Case Report

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Superior Trunk Block: A Novel Approach for Shoulder Reduction in Pregnancy

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Abstract

Anterior shoulder dislocations are common in emergency settings but are rarely reported in pregnant patients, necessitating careful pain management to ensure maternal and fetal safety. While procedural sedation and analgesia are conventional approaches, they carry risks such as altered maternal consciousness, raising concerns during pregnancy. Ultrasound-guided regional anaesthesia offers a safer and more effective alternative, particularly nerve blocks. We present the case of a 30-year-old woman at 28 weeks of gestation with a recurrent anterior shoulder dislocation. An ultrasound-guided superior trunk block was performed, targeting the superior trunk of the brachial plexus, which is formed by the C5-C6 nerve roots, offering a promising alternative to the interscalene brachial plexus block for shoulder procedures in pregnant patients.This technique provided effective analgesia, facilitating successful closed manipulative reduction without maternal or fetal complications, thereby supporting its broader adoption in similar clinical context scenarios.

Keywords: Regional anesthesia, shoulder dislocation, superior trunk block

Introduction

Anterior shoulder dislocation (ASD) is the most common type of shoulder dislocation and a frequent presentation in emergency departments (ED). While reduction is essential in the early management of shoulder dislocations, it is a painful procedure. Its occurrence in pregnant patients is rare and not well documented, necessitating careful pain management to ensure maternal comfort, fetal safety, and procedural success.

Various approaches to managing shoulder dislocations include procedural sedation and analgesia (PSA), intra-articular analgesia (IAA), and ultrasound-guided regional anaesthesia (UGRA). While PSA is commonly used, its potential for adverse effects, such as compromised maternal consciousness, raises concerns in the emergency setting. Ultrasound-guided regional anaesthesia, including nerve block techniques, is increasingly recognised as a safer alternative in these scenarios.

The superior trunk block has emerged as a promising option for shoulder procedures, targeting the C5-C6 nerve roots. Compared to the interscalene brachial plexus block, it provides effective analgesia with a reduced risk of complications, such as hemidiaphragmatic paralysis (HDP). This makes it particularly suitable for pregnant patients requiring shoulder reduction.

In this case report, we describe the successful use of a superior trunk block (STB) for reducing ASD in a pregnant patient. It underscores the potential of this technique to provide effective analgesia with minimal risk, presenting it as a safer alternative for managing shoulder dislocations during pregnancy. Additionally, we review the literature comparing UGRA techniques with PSA and IAA for shoulder procedures.

Case Report

A 30-year-old Malay woman, gravida 2 para 1 at 28 weeks of pregnancy, presented to the ED with recurrent right shoulder dislocation. Her antenatal history included idiopathic generalised seizures, chronic hypertension, and maternal obesity. She reported a sudden onset of right shoulder pain after reaching for a water bottle from the back seat of her car with her right arm in abduction, external rotation, and extension. The pain, worsened by movement and partially relieved by supporting the arm, was not associated with numbness, tingling, or weakness. There were no associated abdominal pain, per vaginal bleeding, or changes in fetal movements. The patient had a prior history of right shoulder dislocation 10 weeks earlier due to a fall, which

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was successfully reduced under procedural sedation and analgesia without complications.

On examination, the patient was alert and reported moderate pain with a pain score 5. Her vital signs were stable, with a blood pressure of 130/75 mmHg, heart rate of 83 bpm, oxygen saturation of 98% on room air, and a temperature of 36.7°C. The right shoulder inspection revealed a loss ofright shoulder contour with no obvious wound, swelling or bruises. The arm was held in abduction and a slight external rotation position with an arm sling. On palpation, there was tenderness over the right shoulder joint with step-off deformity, no crepitus and no warmth. Neurovascular status was intact, with normal sensation and distal pulses. The patient weighed 90 kg, with a BMI of 37.5 kg/m². Abdominal examination was consistent with the gestational age, showing a soft, non-tender abdomen and a gravid uterus palpated four fingerbreadths above the umbilicus. Other systemic examinations were unremarkable.

A right shoulder X-ray confirmed an anterior dislocation of the humeral head without associated fractures (Figure-1a). The diagnosis was right ASD requiring closed manipulative reduction (CMR). The patient was informed of the available analgesic options for the procedure. After a discussion of the risks and benefits, she agreed to a superior trunk block (STB) for shoulder reduction under ultrasound guidance. She was prepared in the resuscitation bay with standard monitoring applied and resuscitation drugs and equipment on standby.

STB was performed using a high-frequency linear probe (6–12 MHz) on a GE Logiq V ultrasound machine and a 22G × 80 mm Pajunk® SonoTAP® block needle under aseptic conditions. During the scanning phase, the C5 and C6 nerve roots were visualised at the cricoid cartilage level, positioned within the groove between the anterior and middle scalene muscles (Figure-2a). The STB targeted the superior trunk of the brachial plexus, after C5 and C6 nerve root convergence (Figure-2b) but before the branching of the suprascapular nerve (Figure-2c). 10 mL of 1% lignocaine was administered using an in-plane technique, with lateral to medial needle insertion relative to the transducer probe (Figure-3). Analgesia was effectively achieved within five minutes, with no subjective increase in breathing effort. Ipsilateral diaphragm sonography showed no paradoxical movement, confirming the absence of phrenic nerve paralysis.

The patient then underwent a successful CMR using the external rotation manoeuvre (ERM) without requiring rescue analgesia. She reported tolerable pain during the procedure, with a pain score of 2. A collar-and-cuff sling was applied, and a follow-up X-ray confirmed successful reduction (Figure-1b). The patient reported minimal pain (pain score 1) post-procedure and was discharged an hour later with an outpatient follow-up appointment. At a next-day telephone follow-up, the patient reported high satisfaction, minimal pain (pain score 1), and no block-related complications. Written informed consent was obtained from the patient.

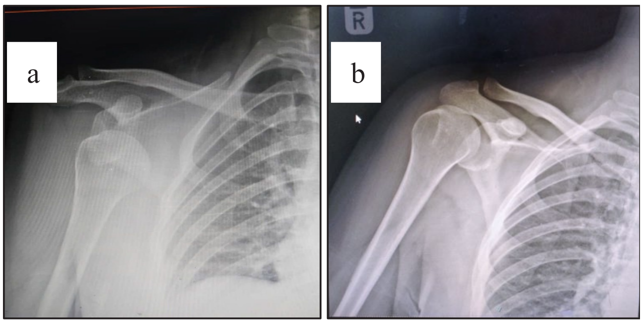

Figure 1. Right shoulder x-ray (anteroposterior view): (a) Pre-reduction right shoulder x-ray showed anterior right shoulder dislocation with the right humeral head dislocated anteriorly and inferiorly with the anteroinferior margin of the glenoid.(b) Post-reduction showed a normally aligned right humeral head with glenoid, and no fracture was seen.

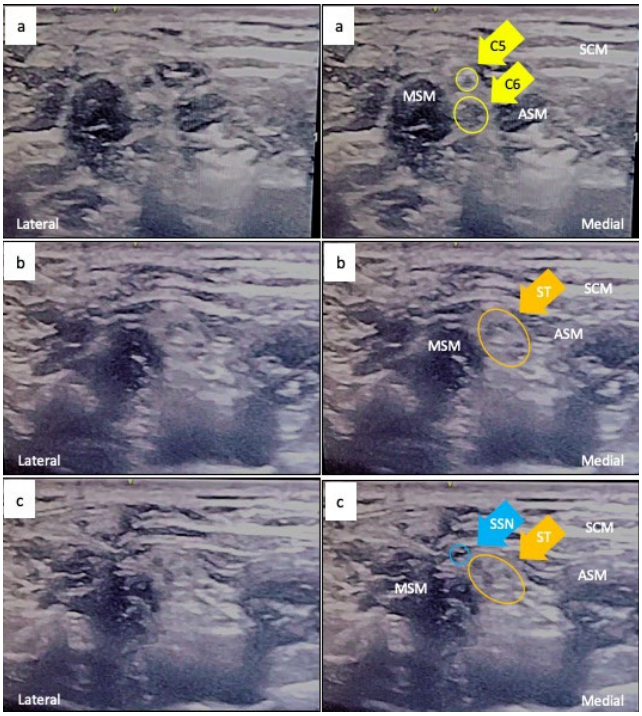

Figure 2. Sequential ultrasound images of the brachial plexus, captured from proximal-to-distal views. The image on the left is unlabelled, while the image on the right is annotated for clarity. Scanning phase of Right Superior Trunk Block (STB): (a) Brachial plexus at the interscalene block level with the classic "stoplight sign" form by C5 and C6 (Yellow) nerve root. (b) The superior trunk of brachial plexus (Orange) at the superior trunk block level. (c) Superior trunk view just distal to take-off of the suprascapular nerve, SSN (Blue).
C5: C5 nerve root; C6: C6 nerve root; MSM: Middle scalene muscle; ASM: Anterior scalene muscle; SCM: Sternocleidomastoid muscle; ST: Superior trunk of brachial plexus; SSN: Suprascapular nerve; Circles identify nerves and/or nerve group. Source: Original Image.

Discussion

Shoulder dislocation during pregnancy is uncommon but carries significant implications. It presents unique challenges due to physiological changes and the need to consider maternal and fetal well-being.The injury often results from a fall on an outstretched hand, with recurrent dislocations

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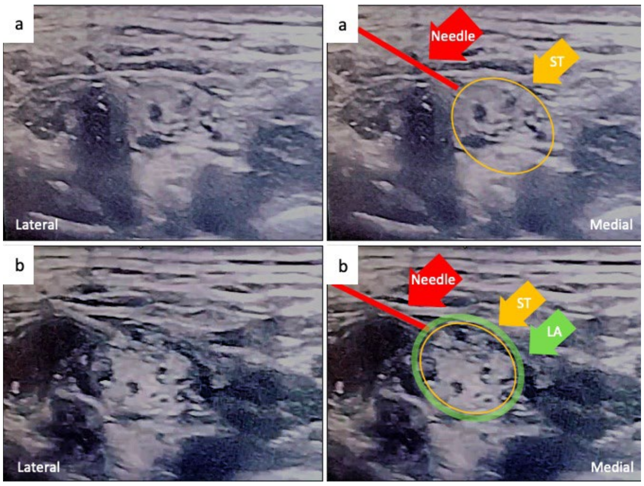

Figure 3. Side-by-side ultrasound images of the brachial plexus at the level of Superior Trunk Block (STB). The image on the left is unlabelled, while the image on the right is annotated for clarity. (a) The needling phase of Right Superior Trunk Block: Regional anaesthesia (RA) needle (Red) advancement towards the superior trunk (ST) of the brachial plexus. (b) Local anaesthesia (LA) depositing phase of Right Superior Trunk Block: Injecting LA in the subparaneural space of the ST, demonstrating the characteristic 'halo' sign of successful deposition (Green).

occurring in about 20% of patients after an initial episode (1). Hormonal and physiological changes in pregnancy, particularly increased ligament laxity induced by relaxin, may predispose patients to shoulder instability and recurrent dislocations (2). In this case, the patient presented with atraumatic recurrent ASD 10 weeks after the first episode.

Severe pain from shoulder dislocation often triggers muscle spasms around the joint, impeding successful reduction. Achieving adequate muscle relaxation is essential for timely and effective management. A network meta-analysis compared the efficacy and safety of three methods—procedural sedation and analgesia (PSA), intra-articular anaesthesia (IAA), and ultrasound-guided regional anaesthesia (UGRA)—for the reduction of anterior shoulder dislocations. The analysis found no differences in reduction success rates and patient satisfaction among the methods. Notably, IAA and UGRA were associated with the absence of adverse respiratory events (3).

Procedural sedation and analgesia (PSA) remain a common approach in many emergency departments, employing agents such as midazolam, remifentanil, propofol, ketamine, and nitrous oxide. Evidence supports the judicious use of PSA in pregnant patients experiencing severe pain, distress, or requiring surgical intervention (4). While brief, low-dose PSA is generally considered safe in pregnancy, it requires careful consideration, particularly in third-trimester patients with underlying morbid obesity. Potential risks include unintentional deep sedation, respiratory or cardiovascular depression, pulmonary aspiration, and possible effects on the fetus, underscoring the need for meticulous monitoring and skilled administration (4). Furthermore, PSA is time-consuming, necessitating prolonged monitoring during and after the procedure (5).

Given these concerns, alternative techniques such as IAA and UGRA are often considered for safer and more effective shoulder reduction. IAA has shown comparable effectiveness to PSA for ASD in the ED, with advantages such as fewer adverse events, shorter ED stays, and no significant differences in pain scores or ease of reduction (5, 6). However, IAA is typically administered using landmark guidance, which reported a misplacement rate of 41.1% in anterior dislocations. Although ultrasound guidance may improve accuracy, studies comparing landmark- and ultrasound-guided IAA are lacking (5). Despite its advantages, IAA has some trade-offs, including longer procedure times, slightly more challenging reductions, and lower patient satisfaction scores. The anxiety and fear associated with joint dislocations may also be difficult to address with IAA. Nevertheless, considering the risks associated with PSA, IAA emerges as a preferred option, particularly when minimising sedation-related side effects is a priority (6).

UGRA has an advantage over PSA as it provides effective pain relief without systemic effects associated with sedation. With advanced training and expertise in point-of-care ultrasound, emergency physicians employ ultrasound-guided regional anaesthesia (UGRA) for managing acute pain in the emergency department (ED) (7). It is regarded as a safe and effective option for providing analgesia during the closed reduction of shoulder dislocations in the ED (5, 8). UGRA shortens ED discharge times and reduces the risk of adverse events and complications, especially respiratory-related issues (5, 8). Several techniques of nerve blocks can be used for the reduction of ASD, including interscalene brachial plexus block (ISB), superior trunk block (STB), supraclavicular brachial plexus block (SCB) and suprascapular nerve block (SSNB) (9).

ISB is the most commonly used peripheral nerve block for shoulder surgeries and procedures, targeting the brachial plexus at C5 and C6 nerve roots. This block is performed in the interscalene groove, located at the level of the cricoid cartilage between the anterior and middle scalene muscles. While effective, ISB has inherent risks, as the phrenic nerve is located within 2 mm of the brachial plexus at this level before diverging caudally (10). Consequently, phrenic nerve palsy and hemidiaphragmatic paralysis (HDP) are unavoidable side effects (9). These effects are particularly concerning during the third trimester of pregnancy, especially in patients with maternal obesity. The combination of reduced diaphragmatic function from HDP and the physiological respiratory changes of pregnancy can significantly compromise ventilation and oxygenation, posing a serious risk to maternal respiratory function.

Compared to the ISB, the SBT provides non-inferior surgical anaesthesia while preserving diaphragmatic function. Administering local anaesthetic at a more distal site reduces the risk of phrenic nerve paralysis (10). Targeting the superior trunk of the brachial plexus at a more inferolateral location, the STB provides effective pain relief while significantly reducing the incidence of HDP compared to the ISB (4.8% vs. 71.4%) (10-12). Additionally, the reduced proximal spread of local anaesthetic to the cervical sympathetic chain and recurrent laryngeal nerve results in a lower risk of Horner's syndrome and hoarseness of voice (10, 12).

The STB and ISB exhibited low complication rates overall, with no reports of major neurological complications, local anaesthetic systemic toxicity, or other adverse events (10). However, STB offers distinct advantages, including reduced needle-nerve contact due to its well-defined connective tissue sheath, a minimised risk of injury to the dorsal scapular and long thoracic nerves, increasing the likelihood of block success by identifying C5 nerve root anomalies, which present in 30-35% of cases (11). Additionally, STB was superior to ISB in providing better pain relief at rest 24 hours post-procedure (10,12).

A more distal block that can avoid HDP is the SCB, which targets the brachial plexus at the level of the tightly packed upper, middle, and lower trunks in the supraclavicular fossa. However, SCB provides anaesthesia to almost the entire upper extremity, which may be excessive for a shoulder reduction procedure. Adequate volume (approximately 20 mL) is required to ensure sufficient spread to the suprascapular nerve (SSN) proximally (12). The SSN arises from the superior trunk of the brachial plexus, located proximal to the division of the plexus into its cords (medial, lateral, and posterior) in the supraclavicular region. As a terminal branch, the SSN supplies up to 75% of the sensory input to the shoulder joint. The SSNB offers effective analgesia comparable to an ISB while avoiding the risk of phrenic nerve palsy (13).

The STB was an ideal choice for analgesia in this case, as it avoided sedation-related risks, preserved respiratory function, and accounted for fetal safety-critical considerations for pregnant patients. The procedure was highly successful, achieving smooth shoulder reduction in a single attempt. The patient was discharged in good condition and reported high satisfaction during follow-up, highlighting the efficacy and safety of the STB in managing shoulder dislocations during pregnancy.

Conclusion

The successful use of an STB for reducing ASD in a pregnant patient highlights the efficacy and safety of this technique. The STB provided effective analgesia, facilitating a smooth and successful closed manipulative reduction without any maternal or fetal complications. This case supports the broader adoption of the STB in similar clinical scenarios.

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Conflict of Interest Statement
None declared.

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