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CASE REPORT

Supraclavicular Block for ORIF of Distal Humerus Fracture in End-Stage Renal Disease: A Case Report

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Abstract

Supraclavicular block (SCB) is a well-established regional anesthesia technique for upper limb surgery; however, its application in patients with end-stage renal disease (ESRD) receiving antiplatelet therapy presents distinct clinical challenges. This case is noteworthy because of the coexistence of ESRD, ongoing clopidogrel therapy, anemia, and potential respiratory compromise, all of which complicate anesthetic decision-making. We report a 44-year-old female with ESRD on regular hemodialysis who sustained a comminuted intra-articular distal humerus fracture and underwent open reduction and internal fixation under ultrasound-guided SCB. The block was performed using 15 mL of 0.75% ropivacaine with dexamethasone as an adjuvant, following careful consideration of bleeding risk, local anesthetic dosing, and pneumothorax prevention. The procedure provided effective intraoperative anesthesia and prolonged postoperative analgesia without neurological, respiratory, or bleeding complications. Postoperative pain scores remained low, opioid consumption was minimal, and motor function recovered uneventfully. This case highlights that ultrasound-guided SCB can be safely and effectively performed in carefully selected ESRD patients receiving antiplatelet therapy when meticulous technique, dose justification, and risk mitigation strategies are applied. The key learning point is the importance of individualized anesthetic planning rather than a generalized preference for regional over general anesthesia.

Keywords: Anesthesia, Regional; Chronic Kidney Disease; Fracture Fixation, Internal; Nerve Block; Ultrasonography

Introduction

Supraclavicular block (SCB) is a widely used regional anesthesia technique for upper extremity surgery because it provides rapid onset, dense sensory and motor blockade, and effective postoperative analgesia. The introduction of ultrasound guidance has significantly improved the safety and accuracy of SCB by allowing real-time visualization of the brachial plexus, surrounding vascular structures, and pleura.[1,2] The subsequent incorporation of ultrasound technology resulted in notable improvements in both procedural safety and effectiveness. By using real-time imaging, anesthesiologists can visualize the brachial plexus and surrounding anatomy, guiding the needle with precision while avoiding critical structures. This advancement has made SCB more accurate, efficient, and much safer, particularly for patients with complex medical conditions.[2,3]

Patients with end-stage renal disease (ESRD) present unique challenges in anesthetic management. Impaired drug clearance, fluid and electrolyte imbalance, and multiple comorbidities increase the risk associated with general anesthesia, including cardiovascular instability, prolonged recovery, and respiratory complications.[4]

Regional anesthezsia techniques such as ultrasound-guided SCB offer a valuable alternative by minimizing systemic drug exposure, reducing opioid requirements, and providing effective analgesia with fewer systemic side effects.[1,3,4]

This report describes a 44-year-old woman with ESRD undergoing regular hemodialysis who sustained a comminuted distal humerus fracture. Considering her multiple comorbidities, including hypertension and type 2 diabetes mellitus, ultrasound-guided SCB was selected as the primary anesthetic technique. The block provided effective intraoperative anesthesia and prolonged postoperative analgesia without complications, supporting its role as a safe and practical option in high-risk patients.

This case highlights how ultrasound-guided SCB can be a safe, effective, and practical anesthetic choice for high-risk patients, supporting its role as a preferred technique in modern anesthesia practice.

Case Presentation

A 44-year-old female with end-stage renal disease (ESRD) on regular maintenance hemodialysis presented with left elbow pain following a fall. Imaging studies confirmed a comminuted intra-articular distal humerus fracture, and open reduction and internal fixation (ORIF) was planned. The clinical course and the radiographic findings are illustrated in **Figures 1** and **2.**

Figure 1. X-ray examination of the left humerus (anteroposterior and lateral views)

The patient had been undergoing scheduled hemodialysis three times per week for several years. She was on long-term antiplatelet therapy with clopidogrel for cardiovascular risk reduction.

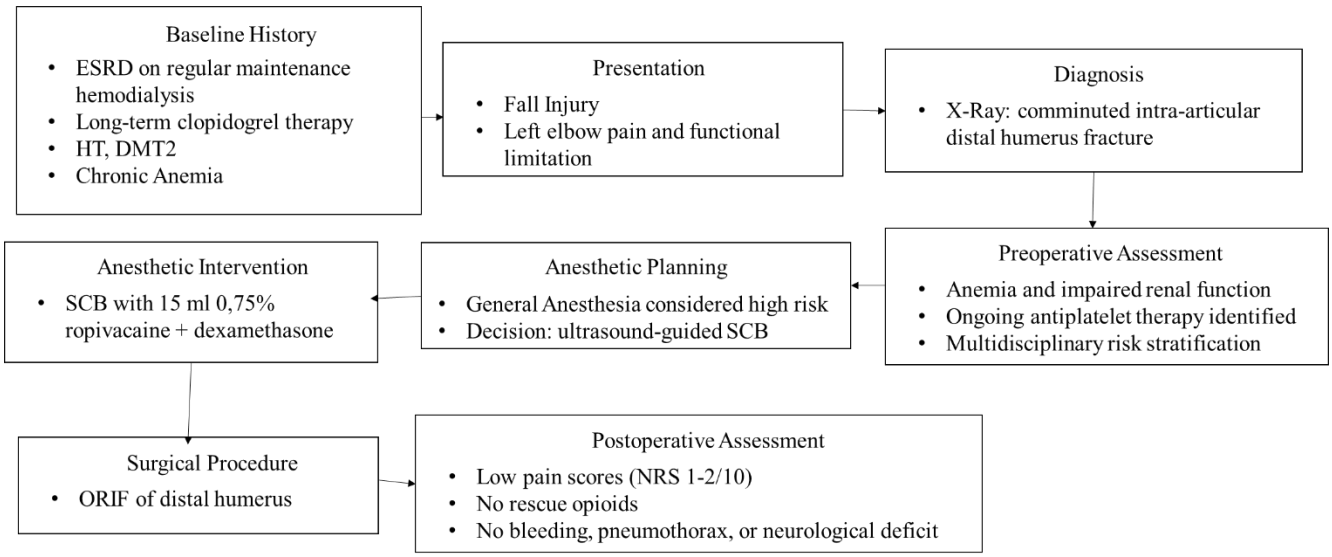
Table 1. Preoperative Laboratory Values

Parameter	Value	Reference Range
Hemoglobin	9.5 g/dL	11.4-15.1
MCV	81.7 fL	80-93
MCH	28.4 pg	27-31
Platelet Count	389 x 10^3/mL	142-424
Random Blood Glucose	157 mg/dL	<180

Pain related to the fracture had been managed conservatively with oral non-opioid analgesics prior to admission, with inadequate relief. No prior surgical procedures or regional anesthetic interventions were documented. Relevant comorbidities included poorly controlled hypertension, type 2 diabetes mellitus treated with insulin, and chronic anemia

related renal disease. Preoperative laboratory evaluation demonstrated anemia and impaired renal function without severe thrombocytopenia or clinically significant coagulation abnormalities. Preoperative laboratory values are summarized in **Table 1**.

Figure 1. Clinical Course of The Patient



Several factors complicated anesthetic planning in this patient. Ongoing clopidogrel therapy increased the risk of bleeding and hematoma formation associated with deep peripheral nerve blocks. ESRD-related anemia and altered drug pharmacokinetics raised concerns regarding systemic anesthetic exposure and delayed drug clearance. In addition, supraclavicular block carries an inherent risk of pneumothorax due to the proximity of the pleura, a concern that may be amplified in ESRD patients who are prone to fluid overload and reduced pulmonary reserve. These considerations necessitated careful risk–benefit evaluation and meticulous procedural planning.

Given the elevated perioperative risk associated with general anesthesia, an ultrasound-guided supraclavicular brachial plexus block was selected. The block was performed using 15 mL of 0.75% ropivacaine combined with dexamethasone as an adjuvant. This reduced yet clinically effective volume was chosen to provide adequate neural coverage while minimizing total local anesthetic exposure, which is particularly important in patients with ESRD because of altered pharmacokinetics and increased susceptibility to systemic toxicity. Continuous real-time ultrasound visualization allowed identification of the brachial plexus, subclavian vessels, and pleura, enabling precise needle placement and reducing the risk of vascular puncture and pneumothorax. The block was completed with a single needle insertion and without immediate complications. The supraclavicular block provided complete sensory and motor blockade of the operative limb, allowing ORIF to proceed without supplemental general anesthesia. Postoperative outcomes were assessed

using standardized measures and are summarized in **Table 2**.

Table 2. Postoperative Outcome Assessment

Outcome Parameter	Result
Pain Score in PACU (NRS)	1/10
Pain Score at 24 hours (NRS)	2/10
Duration of sensory block	Approximately 18 hours
Motor function recovery	Complete within 24 hours
Rescue opioid requirement	None

No adverse events were observed during or after the procedure. There were no signs of bleeding or hematoma at the injection site, no neurological deficits, no respiratory complications including pneumothorax, and no evidence of local anesthetic systemic toxicity. These potential complications were anticipated and actively monitored due to the patient's antiplatelet therapy, renal impairment, and the anatomical risks associated with supraclavicular block.

The patient reported high satisfaction with the anesthetic technique. She expressed relief at avoiding general anesthesia and described minimal postoperative pain, which facilitated comfort during recovery. She did not experience nausea, respiratory discomfort, or other distressing symptoms following the procedure.

Discussion

This case demonstrates the successful use of ultrasound-guided supraclavicular block as the primary anesthetic technique for distal humerus fracture surgery in a patient with ESRD receiving ongoing antiplatelet therapy. Anesthetic management was challenging due to ESRD-related physiological alterations, chronic anemia, clopidogrel use, and the anatomical risks associated with supraclavicular block.[1-3]

In patients with ESRD, anesthetic planning must consider altered pharmacokinetics, impaired drug clearance, fluid balance instability, and increased sensitivity to opioids and sedatives. In this patient, these factors raised concerns regarding general anesthesia, particularly the risks of prolonged recovery, respiratory compromise, and hemodynamic instability. The decision to use SCB was therefore based on individualized risk assessment rather than a generalized preference for regional anesthesia.[4,5]

The distal humerus fracture required a dense and reliable block extending to the elbow joint. Ultrasound-guided SCB was selected because it provides consistent anesthesia for surgeries at and below the distal humerus while allowing precise visualization of neural and non-neural structures.[1,5,6]

A total volume of 15 mL of 0.75% ropivacaine was deliberately chosen to balance efficacy and safety. Ultrasound guidance enables effective blockade with lower volumes of local anesthetic compared with landmark-based techniques. In patients with ESRD, minimizing total local anesthetic dose is particularly important due to altered drug distribution and clearance, which may increase the risk of systemic toxicity. The addition of dexamethasone as an adjuvant was intended to prolong block duration and reduce postoperative analgesic requirements, contributing to minimal opioid use in this case.[7-10]

Ongoing clopidogrel therapy represented a significant consideration because

supraclavicular block is classified as a deep peripheral nerve block with potential bleeding risk. In this case, the absence of severe coagulopathy, careful ultrasound-guided needle placement, avoidance of vascular puncture, and use of a single-insertion technique supported the decision to proceed. Continuous postoperative monitoring allowed early detection of potential complications, none of which occurred.[9,10]

Pneumothorax is a recognized complication of supraclavicular block due to the proximity of the pleura. This risk may be heightened in patients with ESRD because of reduced pulmonary reserve related to fluid overload or anemia. In this case, real-time ultrasound visualization of the pleura and continuous needle tracking were critical in minimizing this risk. No respiratory complications occurred during or after the procedure, underscoring the importance of ultrasound guidance in high-risk patients.[11-13]

The block provided effective intraoperative anesthesia and prolonged postoperative analgesia, as reflected by low postoperative pain scores, absence of rescue opioid requirements, and complete motor recovery within 24 hours. These outcomes highlight the value of systematic outcome assessment rather than descriptive reporting alone. Importantly, no neurological, respiratory, or bleeding complications were observed, despite the patient's elevated baseline risk.[12-14]

This case emphasizes that ultrasound-guided SCB can be safely performed in carefully selected ESRD patients receiving antiplatelet therapy when meticulous technique, appropriate dose selection, and vigilant monitoring are applied. The key clinical lesson is the importance of individualized anesthetic decision-making based on patient-specific risks, rather than broad assumptions regarding the superiority of regional versus general anesthesia.[14,15]

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Declaration of Patient Consent

The authors confirm that all necessary patient consent forms have been obtained. In these forms, the patient(s) provided informed consent for the publication of their images and relevant clinical information in the journal. The patients have been informed that while their names and initials will not be published and reasonable efforts will be made to protect their identity, complete anonymity cannot be guaranteed.

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Conflict of Interest

The author(s) report no conflict of interest.

Data Availability Statement

The individual patient data collected in this Case Report/Series are not publicly available due to ethical, legal, and institutional restrictions. For further information, please contact the corresponding author.

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Author's Contributions

Conceptualization: DK, TAS. Data curation: DK. Investigation: DK. Writing – original draft: DK. Writing – review & editing: DK., TAS. Supervision: TAS. All authors have read and approved the final version of the manuscript.

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