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Iatrogenic median nerve injury as a result of venous cut down procedure: A rare case report

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ABSTRACT

INTRODUCTION: Venous cut down is an emergency procedure done to get vascular access in trauma patients where peripheral cannulation/central venous catheter is challenging or causes delays.

PRESENTATION OF CASE: We present a rare case of iatrogenic injury of right median nerve which occurred during basilic vein cut down. The injury came to notice when the patient presented with complaints of paraesthesia and weakness in his right hand for the past 6 weeks. On examination, tests for median nerve function were indicative of median nerve injury. Median nerve palsy was subsequently confirmed on electrodiagnostic studies. Upon exploration, it was noted that the median nerve was tightly tied circumferentially with a suture forming a constriction band which was released and neurolysis done. At 4 months follow up, patient showed complete recovery in terms of motor and sensory function of median nerve.

DISCUSSION: The anatomical variations in the pattern of cubital veins have been reported in literature. These anatomical variations and close proximity of nerves should be kept in mind and anticipated for while performing venesection. Moreover, these procedures are done by junior doctors in emergency settings, under stressful circumstances and suboptimal conditions, especially in developing countries, which increase the risk of an iatrogenic injury.

CONCLUSION: With good anatomical knowledge and high caution during the procedure, such complication could have been avoided.

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1. Introduction

Peripheral venous cut down has lost popularity over the years for gaining vascular access in acutely ill or injured patients. Once the mainstay of resuscitation, it is seldom preferred these days due to the availability of Seldinger percutaneous central venous cannulation. However, it still has a role in situations where percutaneous cannulation is challenging or causing delays [1,2]. Like any invasive device, it has its own share of associated complications. The usual reported complications being cellulitis, hematoma, phlebitis, perforation of the posterior wall of the vein, venous thrombosis and neuro-vascular injury [3,4]. We present a rare case of iatrogenic injury of the right median nerve which occurred during the basilic vein cut down procedure.

2. Presentation of case

Patient information: A 35-year-old male patient, left hand dominant, presented to orthopaedic outpatient clinic with complaints

of paraesthesia and weakness in his right hand for the past 6 weeks along with an inability to make a fist fully and difficulty in writing with the same hand. **Clinical Findings:** A detailed examination was carried out. General physical examination was unremarkable. Local examination revealed a 2 cm transverse surgical scar mark (from the venous cut down procedure) present at the medial aspect of right arm just proximal to the elbow crease (Fig. 1). He had appreciable wasting of thenar eminence of that hand as compared to the other side. There was decreased sensation over the lateral aspect of palm and palmar aspect of radial 3^{1/2} digits as compared to the other side. He was unable to do the “OK sign”, which suggested weakness of the flexor pollicis longus (FPL) and flexor digitorum profundus (FDP) of index finger (Fig. 2) [5]. “Pointing finger sign” was positive due to the inability to flex PIP and DIP joints of index finger (Fig. 3) [6]. Hence, a clinical diagnosis of median nerve injury secondary to peripheral venous cut down was made. **Timeline:** He reported that his symptoms started developing 6 weeks ago when he was admitted in emergency room and had a peripheral venous cut down procedure done to gain emergency vascular access as he had presented with intestinal perforation secondary to intestinal tuberculosis. **Diagnostic Assessment:** Clinical suspicion of median nerve injury warranted the need to do electrodiagnostic studies, EMG (electromyography) and NCV (nerve conduction velocity), to further aid in diagnosis [7]. EMG revealed wasted right abductor

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Fig. 1. Transverse scar as a result of cut down procedure.



Fig. 2. "Pinch Test/OK Sign" showing the weakness of flexor pollicis longus and flexor digitorum profundus of index finger.

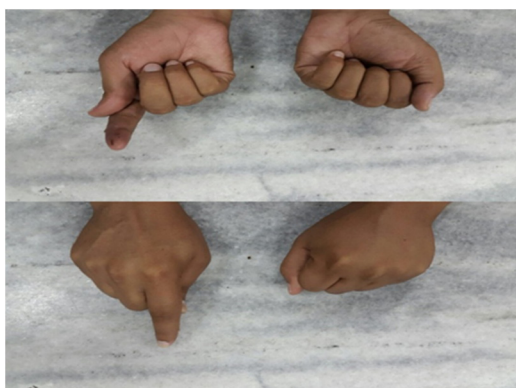


Fig. 3. "Pointing finger sign" due to inability to flex PIP and DIP joints of index finger.

pollicis brevis with decreased recruitment and interference pattern. Sensory NCV revealed lack of stimulation of fibres across right median nerve at the level of elbow. Hence, the diagnosis of median nerve injury was confirmed. Therapeutic intervention: Patient was explained the nature of the problem and a detailed discussion was held with him discussing the various treatment options, operative versus non-operative. Patient was counselled about the risks and benefits of the surgery and signed an informed consent form. Upon exploration, it was noted that the median nerve was tightly tied circumferentially with a non absorbable suture, (most likely being an ethilon suture, which is same as used to close the skin) forming a constriction band (Fig. 4). The constriction band was released and external neurolysis done (Fig. 5). Follow up & Outcomes: Post-operatively, patient underwent transcutaneous nerve stimulation daily for three weeks along with physiotherapy exercises. Around two weeks post operatively, it was noted that patient was able to flex PIP joint of index finger (Fig. 6). During follow-up visit, at



Fig. 4. Median Nerve found ligated with a suture.



Fig. 5. The constriction band was released and external neurolysis done.



Fig. 6. Two weeks post operatively, patient was able to flex PIP joint of index finger.

around 4 months, he showed complete recovery in the function of the muscles of the hand innervated by median nerve i.e. flexor digitorum superficialis, lateral half of the flexor digitorum profundus and flexor pollicis longus and was able to make a full fist (Fig. 7). He was able to write normally, had no complaints of paraesthesia and could go back to work. He has been followed up for a period of 12 months and there have been no concerns.

3. Discussion

Establishing vascular access is a key aspect of resuscitative measures in acutely ill or injured patients. These days less invasive methods like percutaneous central venous cannulation using Seldinger technique or ultrasound guided venous access are the preferred routes for resuscitation. However, at times it might be



Fig. 7. At four months follow up, patient was able to completely flex the PIP and DIP joints of index finger and make a fist.

difficult to use the percutaneous or ultrasound guided technique due to body habitus, unavailability of resources and trained personnel and this might result in unnecessary delays. In such a scenario, performing a venous cut down procedure could prove to be pivotal and life-saving as it is quick and is possible with only limited resources [1,2,8,9]. Saphenous vein and veins in cubital fossa are most commonly used for cut down procedure [1].

The usual reported complications are cellulitis, hematoma, phlebitis, perforation of the posterior wall of the vein, venous thrombosis and neuro-vascular injury [3,4]. Chang et al., in a retrospective study on implantable venous devices, have reported the rate of complications of cephalic vein cut down to be 11% [9]. To the best of our knowledge, there are only two isolated cases in the literature, reported in 1989 [10] and 2008 [11], mentioning injury to the ulnar nerve caused during a cut down procedure on the basilic vein, with no documented case reports of median nerve injury following cut down procedure on the basilic vein. This raises a valid question like whether such complications are under-reported in literature.

The anatomical variations in the pattern of cubital veins have been reported in literature [12]. These anatomical variations and close proximity of nerves should be kept in mind and anticipated for while performing venesection. Moreover, these procedures are done by junior doctors in emergency settings, under stressful circumstances and suboptimal conditions, especially in developing countries. These factors increase the risk of an iatrogenic injury [11]. The golden rule of checking neuro-vascular status of the limb after performing any procedure on that limb should always be followed. Had this patient being examined for signs of nerve injury while being admitted in the hospital, such a complication could have been detected early.

A detailed history taking and thorough clinical examination form the cornerstone of diagnosing nerve injuries. However, in modern practice, it has become very common to get electrodiagnostic studies (EMG & NCV) done to aid the diagnosis. These modalities provide important information like localizing areas of compression and neuropathy, determining severity and prognosis and demonstrating denervation, reinnervation, aberrant reinnervation, motor end plate lesion etc. [13,14]. Hence, these studies form a part of our pre-operative diagnostic work up protocol.

In the present case, median nerve was found compressed by a circumferential tie. It has been shown in literature that compression injury results in impairment of axonal function and performing external neurolysis in such a situation results in faster recovery [15]. Following the same principle in the present case, external neurolysis was performed and complete recovery of motor and sensory function of median nerve was observed at 4 months of follow up.

It has been suggested in literature that when the nerve trunk is targeted, muscle contractions and/or sensations can be produced in distal locations based on the innervation pattern of the nerve. As a result, stimulation of the median nerve at the elbow should produce muscle activation and/or sensation in the hand [16,17]. Hence, this patient was considered for surface electrical stimulation with the intended benefit of enhanced recovery.

4. Conclusions

Good anatomical knowledge and practicing extra caution while performing the procedure can help avoid such a preventable complication.

Declaration of Competing Interest

No conflict of interest for any author.

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Ethical approval

Ethics approval was taken.

Consent

Informed written consent was taken.

Author contribution

RK was the primary surgeon in this case and conceptualized the study. AS assisted in this case, did review of literature and wrote the manuscript. BP did final proof reading of the manuscript. AM contributed in review of literature and editing of the manuscript.

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