Case Report

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Delayed Supraclavicular Hematoma and Thyrocervical Branch Pseudoaneurysm Following Ultrasound-Guided Supraclavicular Brachial Plexus Block: A Case Report

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ABSTRACT

Background: Ultrasound-guided supraclavicular brachial plexus block permits real-time visualization of the brachial plexus and nearby structures, but it does not eliminate the possibility of vascular injury. Clinically significant bleeding after this block is uncommon and delayed arterial pseudoaneurysm is particularly unusual.

Case Presentation: We report a case of 84-year-old man with end-stage renal disease on hemodialysis, coronary artery disease, congestive heart failure, atrial fibrillation, hypertension and thrombocytopenia underwent a right ultrasound-guided supraclavicular block before planned arteriovenous access creation. His platelet count was 86 × 10^3/μL. Forty-five minutes after the block, right supraclavicular swelling was identified. Initial bedside ultrasonography showed a hematoma without active bleeding or visible pseudoaneurysm. After six hours of stable observation, he was discharged. Four hours later, he returned with increased firmness and pain. His platelet count was 78 × 10^3/μL and computed tomography angiography demonstrated a 9 × 7 × 7 cm hematoma with a central contrast blush suspicious for pseudoaneurysm. On day 5 after the block, angiography identified a distal thyrocervical branch pseudoaneurysm, which was treated with Onyx and Optoblock coils followed by ultrasound-guided percutaneous thrombin injection. He was discharged the following day.

Conclusion: A negative initial bedside ultrasound does not exclude evolving arterial injury in a patient with persistent or progressive post-block swelling. In patients with clinically relevant bleeding risk factors, serial examination and timely escalation to computed tomography angiography and catheter angiography should be considered when symptoms evolve.

Keywords: Supraclavicular brachial plexus block, Pseudoaneurysm, Thyrocervical artery, Hematoma, Ultrasound guidance, Regional anesthesia, Thrombocytopenia, Case report

1. Introduction

Ultrasound-guided supraclavicular brachial plexus block is widely used for anesthesia and analgesia during upper-extremity procedures. Ultrasound allows the operator to identify the plexus, subclavian artery, pleura and other regional structures in real time and it may reduce unintended vascular or pleural puncture compared with landmark-based techniques. However, ultrasound is not a substitute for detailed anatomic knowledge, careful needle visualization or post-procedure surveillance[1-4].

The supraclavicular region contains multiple arterial structures that may be encountered during needle advancement, including the subclavian, transverse cervical and dorsal scapular arteries. In a 2019 evidence review, large studies of supraclavicular block reported vascular puncture rates of 0 to 0.4% and no hematomas, while the review identified no published hematoma case reports after supraclavicular block at that time[1]. Rare bleeding complications have nevertheless been described with brachial plexus techniques, including hemothorax after supraclavicular block and hematoma after other approaches[5,6].

We report a delayed right supraclavicular hematoma associated with a distal thyrocervical branch pseudoaneurysm after an ultrasound-guided supraclavicular block in a patient with end-stage renal disease and thrombocytopenia. The case emphasizes the limitations of an initially negative bedside study and the importance of reassessing evolving symptoms. The report is organized according to CARE case-report guidance[7].

2. Case Presentation

2.1. Patient information and risk profile

Here we present a case of 84-year-old male patient with end-stage renal disease receiving hemodialysis, coronary artery disease, congestive heart failure, atrial fibrillation and hypertension presented for scheduled creation of a right upper-extremity arteriovenous access for hemodialysis. He had received dialysis the day before the planned procedure. Pre-procedure laboratory testing showed thrombocytopenia with a platelet count of 86 × 10^3/μL; the remaining coagulation studies were reported as within normal limits. He was not receiving anticoagulation for atrial fibrillation because of a previous gastrointestinal bleed while taking warfarin.

2.2. Block procedure

A right supraclavicular brachial plexus block was performed in the preoperative area for surgical anesthesia and postoperative analgesia. Standard monitors were used. The skin was prepared with 2% chlorhexidine and a sterile ultrasound probe cover was applied. Ultrasound identified the subclavian artery superior to the first rib and the upper, middle and lower trunks of the brachial plexus. No additional pulsatile vessels were visualized during the procedure. A total of 30 mL of local anesthetic was injected incrementally, consisting of 10 mL of 1% mepivacaine and 20 mL of 0.5% ropivacaine, with negative aspiration performed every 5mL. The patient did not report paresthesia and remained hemodynamically stable.

2.3. Initial swelling and delayed presentation

Forty-five minutes after completion of the block, swelling was noted in the right supraclavicular area after the patient was transferred to the operating room. Bedside ultrasound demonstrated a right supraclavicular hematoma without active bleeding or a visible pseudoaneurysm. A pressure dressing was applied and the planned surgery was cancelled. The patient was observed in the post-anesthesia care unit for six hours. He remained hemodynamically stable without evidence of hematoma expansion and was discharged with close follow-up.

Four hours after discharge, he returned to the emergency department because of new firmness in the right supraclavicular area and pain when turning his head to the right. He had no motor or sensory deficit, respiratory distress or abnormal vital signs. His platelet count was 78 × 10^3/μL. Computed tomography angiography of the neck demonstrated a large right supraclavicular hematoma measuring approximately 9 × 7 × 7 cm with a central area of contrast blush concerning for pseudoaneurysm formation.

2.4. Definitive diagnosis and treatment

The patient was admitted to the vascular surgery service for continued pressure dressing and neurovascular and wound checks every four hours. He underwent dialysis the following day using a pre-existing right internal jugular tunneled dialysis catheter. On the fourth day after the nerve block, the neurosurgery and interventional radiology teams were consulted. On the fifth day after the block, diagnostic cerebral angiography demonstrated a large distal thyrocervical branch pseudoaneurysm (Figures 1 and 2). The pseudoaneurysm was embolized with Onyx and Optoblock coils, followed by ultrasound-guided percutaneous thrombin injection. The patient tolerated the intervention and was discharged the following day show in Table 1. Longer-term follow-up information was not available in the source record.

Table 1: Clinical timeline.

Time point	Clinical event
Day-1	Hemodialysis before the planned arteriovenous access procedure.
Day 0, before surgery	Right ultrasound-guided supraclavicular block performed. Platelet count: 86 × 10^3/μL.
Day 0, 45 minutes after block	Right supraclavicular swelling noted. Bedside ultrasound showed a hematoma without visible active bleeding or pseudoaneurysm. Surgery cancelled; pressure dressing and observation initiated.
Day 0, 6 hours after observation	Hemodynamically stable without documented expansion; discharged with close follow-up.
Day 0, 4 hours after discharge	Returned with increased firmness and pain. Platelet count: 78 × 10^3/μL. CTA showed a 9 × 7 × 7 cm hematoma with contrast blush.
Day 1 after readmission	Dialysis performed through the pre-existing right internal jugular tunneled catheter.
Day 4 after block	Neurosurgery and interventional radiology consulted.
Day 5 after block	Angiography demonstrated distal thyrocervical branch pseudoaneurysm. Onyx and Optoblock coil embolization and percutaneous thrombin injection performed.
Day 6 after block	Discharged after tolerating treatment.

3. Discussion

3.1. Bleeding risk and regional anatomy

This case illustrates a rare but clinically important vascular complication temporally associated with an ultrasound-guided supraclavicular block. The available evidence suggests that

bleeding after supraclavicular block is uncommon. Tsui and colleagues reported vascular puncture rates of 0 to 0.4% in large supraclavicular-block studies and identified no hematomas or published hematoma case reports for this approach in their review[1]. Large clinical series have also reported low rates of clinically significant complications after ultrasound-guided supraclavicular block[8]. These data support the safety of the technique at a population level, but they cannot exclude rare, high-consequence events in individual patients.

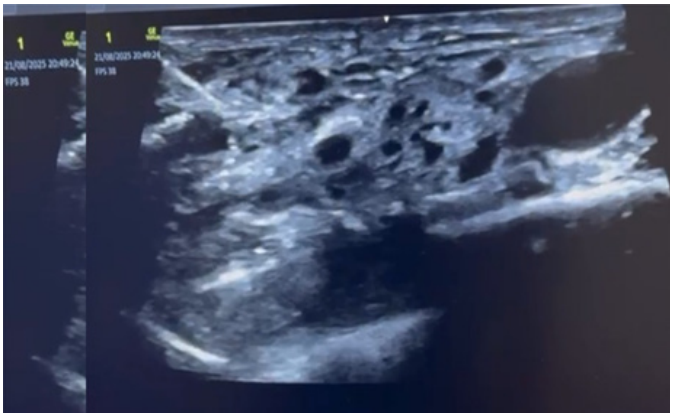

Figure 1: Computed tomography angiography of the neck demonstrating a large right supraclavicular hematoma with a central contrast blush concerning for pseudoaneurysm formation. The airway was patent.

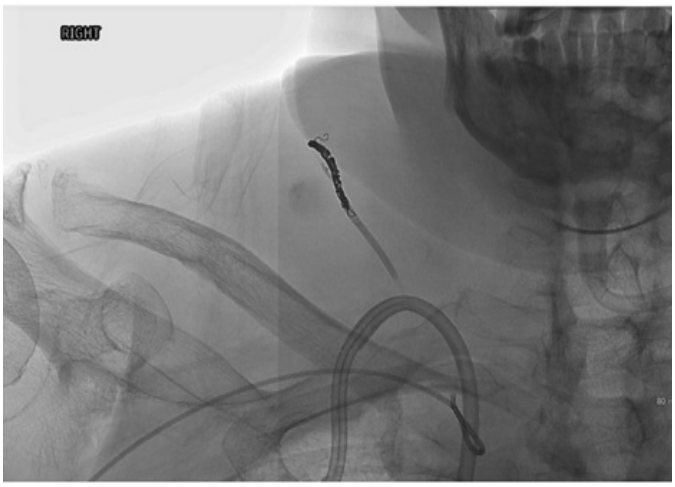

Figure 2: Representative procedural images from the diagnostic angiography and endovascular treatment of the distal thyrocervical branch pseudoaneurysm. Panels A-C show the procedural images obtained during angiography and embolization.

The supraclavicular fossa is anatomically complex. The subclavian artery is a key landmark, but smaller branches of the thyrocervical system may not be conspicuous on routine grayscale imaging. The transverse cervical and other arterial branches can be at risk during needle advancement[1,3]. In addition, anatomic variation in the relationship between the brachial plexus and subclavian artery has been described and ultrasound may reveal variants that materially change the safest needle trajectory[4]. In the present case, no additional pulsatile vessel was visualized during the block, yet a distal thyrocervical branch pseudoaneurysm was later demonstrated. This finding highlights that visualization of the expected major vessels does not prove that all smaller or variant vessels have been excluded from the needle path.

3.2. Patient-specific considerations

The patient had several potential bleeding-risk modifiers, including thrombocytopenia and end-stage renal disease. He was not taking chronic anticoagulation for atrial fibrillation, but the source record does not report whether anticoagulation was used during the preceding dialysis session. Therefore, the relative contribution of platelet dysfunction, thrombocytopenia, uremia, dialysis-related factors and direct arterial trauma cannot be determined. The case also does not establish that the needle directly injured the later-identified branch; the relationship is inferred from the temporal sequence, location of the hematoma and angiographic diagnosis.

Bleeding-risk assessment before peripheral nerve and interfascial plane blocks should be individualized rather than based solely on whether a patient is receiving therapeutic anticoagulation. Expert consensus emphasizes that evidence for bleeding risk is limited and that recommendations should support, rather than replace, clinical judgment[1]. In a patient with thrombocytopenia or renal disease, the decision to proceed should incorporate the urgency and benefit of the block, alternative anesthetic strategies, the planned needle path, the ability to compress the site and the feasibility of post-procedure observation.

3.3. Diagnostic implications of delayed symptoms

The initial bedside ultrasound identified the hematoma but did not demonstrate active bleeding or a pseudoaneurysm. Four hours after discharge, the patient returned with new firmness and pain and Computed Tomography Angiography (CTA) then showed a large hematoma with a contrast blush. This sequence is clinically important because pseudoaneurysms may evolve after the initial injury and may be missed when the study is performed early, when the lesion is small or when the relevant branch is difficult to visualize. Ultrasound guidance during the block and an initially reassuring post-procedure examination should therefore not be interpreted as definitive exclusion of delayed arterial injury.

New or progressive swelling, increasing firmness, pain, pulsatility, neurologic symptoms, airway symptoms, hemodynamic change or a fall in hemoglobin should prompt immediate reassessment. When the clinical course is discordant with an initial bedside study, contrast-enhanced Computed Tomography Angiography (CTA) can define the size and extent of the hematoma and identify a contrast blush or pseudoaneurysm. Catheter angiography remains useful when a treatable arterial source is suspected because it can establish the diagnosis and permit selective embolization.

3.4. Management considerations

Management should be individualized according to hemodynamic status, airway and neurologic findings, hematoma behavior and the anatomy of the arterial lesion. Initial measures may include close observation, pressure when anatomically appropriate, serial neurovascular and airway assessment and early involvement of vascular surgery, interventional radiology and other relevant services. The reported patient was initially stable, but delayed clinical progression led to Computed Tomography Angiography (CTA), admission and subsequent angiography.

The distal thyrocervical branch pseudoaneurysm was treated with Onyx and Optoblock coils, followed by percutaneous thrombin injection. Endovascular treatment is commonly used for selected thyrocervical or subclavian branch pseudoaneurysms and branch-vessel hemorrhage, while open or hybrid repair may be appropriate when anatomy, lesion size, collateral circulation or failure of endovascular treatment requires it[9-11]. In a retrospective series of subclavian and axillary branch hemorrhage, transcatheter arterial embolization achieved 100% technical success and 85.7% clinical success, although the study population and causes of bleeding were heterogeneous[11]. These results support early consultation with an endovascular team when imaging identifies a potentially treatable branch-vessel source, but they should not be interpreted as a procedure-specific outcome estimate for supraclavicular block complications.

4. Strengths and Limitations

The principal strength of this report is the clinically detailed sequence from block placement to initial ultrasound, delayed return, Computed Tomography Angiography (CTA), angiographic diagnosis and definitive treatment. The case also documents relevant platelet counts and the absence of early neurologic or respiratory compromise. Limitations include the single-patient design, incomplete information about the exact needle gauge and trajectory, absence of documented dialysis anticoagulation details, lack of a long-term follow-up assessment and inability to prove direct needle injury to the pseudoaneurysm branch. The case should therefore generate vigilance and hypotheses rather than establish incidence or causation.

5. Conclusion

A distal thyrocervical branch pseudoaneurysm can present as a delayed enlarging supraclavicular hematoma after an ultrasound-guided supraclavicular brachial plexus block, even when the initial ultrasound does not show active bleeding or a pseudoaneurysm. Thrombocytopenia and end-stage renal disease may increase concern for bleeding, but the specific contribution of each factor cannot be determined from this case. Progressive swelling or new pain warrants serial clinical assessment and timely escalation to CTA and catheter angiography, with early multidisciplinary management when an arterial source is suspected.

6. Declarations

6.1. Ethics approval

This report describes a single-patient case and was not conducted as human-subjects research. In accordance with University of South Florida IRB guidance, retrospective review of records for publication of a single case report involving three or fewer individuals does not require IRB review or approval.

6.2. Consent for publication

Written informed consent was obtained from the patient for the collection, analysis and publication of the clinical information, including images and photographs. Written informed consent was obtained from the patient for publication of this case report, including all clinical details and images. The patient was informed about the purpose of the report, its intended scientific audience and the measures taken to preserve anonymity.

6.3. Conflict of interest

The authors declare that they have no financial or non-financial conflicts of interest related to this work.

6.4. Funding

The authors received no external financial support for the work reported in this case report.

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