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## An Uncommon Cause of Contralateral Brachial Plexus Injury Following Jugular Venous Cannulation

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
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**Conflict of interest:** None declared

**Patient:** Female, 71  
**Final Diagnosis:** Brachial plexus injury  
**Symptoms:** Arm pain  
**Medication:** —  
**Clinical Procedure:** Syptoms released  
**Specialty:** Urology

**Objective:** Unusual or unexpected effect of treatment

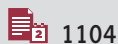
**Background:** The complication rate of central venous catheterization ranges from 4% to 35%. Brachial plexus injury can occur, mostly on the same side as the catheterization, without affecting the contralateral brachial plexus.

**Case Report:** A 71-year-old woman received placement of a vein hemodialysis catheter via right internal jugular vein. Five days after the cannulation, she complained of contralateral burning pain and numbness at the ulnar side of her left forearm. On the next day, the pain increased and extended to her left shoulder girdle and whole left arm, despite use of analgesics. When she passively tilted her head to the right side, ear to shoulder, the pain increased in the left arm. We found the patient had a tight suture with which the jugular catheter was fixed. The patient persistently turned her head to the right and slightly flexed her neck to loosen the suture to avoid discomfort. We removed the suture and the central venous catheter. Her pain in the left shoulder and arm was diminished the next day. Three days later, the symptoms had all disappeared completely.

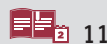
**Conclusions:** Central venous catheterization may cause contralateral brachial plexus injury, which may result from a tight suture with which the jugular catheter is fixed.

**MeSH Keywords:** Arm Injuries • Brachial Plexus • Catheterization, Central Venous • Jugular Veins

**Full-text PDF:** <https://www.amjcaserep.com/abstract/index/idArt/908125>



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## Background

The complication rate of central venous catheterization ranges from 4% to 35% [1]. The 3 main types of complications are thrombotic, traumatic, and infectious. Brachial plexus injury can occur following the implementation, mostly due to hematoma formation on the same side as the catheterization [2–5]. In most cases, it results from vascular injury because of multiple puncture attempts. We describe the first case, to the best of our knowledge, of central venous catheterization that may cause contralateral brachial plexus injury, which may result from forced neck position for 5 days because of a tight suture with which the jugular catheter is fixed.

## Case Report

A 71-year-old woman was admitted with the complaint of hematuria for 3 days. The patient was thin, with a height of 153 cm and a weight of 42 kg. She claimed that she was healthy previously. After being hospitalized, she underwent relevant examinations and was diagnosed with uremia, bladder cancer, and mild anemia. The patient was scheduled for hemodialysis 3 times a week, so a double-lumen hemodialysis catheter (ABLE, Guangdong Baihe Medical Technology Co. Ltd., Foshan, China) was placed via the right internal jugular vein using a rear approach between the clavicle and the clavicular head of sternocleidomastoid muscle. The puncture and catheterization were achieved on 1 attempt and in an uneventful manner without ultrasound guidance.

Five days after catheterization, the patient complained of contralateral burning pain and numbness at the ulnar side of her left forearm, which interfered with her sleep. She received oral 100 mg tramadol 3 times a day for management of her pain. On the next day, the pain increased to become continuous and extended to her left shoulder girdle and her whole left arm, which was exacerbated by physical factors such as pressure or touch and could not be released by analgesics.

Physical examination revealed no color changes, swelling, coldness, paresthesia, or muscle weakness detected around her neck, shoulders and arms. Her head could move actively without obvious limitation. A slight tenderness around the scalene muscles in the left neck was noted. When the patient passively tilted her head to the right side, ear to shoulder, she had increased burning pain in the left shoulder and arm and increased tenderness in the left neck. A left brachial plexus injury was highly suspected. Chest radiography and duplex ultrasound revealed no apparent abnormality in the left brachial plexus or the location of central venous catheterization on the right side.

After close observation for a relatively long time, we found the patient had a tight suture with which the jugular catheter was fixed in the conventional mode. The patient persistently turned her head about 30 degrees to the right and slightly flexed her neck to loosen the suture to alleviate the discomfort. The suture and the catheter were removed, and another catheter was subsequently placed via the right femoral vein. The patient was asked to hold her head in the neutral position to avoid excessive traction to the contralateral brachial plexus. She denied a history of prior episodes of arm pain, neck trauma, or surgery.

About 3 h following the removal, the pain in the left shoulder and arm was gradually reduced and she reported improvement in her sleep at night without taking analgesics. On the next morning, her pain had disappeared with residual slight numbness. Three days later, the symptoms over the left shoulder and arm had all disappeared completely. Written consent to publish this case report was obtained from the patient.

## Discussion

Our review of the literature revealed no reports of brachial plexus injury on the other side of the catheterization with a delayed onset of 5 days after jugular vein catheterization. The injury may result from a tight suture with which the central venous catheter is fixed. The suture is probably associated with a forced neck position. This case is an extremely uncommon complication, probably associated with central vein cannulation, because the injury happened on the contralateral side of the catheterization.

In this patient, we postulate that the possible cause of brachial plexus injury was neck tilting to the right, leading to stretching (traction) and compression of the contralateral brachial plexus for a long duration (5 days). The distribution of early pain is consistent with a lesion involving the lower trunk of the left brachial plexus. It is unfortunate that electromyography or magnetic resonance imaging was not performed to confirm the diagnosis.

The brachial plexus is vulnerable to injury because of its lack of mobility [6,7]. The brachial plexus is firmly attached proximally to the vertebra and prevertebral fascia and distally to the axillary sheath. Injuries may result from any position that increases the distance between points of the plexus fixation. Furthermore, any compression from surrounding structures can cause injury in the nerve trunks. In turning the head to the right, the proximal attachments of the left scalene muscles were displaced anteriorly, making the scalene muscles taut and thus narrowing the interscalene groove. With time, this could result in severe entrapment and compression of

the left brachial plexus, leading to injury. Lateral rotation and flexion of the head and neck have been reported to produce injury to the brachial plexus [6–10]. The injury occurs as a result of stretching and compression of the plexus, on the contralateral side in this case.

Congenital anomalies such as a cervical rib or anomalous derivation of the plexus, along with hypertrophy of the scalene muscles, may make the nerves more vulnerable. In our patient, chest radiography and duplex ultrasound of the left neck did not detect individual anatomical variations.

Needle trauma and hematoma could be ruled out, because the pain was on the contralateral side of the cannulation. Idiopathic brachial neuritis may be confused with brachial plexus injuries related to forced position. It is characterized by patchy weakness and atrophy of muscles of the shoulder girdle, preceded by intense and unbearable pain. In our patient, the neurological involvement was rather extensive instead of patchy. This patient did not have a history of idiopathic brachial neuritis. These features suggest against the diagnosis of idiopathic brachial neuritis [11].

## References:

1. Kaye CG, Smith DR: Complications of central venous cannulation. *BMJ*, 1988; 297(6648): 572–73
2. Porzionato A, Montisci M, Manani G: Brachial plexus injury following subclavian vein catheterization: A case report. *J Clin Anesth*, 2003; 15(8): 582–86
3. Karakaya D, Baris S, Güldogus F et al: Brachial plexus injury during subclavian vein catheterization for hemodialysis. *J Clin Anesth*, 2000; 12(3): 220–23
4. Kim E, Kim HJ, Hong DM et al: Influence of mechanical ventilation on the incidence of pneumothorax during infraclavicular subclavian vein catheterization: a prospective randomized noninferiority trial. *Anesth Analg*, 2016; 123(3): 636–40
5. Akata T, Noda Y, Nagata T et al: Hemidiaphragmatic paralysis following subclavian vein catheterization. *Acta Anaesthesiol Scand*, 1997; 41(4): 1223–25
6. Klaassen Z, Sorenson E, Tubbs RS et al: Thoracic outlet syndrome: A neurological and vascular disorder. *Clin Anat*, 2014; 27(5): 724–32
7. Vemuri C, McLaughlin LN, Abuirqeba AA, Thompson RW: Clinical presentation and management of arterial thoracic outlet syndrome. *J Vasc Surg*, 2017; 65(5): 1429–39
8. Bhardwaj D, Peng P: An uncommon mechanism of brachial plexus injury. A case report. *Can J Anaesth*, 1999; 46(2): 173–75
9. Shimizu S, Sato K, Mabuchi I et al: Brachial plexopathy due to massive swelling of the neck associated with craniotomy in the park bench position. *Surg Neurol*, 2009; 71(4): 504–8
10. Hébert-Blouin M-N, Chowdhry SA, Abrahams PH, Spinner RJ: An unusual anatomical explanation for contralateral upper extremity weakness after frontal craniotomy. *Clin Anat NYN*, 2009; 22(7): 840–45
11. Malamut RI, Marques W, England JD, Sumner AJ: Postsurgical idiopathic brachial neuritis. *Muscle Nerve*, 1994; 17(3): 320–24

Patients with brachial plexus injury may have their symptoms conservatively managed through pharmacotherapy, physiotherapy, and postural adjustments, which can alleviate strain and compression on the brachial plexus. The outcome at follow-up was good, indicating conservative treatment was effective for this patient.

## Conclusions

An excessively tight suture for securing central venous catheter position resulting in abnormal head and neck position may lead to contralateral brachial plexus injury. We discuss the mechanism and treatment strategies for this extremely uncommon complication, which may be associated with central venous catheterization.

## Conflict of interest

None.