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Case Report

Ultrasound-Guided Sub-Sartorial Spread in Adductor Canal Block: A Case Series

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ABSTRACT

The adductor canal block (ACB) is a commonly used regional anesthesia technique in anterior cruciate ligament (ACL) repair that provides effective postoperative analgesia while preserving motor function. The adductor canal extends from the apex of the femoral triangle to the adductor hiatus and is roofed by the sartorius muscle and vasto-adductor (V-A) fascia. The subsartorial space, situated between the sartorius and V-A fascia, contains the subsartorial plexus, which contributes to the sensory innervation of the knee.

Introduction

The utility of ultrasound-guided adductor canal block (ACB) has emerged as a key component of multimodal analgesia in patients undergoing Anterior Cruciate Ligament (ACL) surgery. By selectively targeting sensory nerves while preserving motor function, ACB facilitates effective postoperative pain relief and promotes early mobilization, which is critical for reducing complications such as deep vein thrombosis and improving functional recovery [1-2]. The adductor canal, approximately 15 cm in length, extends from the apex of the femoral triangle to the adductor hiatus of the adductor magnus [3]. Anatomically, it is bordered anteromedially by the sartorius muscle and the vasto-adductor (V-A) fascia, laterally by the vastus medialis, and posteriorly by the adductor longus and adductor magnus muscles. Within this canal travel the femoral artery, femoral vein, nerve to vastus medialis, and saphenous nerve [4]. The adductor canal provides the delivery of local anesthetic aimed at blocking the nerves, however, the success of ACB in providing reliable analgesia depends on the precise spread of the injectate within the subsartorial compartments [5-6].

Ultrasound confers a real-time, non-invasive, and widely accessible method to visualize anatomical structures and track the spread [7]. Studies have specifically focused on ultrasound to evaluate the spread of local anesthetic following block administration. The subsartorial space lies superficial to the adductor canal beneath the sartorius muscle, plays a paramount role in determining the extent of sensory blockade, especially regarding the saphenous nerve [8-9].

In this case series, we aimed to evaluate the local anesthetic spread into the subsartorial space using ultrasound in patients undergoing ACL reconstruction. By real-time distribution and correlating it with clinical sensory blockade, we sought to enhance the understanding of how ACB achieves its analgesic effect across patients. This study contributes novel insights as, to our knowledge, ultrasound-based evaluation of subsartorial spread following ACB.

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Case Report

This case series describes three patients who underwent ACL reconstruction surgery. None of the patients had a history of chronic pain, opioid dependence, or any significant comorbid conditions that could influence the analgesic effect. Informed consent from each patient was taken.

Anesthetic Technique

- Preoperatively, spinal anesthesia was given under strict aseptic conditions in the operating room using 26G Quincke Babcock spinal needle, in sitting position with 3.5 ml 0.5% hyperbaric bupivacaine followed by an ultrasound-guided ACB as part of a multimodal analgesia strategy.

Adductor Canal Block (ACB) Procedure

Postoperatively, patients were placed in a supine position, thigh semi-flexed and externally rotated. A linear ultrasound probe was employed to identify the adductor canal, including the femoral artery, sartorius muscle, vastus medialis, and adductor muscles (Figure 1).

Using continuous standard monitoring per ASA guidelines and under aseptic precautions, the ACB was performed. An in-plane technique under ultrasound guidance was used to advance a 20G Intracath toward the lateral aspect of the femoral artery. The needle traversed the sartorius muscle and vasto-adductor (V-A) fascia to reach the target site within the adductor canal.

The injectate included:

- 7 mL of 0.5% bupivacaine
- 7 mL of 2% lignocaine
- 1 mL of dexamethasone

A total of 15 mL of this solution was carefully administered into the adductor canal. Ultrasound evaluation was repeated, scanning both proximal and distal to the injection site. New anechoic zones, not present during the initial scan, indicated successful spread of the local anesthetic (Figure 2).

Case 1

A 61-year-old male patient, body mass index (BMI) of 32.1 kg/m² and ASA Physical Status II was scheduled for right-sided ACL reconstruction due to degenerative ligament. On physical examination, no abnormalities were detected, and all laboratory investigations were within normal limits. Preoperatively, the patient had ipsilateral knee pain with Visual Analogue Score of 5 (VAS 0–10). Postoperatively, the patient's pain score over the first 24 hours post surgery remained VAS 3/10, indicating effective analgesia.

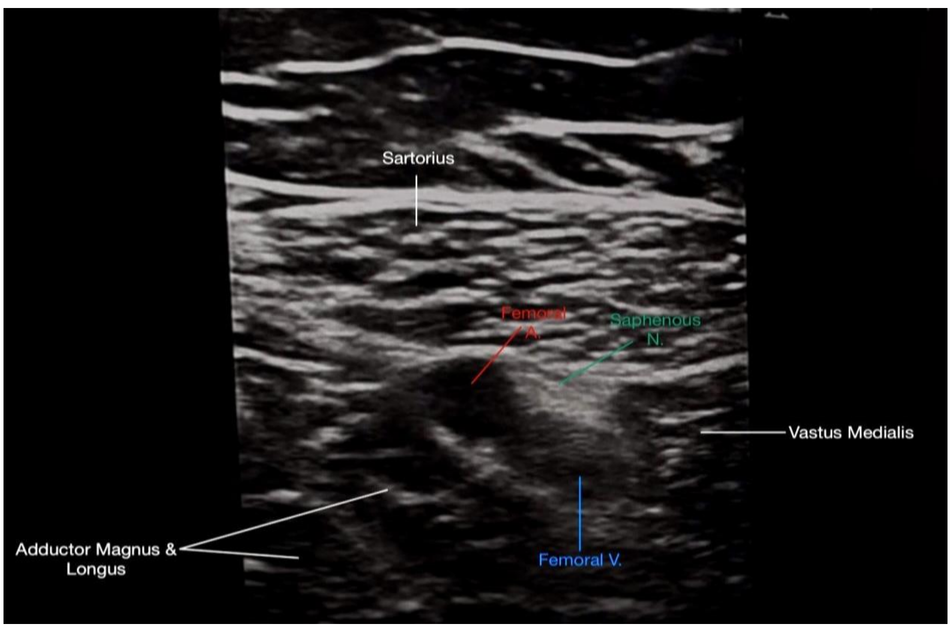

Figure 1- Adductor Canal Sonoanatomy

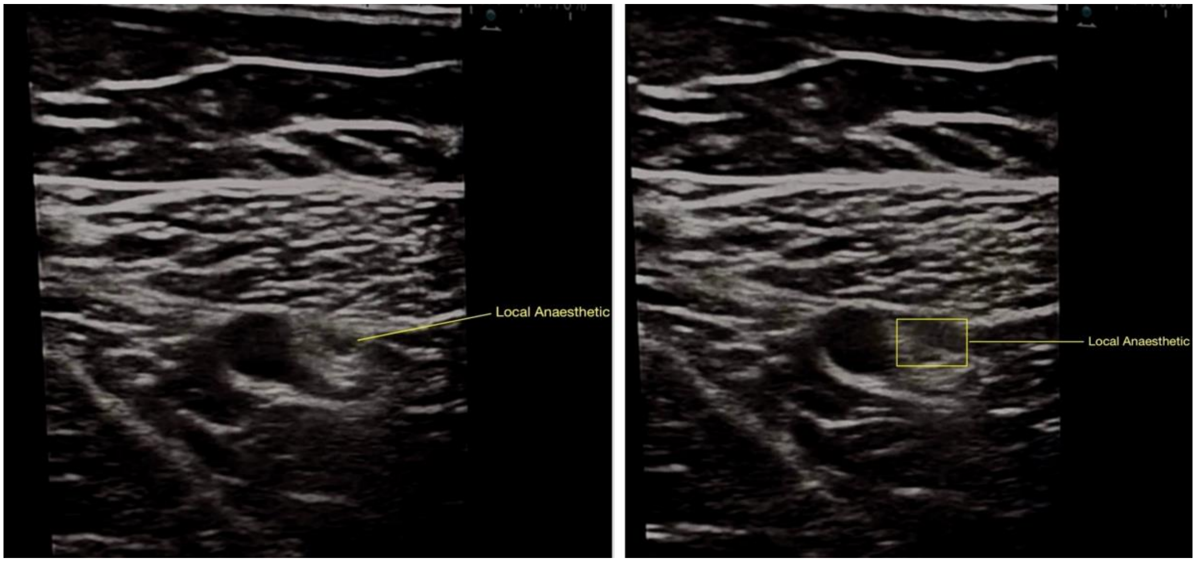

Figure 2- Local anaesthetic spread post administration

Table 1- Patient Demographics, Anesthetic Characteristics, and Clinical Outcomes

Patient	Case 1	Case 2	Case 3
Age (years)	61	28	56
Sex	Male	Male	Female
Height (cm)	170.2	170	167.6
Weight (kg)	93	75	85.7
BMI (kg/m²)	32.1	28.8	30.5
ASA Physical Status	II	I	II
Ultrasound Demonstration of Local Anesthetic Spread	Sub sartorial	Sub sartorial	Sub sartorial
Preoperative Pain Score (VAS)	5	4	4
Postoperative Mean Pain Score (VAS first 24 hours)	3	2	4
Sensory Block Distribution	Saphenous nerve	Saphenous nerve	Saphenous nerve
Motor Weakness (Knee/Ankle Flexion or Extension)	No	No	No

Case 2

A 28-year-old male, body mass index (BMI) of 28.8 kg/m² and ASA Physical Status I, for right-sided ACL reconstruction and medial meniscus tear repair. Preoperatively, the patient reported knee pain and a VAS score of 4 (VAS 0–10). His medication history included Tab Acetaminophen 500 mg administered as needed for pain control. Physical examination was unremarkable, and laboratory investigations were within normal limits. Postoperatively, the patient reported a pain score of 2/10 in the first 24 hours, demonstrating effective analgesia achieved by the ACB.

Case 3

A 56-year-old female, body mass index (BMI) of 30.5 kg/m², ASA Physical Status II, known case of controlled hypertension posted for left-sided ACL tear repair. Preoperatively, the patient reported a knee pain score of 4 (VAS 0–10). Her regular medications included Tab Amlodipine 5mg once daily. Physical examination and laboratory investigations were within normal limits. Postoperatively, the patient's pain score was 4/10 over the first 24 hours, indicating satisfactory pain control with the adductor canal block.

(Table 1) represents collective Patient Demographics, Anesthetic Characteristics, and Clinical Outcomes.

Discussion

The subsartorial space, positioned superficial to the vasto-adductor (V-A fascia) and beneath the sartorius muscle, is an important anatomical region that communicates proximally with the femoral triangle. Arterial branches from the femoral artery perforate the V-A fascia to supply the sartorius muscle, and occasionally, communicating nerve branches from the saphenous nerve connect with the medial femoral cutaneous branches just above the adductor canal [10].

The ACB is well established in reducing opioid requirements and improving postoperative analgesia after ACL reconstruction. The subsartorial space contains a plexus of nerves contributing to the complex innervation of the knee joint, including branches from the femoral, obturator, tibial, and common peroneal nerves, medial cutaneous nerve of the thigh, the saphenous nerve, and the obturator nerve branches. The subsartorial delivery of local anesthetic can block these additional sensory nerve fibers, contributing to enhanced analgesia.

Importantly, motor function in all cases was retained. The safety and efficacy of ACB in providing selective sensory block sparing the quadriceps strength, is critical for early mobilization.

Limitations

This case series has a small sample size, observational design, and the findings are retrospective. There is no control group thereby observations cannot be generally statistically validated. Ultrasound to evaluate the spread is operator-dependent and not always provide precise information. Furthermore, the clinical impact of subsartorial space spread on long-term pain control and functional recovery after ACL reconstruction requires further investigation through larger, controlled studies.

Conclusion

This case series demonstrates that ultrasound-guided adductor canal blocks (ACB) provide effective postoperative analgesia for patients undergoing anterior cruciate ligament (ACL) reconstruction. Ultrasound evaluation successfully confirmed the subsartorial spread of the local anesthetic in all three cases, consistently resulting in targeted sensory blockade of the saphenous nerve. Postoperatively, patients maintained satisfactory pain control, reporting mean Visual Analogue Scale (VAS) pain scores ranging from 2 to 4 during the first 24 hours. Importantly, none of the patients experienced motor weakness, highlighting the efficacy of ACB in providing selective sensory blockade without compromising quadriceps strength. These outcomes suggest that visualizing and achieving subsartorial spread via ultrasound-guided ACB is a safe and reliable regional anesthesia technique for optimizing pain relief and supporting early postoperative mobilization following ACL surgery.

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