

Delayed diagnosis of right ventricle perforation after blind needle pericardiocentesis.

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ABSTRACT: A case of right ventricle perforation in a 63-year old man after blind needle pericardiocentesis for pericardial effusion is presented, focusing on the delayed diagnosis of this serious complication. During surgical repair, the pigtail catheter was found to enter the right ventricle with its tip resting within the pulmonary artery.

Key Words: Pericardiocentesis, Pigtail catheter, Right ventricle perforation.

INTRODUCTION

Pericardiocentesis has shown to be an effective method for drainage of pericardial effusions. Complications such as pneumothorax, haemothorax, purulent pericarditis, ventricular arrhythmias as well as chamber lacerations have been reported to reach up to 10% in the past¹. Electrocardiographic guiding, echocardiographic guiding and injection of contrast media improved the initially blind approach and significantly reduced these complications to 2% in recent clinical studies^{2,3}. Cardiac injuries after pericardiocentesis are rarely reported in the literature^{1,2,4}. We present a patient with pericardial effusion who underwent pericardiocentesis, perforation of the right ventricle of the heart and surgery for removal of the pigtail catheter from the right ventricle.

CASE REPORT

A 63-year old male was initially scheduled for surgery of iliofemoral arteriosclerotic occlusive disease. Because of history of coronary artery disease and previous myocardial infarction he underwent trans-thoracic echocardiography (TTE) during the preoperative work-up. TTE revealed a clinically “silent” pericardial effusion around the heart (maximum diameter of

1 cm). The left ventricular function was impaired and ejection fraction was 35%. For more than one month the patient had reported moderate symptoms including chest pain, and dyspnoea on exercise. Thus, elective vascular surgery was abandoned. During his subsequent TTE examination 10 days later, an increase of the maximum diameter of pericardial effusion was found reaching 2 cm. Computed tomography of the chest confirmed the circular pericardial effusion, without assessment of the etiology due to a lack of other pathological findings. The patient’s symptoms worsened during the following days, leading to dyspnoea on minimal exertion and subsequently at rest with features of orthopnoea, coughing and weakness. The next day he underwent blind needle pericardiocentesis for pericardial drainage. The procedure was felt to be uncomplicated by the performing physician, however only 50 ml of serous fluid could be initially aspirated. Chest radiograph after the procedure showed the pigtail catheter with the tip projecting in the superior reflection of the pericardium. These findings were considered to be normal.

The patient was admitted to the department of cardiac surgery one day later because of chest pain and persistence of pericardial effusion. On admission the

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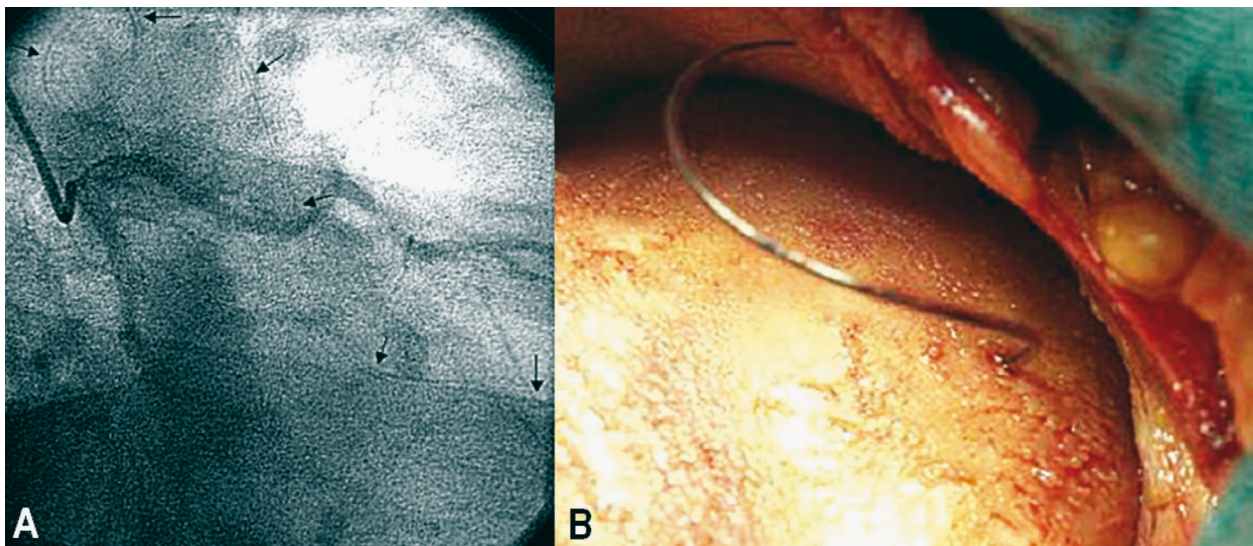


Figure 1. A: Cardiac catheterization shows the pigtail catheter (arrows) passing through the right ventricle into the pulmonary artery. **B:** Intraoperative view of the pigtail catheter entering the apex of the right ventricle.

patient was dyspnoeic and his systolic blood pressure dropped below 100 mmHg. The subsequent TTE examination showed an unexpected course of the pigtail catheter within the right ventricular cavity. Moreover, continuous aspiration of pure bloody effusion over the catheter was feasible. Prior to surgical revision coronary angiography was performed revealing a two vessel disease with proximal stenoses of left anterior descending (LAD) artery and right coronary artery (RCA). In addition, cardiac catheterization confirmed the echocardiographic findings and showed the pigtail catheter passing through the right ventricle with its tip resting in the bifurcation of the pulmonary artery (Figure 1A). An emergency operation was planned and the patient reached the operating room under moderate support with inotropic drugs. After median sternotomy and pericardiotomy 300 ml of bloody effusion could be collected, while the epicardial surface of the heart showed signs of inflammation with partial adherence to the pericardium. The pigtail catheter was found at the level of 27 cm to enter the apex of the right ventricle (Figure 1B). Removal of the catheter from the right ventricle was uncomplicated and the puncture hole could be safely sutured. Then, LAD and RCA arteries were grafted with left internal thoracic artery and saphenous vein grafts respectively. The postoperative course was uneventful. Microbiologic and histologic examinations showed no specific infec-

tion. The patient was discharged home on the tenth postoperative day.

DISCUSSION

Over the last decades echocardiography has emerged as an important tool for the diagnostics and management of pericardial effusion with confirmation of its location and distribution. Among the various published methods of performing pericardiocentesis, the subxiphoid approach is the one postulated by the American Heart Association⁵. Briefly, the needle entry site is located directly below the xiphoid, approximately 1 cm left of midline. The needle on syringe is advanced through the skin entry site at a 30° angle, directed towards the right shoulder. After the needle has entered the pericardial sac a pigtail catheter is inserted with the Seldinger technique. This blind approach is sometimes assisted by electrocardiography to prevent myocardial injury. In contrast to that, echocardiographic guiding of the needle during pericardiocentesis and injection of contrast media to monitor and confirm the position of the catheter represent improved techniques with reduced complication rates^{2,6,7} that have been clearly demonstrated by the Stanford Experience⁸ and, more recently by the Mayo Clinic Experience⁹. These results confirmed the subxiphoid approach with echocardiographic guidance as the gold standard for the management of pericardial effusion.

However, a number of puncture and catheter related complications such as pneumothorax, haemothorax and ventricular arrhythmias may still occur in the range of 2% to 5%^{2,6,7}. Another, more infrequent complication, is the puncture of cardiac chambers. Tsang et al.⁹ from the Mayo Clinic reviewed 245 patients necessitating pericardiocentesis after cardiac surgery over a period of 9 years, showing an incidence of 0.8% concerning ventricular perforation. McDonald et al.¹⁰ demonstrated in his retrospective study ventricular perforation also with an incidence about 1% in patients treated by percutaneous catheter drainage.

In the presented case, perforation of the right ventricle was diagnosed in retrospect during pericar-

diocentesis, without immediate awareness of the performing physician. However, failure of the procedure could be determined after a delay of 24 hours on the basis of TTE providing information about the unexpected course of the pigtail catheter. Cardiac catheterization and surgery confirmed these findings.

In conclusion, the possibility of ventricular injury should be kept in mind while performing pericardiocentesis in patients with pericardial effusion. Therefore, we recommend pericardiocentesis to be performed under echocardiographic guidance.

Καθυστερημένη διάγνωση διάτρησης της δεξιάς κοιλίας της καρδιάς στη διάρκεια «τυφλής» περικαρδιοπαρακέντησης.

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ΠΕΡΙΛΗΨΗ: Παρουσιάζεται περίπτωση ασθενούς 63 ετών, που υπέστη διάτρηση της δεξιάς κοιλίας της καρδιάς σε περικαρδιοπαρακέντηση για εκκένωση ευμεγέθους περικαρδιακής συλλογής, εστιάζοντας κυρίως στην καθυστερημένη διάγνωση της σοβαρής αυτής επιπλοκής. Ο καθετήρας παροχέτευσης βρέθηκε διεγχειρητικά εντός της δεξιάς κοιλίας της καρδιάς, με το άκρο του να φθάνει στην πνευμονική αρτηρία.

Λέξεις Κλειδιά: Περικαρδιοπαρακέντηση, Καθετήρας pigtail, Διάτρηση δεξιάς κοιλίας της καρδιάς.

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