

Management Of Iatrogenic Subclavian Artery Injury Using Balloon Tamponade: A Case Report

SH Neoh, YY Gan, R. Hardin, Susan W. Matthew, CM Yeat, D. Balakrishnan

Department Of Surgery, Faculty Of Medicine, Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia

Department Of General Surgery, Vascular Unit, Sarawak General Hospital, Sarawak, Malaysia

Department Of Radiology, Sarawak General Hospital, Sarawak, Malaysia

Abstract

Introduction: Iatrogenic injury to major vessel during central venous catheter insertion is a commonly encountered complication. Different approaches have been described to repair the injured vessel, including open and endovascular technique.

Method: We observed a case involving a 47-year-old lady with right subclavian artery injury and hemopneumothorax after insertion of central venous catheter for inotropic support.

Result: CT Angiography of the thorax showed malposition of the catheter, piercing the right subclavian artery, with its distal tip within the pleural space at the level of posterior right 7th rib. Digital subtracted angiography (DSA) showed contrast extravasation from proximal right subclavian artery. Temporary balloon tamponade was performed, and the catheter was removed at the same setting. Post balloon tamponade angiogram confirmed no contrast extravasation.

Conclusion: Iatrogenic injury to the subclavian artery is rare. Our case demonstrates that the approach of using a balloon to achieve tamponade effect is effective in achieving hemostasis compared to open arterial repair or stenting.

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I. Introduction

Central venous catheters are commonly inserted into the internal jugular, subclavian and femoral veins. These centrally placed catheters are often of large bore and is higher risk of developing procedure-related complications, including arterial injury which has been reported in 3.7% - 8% of cases. (1)

A simple removal of an intraarterial central venous catheter can result in various complications especially in subclavian artery where its location is not feasible for manual compression. These complications include pseudoaneurysm, arteriovenous fistula and uncontrolled bleeding into the adjacent pleural space and soft tissues. (1)

Subclavian artery injury once diagnosed should be managed immediately either open surgical repair or endovascular technique. However, open surgical repair is highly invasive considering the location of injury within thoracic cavity. Endovascular technique such as placement of a covered stent or closure device, tract embolization, thrombin injection and balloon tamponade can be used as an alternative method. (3)

We report this case of iatrogenic subclavian artery injury where we have attempted balloon tamponade and successful without surgery or endovascular stent placement.

II. Case Summary

A 47-year-old lady presented to us with sepsis in perforated appendicitis. She underwent laparotomy, and post-operatively, a central venous catheter was inserted for the purpose of inotropic infusion. Following the central line insertion, she developed haemopneumothorax, and a right chest tube was inserted immediately.

A CT angiography of the thorax was ordered due to concern of a vascular injury. The CT angiography showed a malpositioned catheter, with its distal tip within the pleural space at the level of posterior right seventh rib, piercing the right subclavian artery (Figure 1). The case was discussed with the interventional radiology team, and a decision was made to proceed with DSA and balloon tamponade, with endovascular stenting kept in view (KIV). Cathetogram from the right neck central venous catheter confirmed the tip of the central catheter within the right pleural space (Figure 2). DSA was accessed from right common femoral artery. Angiographic runs performed at the right subclavian artery demonstrated active contrast extravasation (Figure 3), associated with increasing haemothorax (Figure 4). Balloon tamponade was performed using angioplasty balloon (Jade ballon 6.0mm x 40mm x 135cm), for a total of 3 cycles with inflation time of 7 minutes each

(Figure 4). The malposition catheter was pulled up during balloon tamponade and later removed. Post tamponade DSA showed resolution of contrast extravasation (Figure 5). Stenting was not done as bleeding had been controlled.

Patient remained stable and thoracoscopic guided clot evacuation was done for retained right haemothorax. She did not develop any ischemic symptoms over right upper limb throughout admission.

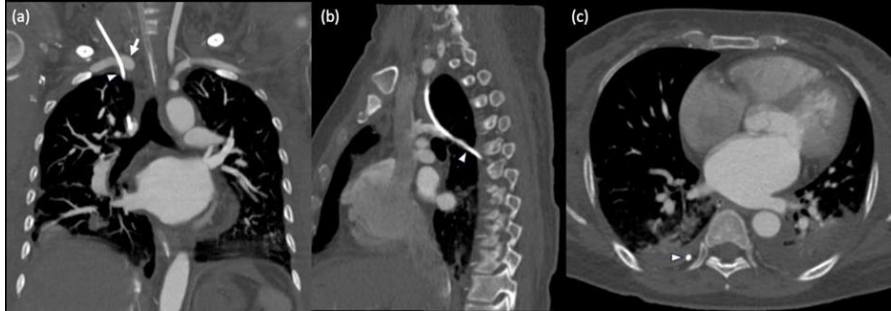


Figure 1. CT Angiography Thorax Showed Malposition Catheter (Arrowhead) With Its Distal Tip Within The Pleural Space At The Level Of Posterior Right Seventh Rib, Piercing The Right Subclavian Artery (Arrow).

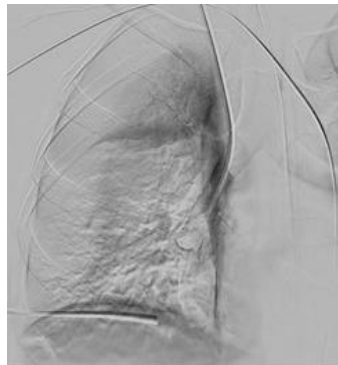


Figure 2. Cathetogram Via The Right Neck Central Venous Catheter Confirmed Its Malpositioning Evidenced By Smearing Of Contrast Within The Right Pleural Cavity.

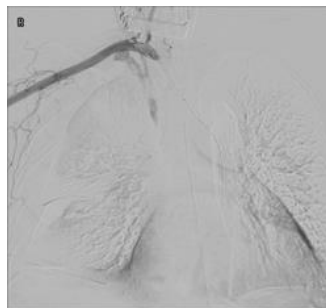


Figure 3. DSA Demonstrated Active Contrast Extravasation From The Right Subclavian Artery Into The Pleural Space (Arrows).



Figure 4. Balloon Tamponade Was Performed Across The Vascular Perforation Site At Right Subclavian Artery. Worsening Right Hemothorax Observed Intra-Procedurally (Arrows).

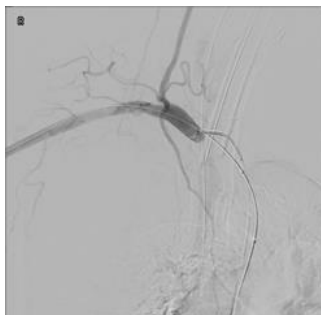


Figure 5. DSA Post Balloon Tamponade Showed Resolution Of Contrast Extravasation Form The Right Subclavian Artery.

III. Discussion

We presented this case of subclavian artery injury successfully treated with balloon tamponade without additional intervention. Several case reports have described this technique to achieve hemostasis and safe removal of catheter without significant bleeding. Different authors mentioned different sizes of balloon for tamponade and different balloon inflation time. (2,3)

There is no data showing the maximum balloon inflation time before upper limb ischemia developed and the reduction of blood flow to the extremities might cause thrombosis to form. The feasibility of balloon tamponade also depends on the location and the size of the injury whether it is a punctured injury or a laceration. Balloon inflated in a laceration injury may cause profuse bleeding. These considerations should be taken into account in deciding the approach of repair. In 1991 Milford et al reported the first case of successful balloon tamponade using 7 FR PTA catheter with 10mm balloon placed distal to the origin of the artery, it helped control the bleeding with temporary reduction of blood flow to upper limb. (4)

Open repair and stent graft procedures have both been described, with endovascular approach having a lower mortality rates compared to surgical repair. Surgical repair is associated with post operative stenosis and occlusions. Injured subclavian artery repaired with stent is also associated with thromboembolism and local intimal hyperplasia which require prolonged anticoagulant whereas balloon tamponade method does not require any anticoagulation post procedure. Moreover, stents are more expensive. (1,3)

IV. Conclusion

Balloon tamponade showed an alternative choice compared to surgery or endovascular stenting in the treatment of subclavian artery injury. Location, extend and size of the arterial injury should be taken into great consideration in deciding the choice of treatment.

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