can be shortened. Ultrasound especially in blunt trauma is an alternative method for the detection of pericardial effusion as a non-invasive and sensitive method. If the result of ultrasound is negative, asymptomatic patient should be closely observed and be kept in close observation and for at least 24 hours (2-3). The most extensive study in the literature is the study of 322 patients with pericardial effusion were examined and

in this study the most common causes were acute idiopathic pericarditis (20%), iatrogenic effusions due as a result of interventions (16%), neoplastic effusions (13%) and chronic idiopathic pericardial effusion (9%). In this study, the frequency of tamponade development was reported to be 37% (4).

In another study, which is about iatrogenic cardiac injury, more than 25,000 patients have been evaluated. Frequency of pericardial tamponade was observed 0.12%. 17 of these patients in the catheterization laboratory and 14 were identified after 4 hours (5).

Iatrogenic perforation rate on pericardiocentesis or interventional procedures on right ventricle has been reported between 0.3 and 5%. Close to half of these cases, tamponade or circulatory collapse development have been reported. Iatrogenic perforation rate on left ventricle has been reported between 0.1 and 3.3 % (6).

Rebecca and friends reported main complications as pneumothorax, cardiac laceration, ventricular perforation, liver laceration, cardiac arrest and 3% to 5% complication rate after pericardiosynthesis in their study (7).

Both in subxiphoid and in apical pericardiosynthesis can be done with the guidance of echocardiography with high success rate and low complication rate.

Worsening of the clinic condition after pericardiosynthesis is a clue for complications related with procedure. Chest x-ray should be done in all approaches in order to be sure pneumothorax or hemothorax are not developing myocardial and coronary arterial puncture may not give any symptoms in the beginning. After that hemopericardium may develop. Myocardial or coronary arterial puncture should be considered if haemorrhagic image is continuing and fluid is not reducing while haemorrhagic fluid coming from the catheter. In this kind of a situation surgical treatment should be considered without touching the catheter.

The patients, who had tamponade formed clinic, can be followed by transthoracic echocardiography, computed tomography, magnetic resonance imaging, or transesophageal echocardiography.

Magnetic resonance imaging (MRI) and computer tomography imaging (BT) can be used in the situations where trans thoracic echocardiography (TTE) failed such as little localized effusions or hematoma that compresses isolated heart cavity or TTE technically cannot be done. Unfortunately applications of these techniques in emergency situations are technically difficult and not safe. Video-assisted thoracoscopic surgery technique, which is macroscopic imaging of pleurae and pericardium by placing thoroscope in left or right hemithorax is really useful in the treatment and diagnosis because of it enables biopsy from pathological location and opening a window from suitable place (8).

Patients with chronic pericardial liquid, tamponade clinic can develop slowly and accumulation speed of pericardial liquid and deflection of the speed of parietal pericardium can tolerate it. However, we believe that it is necessary to remain vigilant during iatrogenic injuries. The size of the perforation determines the clinical severity. Repetition of transthoracic echocardiography in intensive care at frequent

intervals provides life-saving role as we mentioned in this case. Rapid increase of pericardial fluids can be determined with echocardiography. In this case, the operation without waiting for further tests will be the right choice.

Surgical approach is not completely uniform in tamponades develop quickly due to cardiac injury. However, median sternotomy is usually preferred that can enable exploration of all cardiac zones in cardiac (9).

In this iatrogenic injury case we present, determination of rapid rise in the right heart pericardial fluid in echocardiography and in a similar manner rapid increase of central venous pressure pointed out the rapid deterioration of the patient's clinical. At this stage, adequate fluid resuscitation with early transportation and exploration is life-saving.

Movement of patient with bleeding and tamponade may increase the instability problems (10).

In our opinion, an interesting sides of this phenomenon are those; it is not frequently encountered complications, it can be deadly, accurate follow-up and treatment strategies have not been created and besides these, it is educational for new candidates in catheter attempts.

RESULTS

Surgical exploration in iatrogenic heart injuries having high risk of mortality prevents the development of catastrophic results. Early assessment, rapid transportation, and emergency surgery will provide the survival of patients with iatrogenic heart injury.

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