

Chloroprocaine use in Interscalene Block Catheters

Amelia Updegraff MD, Jacob Whittle MD, Alastair E. Moody MD, Jacob Pollard MD
Department of Anesthesiology, University of Utah

Introduction

Chloroprocaine is an ester class of local anesthetic with properties that allow it to be used in a wide range of clinical scenarios. Its unique ability to be degraded by pseudocholinesterases provides low risk for systemic toxicity and allows providers to give higher doses, creating a larger gradient and thus quicker onset (1). Chloroprocaine has a short duration of action which is due to its low protein binding affinity to α -1-acid glycoprotein (1). Given these properties, providers can utilize chloroprocaine in the perioperative period during nerve catheter placement to minimize patient discomfort while still allowing for post-operative neurovascular examination in patients at elevated risk for neurovascular injury. We describe a case where chloroprocaine was used for a nerve block catheter pre-operatively, simultaneously confirming the block, easing patient discomfort, and allowing for postoperative neurovascular examination.

Case Description

A 56-year-old woman presented for a left shoulder revision reverse TSA and glenohumeral cerclage after being diagnosed with instability of her original shoulder implant as well as multiple falls. Her past medical history was pertinent for fibromyalgia on chronic opioids, asthma, chronic bronchitis, post-traumatic stress disorder, obesity (BMI 32), and multiple deep vein thromboses and pulmonary emboli. Pre-operatively we performed an interscalene approach to the brachial plexus, leaving a perineural catheter for post-operative pain control. Under ultra-sound guidance, we tunneled through the trapezius, using 5 ml of 3% chloroprocaine to hydrodissect the subcutaneous tissue, and 10 ml of 3% chloroprocaine surrounding the nerve roots of C5, 6, and 7 followed by a nerve block catheter. We then secured the catheter to the opposite shoulder. Of note the patient reported to our team that she had less discomfort with the placement of this perineural catheter compared to previous similar procedures. The block was confirmed to be working prior to surgery with a neurologic exam showing expected deficits in the median and radial distributions. Sensation returned prior to proceeding to the operating room. She underwent general anesthesia for the surgery without any major complications. Post-operatively, the nerve catheter remained intact. Orthopedic surgery was able to perform a neurological exam in PACU with no residual effects of the pre-operative chloroprocaine bolus present. We then gave a bolus of bupivacaine through the catheter and connected a continuous infusion of 1/8% bupivacaine via elastomeric pump. Following this bolus of medication, the patient had significant pain relief to a tolerable level.

Conclusion

Multimodal analgesia improves post-operative pain control and opioid consumption. Continuous interscalene nerve blocks have demonstrated to decrease time to discharge by providing significant postoperative analgesia, additionally allowing for increased passive shoulder range of motion and decreased opioid usage.(4) A previously published case report utilized chloroprocaine as a novel way to test a brachial plexus catheter for phrenic nerve paralysis in a patient at high risk for hypoxia (5). We demonstrate the ability to utilize chloroprocaine in multiple ways: tunneling the catheter to decrease pain, confirming catheter placement pre-operatively, still allowing for neurovascular exams postoperatively, and allowing for anesthesia providers that do not know how to perform the block to be able to bolus the catheter post-operatively. Both scenarios use chloroprocaine's unique properties and creatively apply it to scenarios that may have precluded the patient to receiving a block otherwise.

Methods

As all patient identifying information has been removed from the case report, it is exempt from IRB approval per University of Utah's policy. Patient was contacted via phone after being discharged from the hospital and verbal consent was obtained to use this case for research and presentation purposes. She was informed that all identifying information would be omitted to protect privacy. We used a L4-12T transducer probe on a GE Venue Go ultrasound machine

Discussion

Commonly, timing is an issue with nerve block and catheter placement. At many institutions it is more efficient to perform nerve blocks and place perineural catheters prior to the operation. This creates a problem with our surgical colleagues that we must balance. In cases when the surgery is technically challenging, high risk for operative nerve damage, or the patient has previously documented neurologic deficits, it is of utmost priority that our surgical colleagues are able to perform a neurological exam post-operatively that is not obfuscated by the block. Although rare, nerve injuries resulting from shoulder surgery carry high morbidity and may require surgical intervention.(2) Early evaluation and recognition of possible nerve injuries is paramount because permanent changes occur at the motor-end plate in a time-dependent fashion.(2) In this case by using chloroprocaine to place the perineural catheter prior to surgery, we were able to confirm the catheter was in the correct position by patient feedback quickly while at the same time being reassured that chloroprocaine's effect would dissipate prior to the post-operative neurological exam. The surgical team's ability to obtain a clear neurological exam post-operatively is of high importance in a technically challenging revision of a reverse TSA, where the axillary nerve is at highest risk, followed by median and ulnar nerves. (3)

References

1. Covino BG. Pharmacology of local anaesthetic agents. *Br J Anaesth*. 1986;58(7):701-716. doi:10.1093/bja/58.7.701
2. Carofino, Bradley C. MD1; Brogan, David M. MD1; Kircher, Michelle F. RN1; Elhassan, Bassem T. MD1; Spinner, Robert J. MD1; Bishop, Allen T. MD1; Shin, Alexander Y. MD1. Iatrogenic Nerve Injuries During Shoulder Surgery. *The Journal of Bone & Joint Surgery* 95(18):p 1667-1674, September 18, 2013. | DOI: 10.2106/JBJS.L.00238
3. North, D., Hones, K. M., Jenkins, P., Sipavicius, E., Salinas, J. L. Z., Hao, K. A., ... & King, J. J. (2023). How common is nerve injury after reverse shoulder arthroplasty? A systematic review. *Journal of Shoulder and Elbow Surgery*, 32(4), 872-884.
4. Ilfeld BM, Vandenborne K, Duncan PW, Sessler DI, Enneking FK, Shuster JJ, Theriaque DW, Chmielewski TL, Spadoni EH, Wright TW. Ambulatory continuous interscalene nerve blocks decrease the time to discharge readiness after total shoulder arthroplasty: a randomized, triple-masked, placebo-controlled study. *Anesthesiology*. 2006 Nov;105(5):999-1007. doi: 10.1097/00000542-200611000-00022. PMID: 17065895.
5. Meier, Adam W. DO; Lin, Shin-e MD; Hanson, Neil A. MD; Auyong, David B. MD. A Novel Approach to Brachial Plexus Catheter Management: A Brachial Plexus Test Dose for Phrenic Nerve Paralysis and Patient-Controlled, Demand-Only Dosing for a Patient With Extreme Obesity. *A & A Case Reports* 7(6):p 139-142, September 15, 2016. | DOI: 10.1213/XAA.0000000000000369