

Reliable Regional: Maintaining Regional Anesthetic technique during intraoperative complications

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INTRODUCTION

Regional anesthesia for upper extremity surgery, when compared to general anesthesia, provides superior post-operative analgesia, shorter PACU stays, and reduced perioperative risk especially in patients with physiologic deficiencies. Conversion of regional to general anesthetic technique is typically done with a failed regional block or when hemodynamic instability or respiratory compromise is encountered or anticipated. However, with proficient technique, regional anesthesia may be maintained and can even mitigate the severity of certain intraoperative complications.

CASE REPORT

66-year-old female, with a history of multiple myeloma presented for scheduled repair of a right proximal humerus fracture. A regional technique was chosen as the primary anesthetic. Pre-operatively, a single shot ultrasound-guided interscalene block was performed with a 22G Sonoplex 5 cm needle and 20cc of 0.5% ropivacaine administered without complications. A propofol infusion was started for sedation, after the patient was placed in the beach-chair position. Clinically significant blood loss began shortly after incision, due to significant vascularity of the intermedullary tumor. After a total of 800ml blood loss, the patient became acutely hypotensive, was managed with pressors and colloids, and eventually blood product was administered for appropriate resuscitation. An arterial line on the non-operative side was placed. A low dose propofol infusion could be maintained with the patient breathing spontaneously throughout the case, without signs of awareness or distress. The case continued to completion with bleeding controlled. The phenylephrine infusion could be discontinued by the end of the case. During admission, the patient received 1 more unit of blood. Pain remained well controlled with non-opioid analgesia. With stabilization of hemoglobin, she was discharged in stable condition on post-operative day 3.

DISCUSSION

With advances in ultrasound technology, regional blocks are increasingly safe and targeted. Regional anesthesia (RA) becomes especially useful in patients with underlying pathology that makes them more susceptible to complications from general anesthesia (GA). Specific to our case, converting to GA in the beach-chair position, on an already hypotensive patient, can have drastic consequences. While clinical judgement must always be employed to weigh the risks and benefits of sole RA, as technique and efficacy of blocks improve, it is reasonable to recognize the advantages



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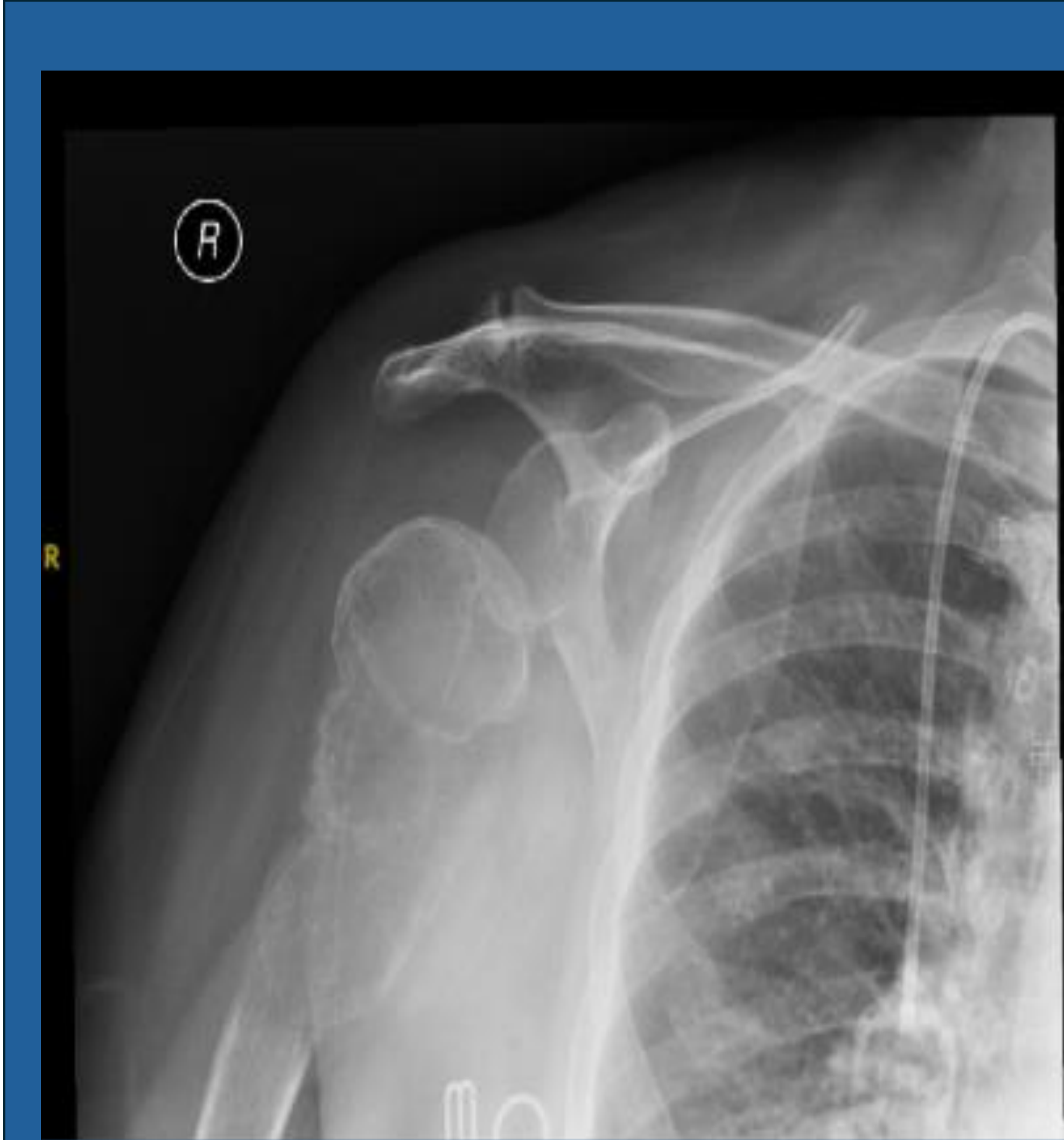


Figure 1 X-Ray image of right proximal intramedullary tumor and humeral fracture



Figure 2: Postoperative X-ray with internal fixation of right proximal humeral fracture

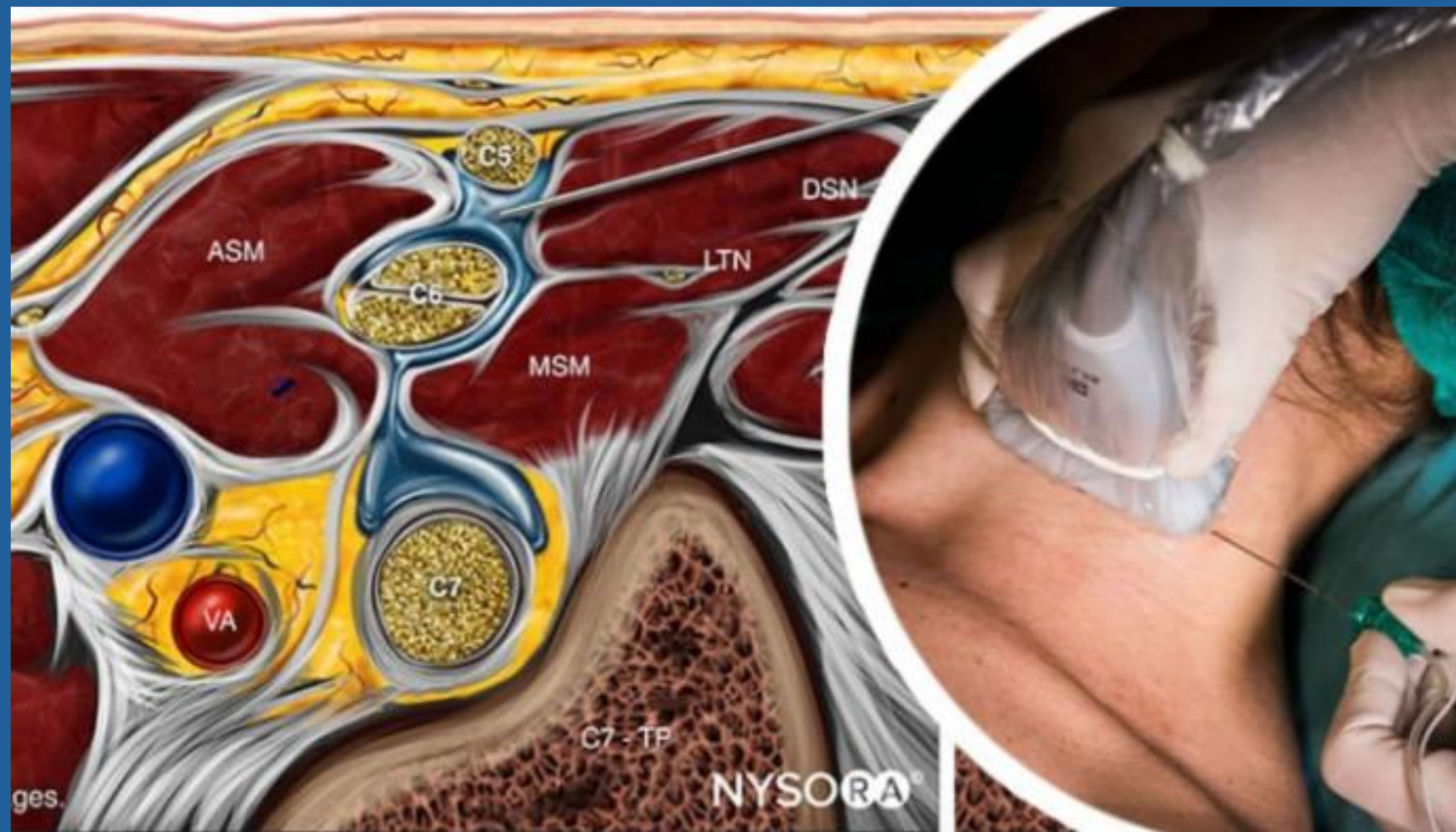


Figure 3: Ultrasound-guided Interscalene block

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of maintaining this anesthetic even in the event of unexpected complications. With regards to our patient, multiple myeloma is a proliferation of monoclonal plasma cells in the bone marrow leading to increased production of abnormal antibodies, and secretion of monoclonal immunoglobulins detectable in the blood or urine and associated with organ dysfunction. Patients are prone to lytic bone lesions, renal failure, anemia, and infections. Renal failure in these patients carries a particularly high risk of mortality. The ability to avoid swings in hemodynamics and NSAIDs with regional technique proves a great advantage. These patients are at baseline also at high risk of bleeding intraoperatively, requiring transfusion of blood and platelets. Regional anesthesia, especially neuraxial, has been shown to have advantages over GA in terms of transfusion requirements and minimizing blood loss. This is due to lower arterial pressure, central venous pressure, and lower blood flow at the surgical site. Despite local anesthetics having the physiological effects of promoting bleeding based on their interaction with FVIII and fibrinolytic activity, this effect seems outweighed in prospective study data by the hemodynamic effect of local anesthetics. While regional anesthesia is safe it always carries an inherent but infrequent risk of failure with need to convert to GA. The most common reasons for conversion include a patient's inability to tolerate sedation, hypoxia/airway obstruction, or the patient moving, being disinhibited, and/or complaining of significant pain/discomfort requiring increased levels of analgesia and sedation. Other reasons noted are hemodynamic instability, aspiration, coughing, seizures, altered mental status, hypercarbia, poor positioning, and inadequate/loss of intravenous access that prompt practitioners to induce GA. Other factors such as change of procedure type, surgeon request, prolonged surgical time and unpredicted blood loss account for some remaining causes of conversion.

CONCLUSION

This case demonstrates that while common practice in anesthesia has historically been to convert to general anesthesia with any hemodynamic instability from a primary regional anesthetic, if the regional block placed is effective it can be maintained while resuscitative efforts continue. Regional anesthesia becomes especially useful in patients with underlying pathology that makes them more susceptible to complications from general anesthesia, especially with significant cardiovascular disease, renal failure, and hypercoagulable states. With advances in ultrasound technology, regional blocks have become increasingly safe and targeted, reducing the risk of damage to adjacent structures or intravascular involvement. Key regional blocks enhance postoperative recovery by providing superior analgesia, enabling early mobilization, and reducing the likelihood of complications associated with general anesthesia, such as nausea, respiratory issues, and prolonged sedation. Advances in ultrasound guidance have also significantly improved the safety and efficacy of regional techniques. Our case builds on the literature of successful maintenance of RA in the face of hemodynamic instability. While clinical judgement must always be employed to weigh the risks and benefits of sole RA, as technique and efficacy of blocks improve, it is reasonable to recognize the advantages of maintaining this anesthetic even in the event of unexpected complications.