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Supraclavicular Continuous Perineural Catheter Technique as an Alternative to General Anaesthesia for Prolonged Humerus Surgery in High-Risk Patient During Covid Pandemic: A Case Report

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ABSTRACT

Brachial plexus block has gained wide acceptance for surgical anesthesia for upper limb surgeries in recent times. The advocacy of regional anesthesia during the ongoing COVID-19 pandemic has increased the frequency of the procedure being performed. Avoidance of airway instrumentation and thus reduction in an aerosol generation has further highlighted the importance of brachial plexus block for upper limb surgeries. We report a case where a prolonged surgery involving humerus was conducted under single-shot interscalene block with supraclavicular brachial plexus perineural catheter for extension of block duration providing adequate surgical anesthesia. This case highlights the potential benefit of regional anesthesia in high-risk patients during the pandemic.

INTRODUCTION

In the wake of COVID-19 pandemic, the American Society of Regional Anesthesia and Pain Medicine (ASRA) and European Society of Regional Anesthesia and Pain Therapy (ESRA) jointly recommended the practice of regional over general anesthesia (GA) whenever feasible, in order to avoid airway manipulation and tracheal intubation.¹ Such airway instrumentation generates aerosol and aids transmission of COVID-19. Regional anesthesia (RA) avoids airway instrumentation and thus reduces aerosol generation. It may also provide better perioperative pain control with less opioid consumption. Additionally, reduction in postoperative pulmonary complications, nausea, vomiting and cognitive dysfunction emphasizes the constant importance of RA.² Over the years, single shot drug injection around brachial plexus has been the norm. The placement of a brachial plexus perineural catheter to extend the duration of block by intermittent boluses is not common. This technique is of utmost value in patients undergoing prolong upper limb surgeries especially in crisis situation like COVID 19 where we want minimal airway handling. We here report a case, where continuous brachial plexus perineural infusion was employed in a patient undergoing extensive humerus surgery.

CASE REPORT

A 41-year-old gentleman, weighing 52 kilograms with non-union of fracture of right humerus was planned for humerus surgery by masquetelet induced membrane technique and flap closure. He had previously undergone external fixation of humerus under brachial plexus block about eight weeks back. The external fixator was removed

after 4 weeks due to local infection and in the same setting, debridement of surrounding tissues was done. During pre-anesthetic checkup, the laboratory report revealed blood glucose level of 426 milligrams per deciliter (mg/dl) and HbA_{1c} 9.8% although he wasn't a known diabetic. He was started on Human insulin following endocrine consultation. A negative RT-PCR for COVID-19 cleared the patient for surgery. A final impression of non-union of right mid-shaft humerus fracture with skin loss over right upper arm with uncontrolled diabetes mellitus with American Society of Anesthesiologists (ASA) Physical grading of III was made.

On the day of surgery, a written informed consent was obtained from the patient regarding the anesthetic technique. Procedural sedation was achieved with midazolam 1 mg and fentanyl 50 micrograms (mcg). A linear probe (5-12 Hertz, Sonosite. MICRO MAXX®) was placed over right supraclavicular fossa to visualize the brachial plexus (Figure:1).



Fig 1: USG Image showing Brachial Plexus (SA- Subclavian Artery).

With all aseptic precautions, 12 milliliters (ml) of 0.33 % of Ropivacaine was deposited using a 22-gauge Ecoplex® needle, in-plane to the ultrasound probe (Figure:2).

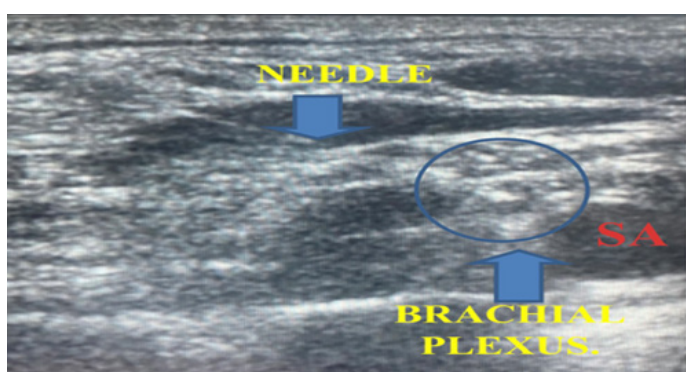


Fig 2: USG Image showing needle insertion and drug deposition around Brachial plexus (SA- Subclavian Artery).

A Perineural catheter (B-Braun®) was inserted through the needle and was placed at the brachial plexus under ultrasound guidance as shown in (Figure: 3).



Fig 3: Figure showing Perineural catheter in situ.

The placement was confirmed with injection of 5 ml normal saline through the catheter and the spread was observed under ultrasound. Then interscalene block was performed with 10 ml of 0.33% Ropivacaine. After confirming the adequacy of motor and sensory blockade, intraoperative sedation was started with dexmedetomidine at 0.25mcg/kg/hour to achieve moderate sedation. Insulin infusion was started for intraoperative glycemic control. The capillary blood glucose measurement was taken every hour and the rate of insulin infusion was adjusted accordingly.

External fixator with masquelet technique with muscle flap was carried out by the combined efforts of orthopedic and plastic surgeons. The total duration of surgery was about six hours. After about 3 hours and 20 minutes from the start of surgery, the patient complained of discomfort at the operating site, so 8ml 0.33% Ropivacaine bolus was given via the perineural catheter. The patient remained comfortable throughout the surgery with stable hemodynamics. He was allowed to take oral feeds about an hour after the completion of surgery. For post-operative analgesia, an infusion of 0.125% Ropivacaine 1.5 ml/hour was started via the perineural catheter, which was continued for 48 hours. His numeric rating score (NRS) remained less than 2 through-out the postoperative period. The perineural catheter was removed after 48 hours and switched to oral analgesics for further pain management.

DISCUSSION

Anesthesiologists have played a crucial role during the COVID-19 pandemic, frequently managing airways in various settings including the operating room, emergency room, and intensive care units.

However, airway management being an aerosol generating procedure risks spread of infection to healthcare professionals especially in low resource setting where strict infection prevention practice may not be in place. The odds of transmission of acute respiratory infection to a healthcare professional is

known to be 6.6 times when exposed to tracheal intubation.³This has prompted concerned anesthesia authorities to advocate minimizing aerosol generating procedures, particularly general anesthesia and to opt for regional anesthesia techniques whenever feasible.⁴

When it comes to surgery involving arm and hand, various randomized controlled trials have shown superiority of regional anesthesia to general in terms of analgesia and reduced opioid-related side effects during the first 24 hours after surgery.⁵The supraclavicular approach for brachial plexus block has been the mainstay of upper extremity regional anesthesia, owing to its simplicity, effectiveness and relatively safe profile. It provides excellent surgical anesthesia for surgeries involving the arm, forearm and hand. However, for prolonged surgeries exceeding 3-4 hours, general anesthesia is used in conjunction with brachial plexus block as single injection brachial plexus block can provide limited effective surgical anesthesia.

We opted for a continuous perineural catheter placement in this patient with the goals of avoiding general anesthesia and providing postoperative analgesia via the indwelling catheter. Finneran JJ et al recommended continuous nerve blocks especially in suspected and confirmed COVID-19 patients expecting complex surgeries with significant postoperative pain.⁶We used continuous supraclavicular block in combination with interscalene to achieve near complete anesthesia of arm expecting an extensive surgery. Tognu A et al combined ultrasound guided interscalene and supraclavicular brachial plexus block as sole anesthesia for proximal humerus fracture during the COVID 19 pandemic.⁷ In their experience with 12 patients undergoing shoulder procedures, surgical anesthesia was effectively achieved along with light sedation with midazolam and/or fentanyl. This technique has definitely provided an escape route to avoid general anesthesia in high-risk patients undergoing prolonged upper limb surgeries. We believe this case report will open possibility for further studies into this technique that we found to be carrying much less risk from aerosol exposure to those involved and providing excellent anesthesia and analgesia for the patient.

CONCLUSION

The use of supraclavicular continuous perineural catheterization provided an effective and safe alternative to general anesthesia for prolonged humerus surgery in a patient during the COVID-19 pandemic. This approach can be considered in similar scenarios to reduce the risk of infection and enhance patient safety.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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