

# Brachial plexus palsy due to subclavian artery pseudo aneurysm from internal jugular cannulation

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## Abstract

Internal jugular vein is the preferred route for central venous cannulation because of easy accessibility and high success rate. Arterial puncture is the most common complication, the reported incidence being 9.3%. However, brachial plexus palsy following arterial puncture is a rare complication of this procedure. We report a case of brachial plexus palsy due to compression by right subclavian pseudoaneurysm as a result of internal jugular vein cannulation in chronic renal failure patient.

**Key words:** Brachial plexus palsy, internal jugular vein cannulation, subclavian pseudoaneurysm

## Introduction

Central venous cannulation is performed for venous pressure monitoring and rapid administration of drugs and fluids. Internal jugular vein (IJV) cannulation provides a rapid access to the central vein and has a relatively low complication rate. However, serious adverse events such as arterial injury, pneumothorax and nerve injury can occur. Among nerve injuries, brachial plexus injury is known complication because of anatomical relation to subclavian and internal jugular veins as well as the "blind" puncture technique, which is almost universally used. Here, we report a case of brachial plexus palsy caused by subclavian pseudoaneurysm associated with tear of subclavian- vertebral artery junction during IJV cannulation.

## Case Report

A 55-year-old male having hypertension and chronic renal failure since two years was scheduled for

elective renal transplantation. He was on maintenance hemodialysis through arteriovenous fistula (AVF) twice a week. He underwent dialysis 12h before surgery and his routine investigations, coagulation profile and serum potassium on the day of surgery were normal. Combined spinal plus epidural (CSEA) anesthesia and right IJV cannulation for central venous pressure monitoring was decided as anesthetic plan. In operation room, routine monitoring was applied and after peripheral line insertion, trendelenberg position was given for right IJV cannulation. An 18 G introducer needle was inserted via low central approach, which resulted in arterial puncture, needle was removed and firm pressure was applied for five minutes. Second attempt via same approach was successful and central venous catheter was inserted with seldinger technique. A hematoma formation was noted, so pressure dressing was applied. Patient underwent renal transplant surgery uneventfully under CSEA. Postop X-ray chest confirmed the central venous catheter in the right position. Eighteen hours after surgery patient complained of pain and swelling in right supraclavicular region and weakness in his right upper limb. Brachial compression was suspected and central venous catheter was removed. Color Doppler study of neck vessels showed pseudoaneurysm at the proximal

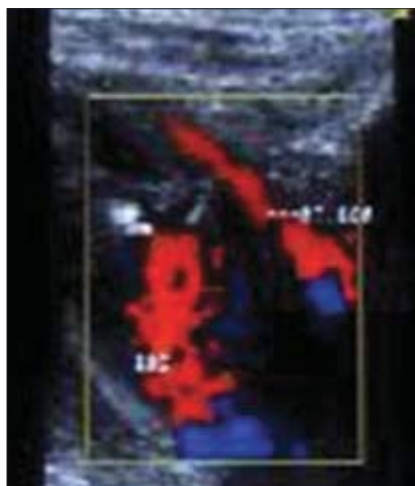
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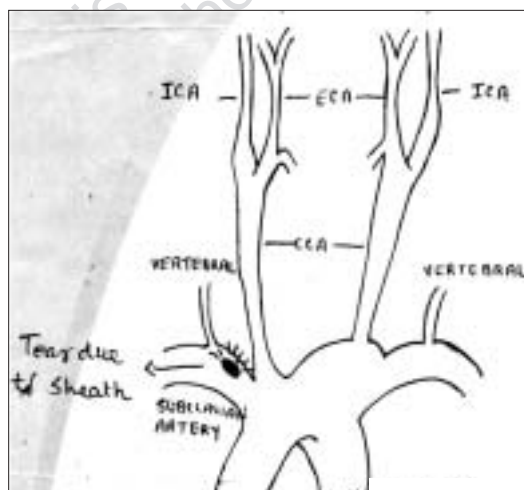
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part of the right subclavian artery measuring 4.4 x 2.6 c.m. and nonorganised hematoma with normal color flow in carotid and IJV [Figure 1]. Patient was subjected to angiography to determine origin of pseudoaneurysm which revealed tear at the subclavian- vertebral artery and pseudoaneurysm of right subclavian artery [Figure 2]. The treatment options suggested were stenting of right vertebral artery or surgical repair with risk of cerebrovascular stroke which was also risky in patient who was already on steroids and immunosuppressant. Over next 24h, patient was unable to move his right upper limb with increasing pain so he was subjected to open surgical pseudoaneurysmectomy through claviclectomy with consent of sternotomy under general anaesthesia. On exploration, the proximal carotid artery was intact but after evacuation of hematoma a 5 mm tear in anterior



**Figure 1:** Colour doppler ultrasound showing right subclavian pseudoaneurysm



**Figure 2:** Schematic presentation of site of injury to right subclavian artery detected by angiography

aspect of subclavian artery near origin of vertebral artery was noted. After achieving proximal control, resection of false aneurysm and vascular repair of subclavian artery was performed. Postoperatively, steroid, passive physiotherapy and analgesics were continued. EMG showed neuropathy of the axonal degenerative type involving C5-T1 segments. Patient was discharged at home four weeks later with normal sensory function, residual arm weakness and was advised to continue physiotherapy.

## Discussion

Right IJV cannulation is commonly used perioperatively for invasive monitoring as well as administration of fluid and vasoactive drugs. The advantages are straight course into superior vena cava, superficial location and definite landmarks for placement. Arterial injury leading to hematoma formation, arterial dissection, AV fistula or pseudoaneurysm are known complications of arterial puncture.

Pseudoaneurysm result from a variety of causes like infection, trauma and surgical procedures. The most common mechanism being disruption of arterial continuity with extravasation of blood into surrounding tissue. This results in the formation of fibrous tissue capsule which progressively enlarges because of underlying arterial pressure.<sup>[1]</sup> In our case, the penetration injury of right subclavian artery associated with low puncture may have led to pseudoaneurysm formation which progressively expanded due to arterial pressure and associated risk factors like high incidence of atherosclerosis, abnormal calcium and phosphate metabolism and coagulopathy attributable to chronic renal failure.<sup>[2]</sup>

Differentiation between simple hematoma and pseudoaneurysm may be difficult by clinical examination alone. Hematoma usually appear shortly after the procedure and tend to resolve in time depending on size, location and extent of injury where as pseudoaneurysm may appear later with pulsatile and expanding mass. Duplex ultrasonography will help to differentiate between two and selective angiogram is necessary to determine precise origin and extent of injury.<sup>[3]</sup> In our case initially we attributed brachial plexus compression due to hematoma in neck.

Because of close anatomic relationship between brachial plexus and subclavian artery in the thoracic inlet,

even a small false aneurysm can result in compression injury to the neuroplexus.<sup>[4,7]</sup> Because, brachial palsy has a poor prognosis when recognition is delayed, an aggressive approach is advocated. In our review, early surgical intervention of compressive hematoma within 48h resulted in improvement in all patients, while late intervention after 48h resulted in improvement in about half patients.<sup>[4-7]</sup> Our patient(removes)had progressive signs and symptoms of brachial plexopathy. Surgical repair 48 hours after injury has resulted in partial improvement.

Treatment options for pseudoaneurysm are USG guided compression, percutaneous thrombin injection, coil embolization, endovascular stents and open surgical repair.<sup>[8-10]</sup> USG guided compression which is frequently used for ablation of femoral pseudoaneurysm was not possible in our case because of depth of the artery and overlying bone. Percutaneous thrombin injection of pseudoaneurysm was not recommended because of potential for thrombin embolization into cerebral circulation. Similarly, coil embolization and endovascular stenting was not feasible owing to potential for cerebral embolization and stroke. Open surgical repair was the only answer in our case.

For all traumatic injuries of attempted jugular venous cannulation, particularly arterial puncture, an aggressive investigational approach is recommended. Any neck swelling or symptoms of brachial plexopathy should arise the suspicion of pseudoaneurysm and confirm by colour doppler study. A symptomatic false aneurysm should be treated without delay to prevent permanent neurological damage.

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**Source of Support:** Nil, **Conflict of Interest:** None declare

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