Malaysian Journal of Medical Research, 8(3), 32-34
https://doi.org/10.31674/mjmr.2024.v08i03.005

MJMR
Malaysian Journal of Medical Research

Malaysian Journal of Medical Research

Online ISSN: 2550-1607

www.mjmr.com.my

Case Study

Exploring Axillary Vein Central Cannulation in Critically Ill Trauma Patients: A Focus on Infraclavicular Techniques

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ABSTRACT

Managing major trauma in hospital settings, especially in emergency departments, presents significant challenges. Hypovolemic shock, often resulting from hemorrhage, is commonly due to bleeding in non-compressible areas like the abdomen and thoracic cavities, complicating intravenous access. Central vein cannulation is typically performed for effective volume resuscitation and blood transfusions prior to surgery, with common sites including the internal jugular, subclavian, and femoral vessels. However, in acutely bleeding trauma patients, early pre-hospital interventions such as cervical collars and pelvic binders can impede the cannulation of these veins and limit access to traditional central venous sites. This article explores the cannulation of central axillary veins, an underutilized yet advantageous route. Central axillary veins are readily accessible and provide a viable alternative for resuscitation in major trauma patients in emergency settings, offering a practical solution when other central venous access points are compromised.

Keywords: *Axillary Veins; Central Vein Cannulation; Emergency Settings; Hypovolemic Shock; Trauma Patients*

INTRODUCTION

Central venous access is essential for the resuscitation of critically ill patients in the emergency department (ED) (Spiegel *et al.,* 2020). Challenges arise when treating trauma patients with neck and pelvic injuries, where common sites for central cannulation are no longer accessible. This case presents a scenario in which these limitations were encountered, and axillary central vein cannulation was utilized as an alternative for obtaining venous access.

In major trauma patients presenting to emergency departments, many are immobilized with a cervical collar to prevent neck injuries and a pelvic binder to control potential bleeding from pelvic venous injuries (Nutbeam, 2022). This immobilization complicates the cannulation of central veins typically used, such as the femoral and jugular veins. Although less common, axillary central vein cannulation is an excellent alternative for accessing a central vein, facilitating hemostatic resuscitation and damage control resuscitation in trauma (Ng, 2022).

CASE SERIES

A 19-year-old woman arrived at the emergency department (ED) by ambulance following a motor vehicle accident in which her motorcycle skidded on a slippery road during her commute to work. Upon arrival, a trauma alert was activated, and she was promptly transferred to the Damage Control Suite (DCS). Initial assessment revealed that she was drowsy but could be aroused. Her shock index was notably high, indicating a state of significant hemodynamic instability.

Received: 27th May 2024; Revised version received on: 15th June 2024; Accepted: 1st July 2024

The primary and secondary surveys conducted identified suspected injuries to the cervical spine, pelvis, and right upper limb. An extended FAST (Focused Assessment with Sonography for Trauma) scan was performed, which did not reveal any intra-abdominal bleeding. Despite these findings, the immediate need for venous access for resuscitation posed a challenge due to the patient's complex injuries.

Given the difficulties encountered with traditional central venous access sites, the medical team opted for ultrasound-guided axillary vein central cannulation. This approach was chosen to bypass the anatomical constraints and trauma-related complications that made other central venous access points impractical. The axillary vein cannulation was successfully executed, allowing for effective resuscitation and stabilization of the patient.

DISCUSSION

With the increased accessibility of ultrasound machines in the ED, there has been a notable rise in the use of ultrasound-guided vascular access in cases of difficult cannulation (Nye, 2022). The practice of axillary vein cannulation, while not as commonly employed in the ED, is a viable option when traditional venous access sites are problematic, particularly in critically ill trauma patients with multiple injuries. The axillary vein is an alternative site for central venous access that is often underutilized (Fuller,2021; Ali & Hashim, 2024). This procedure should ideally be performed using an aseptic technique to minimize the risk of infection. However, in emergency situations where rapid venous access is critical for resuscitation, a clean procedure must be ensured to maintain sterility as much as possible under the circumstances (Cardona *et al.,* 2024).

Accessing the axillary vein typically involves the use of a central or trauma line. An angiocatheter or a large bore cannula can also be used as alternatives to achieve venous access (Ozakin,2020). The use of ultrasound guidance significantly increases the success rate of this procedure by providing real-time visualization of the vein, which is particularly beneficial in patients with challenging anatomy or significant trauma. Despite its advantages, axillary vein cannulation is not without risks. Potential complications include axillary artery injury and pneumothorax (Southmayd, 2020). These risks necessitate that the procedure be performed by experienced personnel who are proficient in ultrasound-guided techniques and familiar with the anatomy of the axillary region (Shaik 2022).

Previous studies have explored the use of the axillary vein for central cannulation in various clinical settings, such as cardiac surgery and intensive care units. These studies have demonstrated that, when performed correctly, axillary vein cannulation can be a safe and effective alternative to more traditional central venous access sites. The technique offers a valuable option in cases where the femoral, jugular, or subclavian veins are not accessible or are contraindicated due to the patient's injuries or other medical conditions.

CONCLUSION

Axillary vein central cannulation serves as an alternative route for venous access in resuscitating critically ill trauma patients with suspected neck, upper limb, and pelvic injuries. The increased use of ultrasound-guided techniques in the Emergency Department (ED) has expanded the possibilities for obtaining venous access in challenging cases. While less common, axillary vein cannulation is a viable and sometimes necessary alternative for central venous access in critically ill trauma patients. This procedure requires a thorough understanding, careful technique, and awareness of potential complications to ensure patient safety and successful resuscitation.

Conflict of Interest

The authors declare that they have no competing interests.

ACKNOWLEDGEMENT

Authors are thankful to the faculty of medical science and management of Lincoln University College, Malaysia for providing all the necessary support and facilities to complete the present study.

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