

[Primary Care]

Intra-articular Lidocaine Injection for Shoulder Reductions: A Clinical Review

Anna L. Waterbrook, MD,*[†] and Stephen Paul, MD,[‡]

Context: The shoulder is the most commonly dislocated joint, and shoulder dislocations are very common in sports. Many of these dislocations present to the office or training room for evaluation. Usual practice is an attempt at manual reduction without analgesia and then transfer to the emergency department if unsuccessful. The clinical efficacy of intra-articular lidocaine for reduction of anterior shoulder dislocations in the outpatient setting was examined.

Evidence Acquisition: An OVID MEDLINE search (1966-present) was performed using the keywords *shoulder*, *reduction*, and *analgesia* as well as *shoulder*, *intra-articular*, and *lidocaine*. Search limits included articles in the English language. Bibliographic references from these articles were also examined to identify pertinent literature.

Results: Six randomized controlled clinical trials were identified that directly addressed this clinical technique. Although the reduction techniques used in these studies were not controlled, there was no statistically significant difference in success rates between groups. The complication rate, length of stay, and costs were significantly less in the intra-articular lidocaine group when compared with the intravenous sedation group.

Conclusions: According to current evidence, the use of intra-articular lidocaine injection for reduction of anterior shoulder dislocations is not harmful and is likely advantageous in the outpatient clinical setting.

Keywords: shoulder; analgesia; lidocaine; intra-articular; reduction

The shoulder is the most commonly dislocated joint, and shoulder dislocations are very common in sports. A recent study evaluated 8940 shoulder dislocations and found that 48.3% occurred during sports and recreation.¹⁴ Many of these dislocations present to the office or training room for evaluation and treatment. Usual practice is an attempt at manual reduction without analgesia and then transfer to the emergency department if unsuccessful. There have been several prospective studies as well as systematic reviews published in the orthopaedic and emergency medicine literature showing the benefits of intra-articular analgesia for successful shoulder reductions. This method is not commonly discussed in the sports medicine literature despite the fact that this could be an alternative management strategy for athletes that present to the clinic or training room with shoulder dislocations.

METHODS

An OVID MEDLINE search (1966-present) was performed using the key words *shoulder*, *reduction*, and *analgesia*. This search yielded 75 articles. An alternative search was used using *shoulder*, *intra-articular*, and *lidocaine*, which yielded 68 articles. Search limits included articles in the English language.

Bibliographic references from these articles were also examined to identify pertinent literature. We identified 9 articles that directly addressed this technique, including 6 peer-reviewed research articles^{4,6-8,10,12} and 3 systematic reviews,^{3,5,9} which included the 6 research articles.

RESULTS

All 6 reviewed studies (Table 1) were randomized controlled clinical trials. Each study compared intra-articular lidocaine (IAL) versus intravenous sedation (IVS) for the reduction of anterior shoulder dislocations. The study populations were small, ranging from 30 to 54 participants each.

IAL was used in all 6 studies. Out of the 6 studies, 5 used 20 mL of 1% lidocaine, while 1 study used 4 mg/kg of 1% lidocaine.⁴ Four studies described the technique for IAL: 2 studies used the posterior approach,^{4,12} 1 the anterior approach,⁸ and another injected lateral to the acromion through the lateral sulcus.⁶ In the IVS groups, several agents were used in varying dosages, including morphine, diazepam, meperidine, pethidine, midazolam, and fentanyl.^{6-8,10,12} There was no significant difference with the agents used for IVS in terms of pain control or complication rate, although complication rate was difficult to

From the [†]Department of Emergency Medicine, University of Arizona, Tucson, Arizona, and the [‡]Department of Family and Community Medicine and Orthopedics, University of Arizona, Tucson, Arizona

*Address correspondence to Anna L. Waterbrook, MD, Assistant Professor, University of Arizona, Department of Emergency Medicine, 2800 East Ajo Way, Tucson, AZ 85713 (e-mail: waterbro1@gmail.com).

DOI: 10.1177/1941738111416777

© 2011 The Author(s)

Table 1.

| Study | Level of Evidence | Number Enrolled | Success Rate | Complications | Length of Stay | Ease of Reduction | Cost | Pain Control | Treatment |
|---------------|-------------------|-----------------|--|-----------------|---|---|---------------------------------|--|--|
| Matthews 1995 | A, RCT | 30 | No statistical significance between groups | IAL-0 IVS-3 | IAL-78 minutes IVS-186 minutes | No statistical significance between groups | IAL-\$ 117-133 IVS-\$159-240 | No statistical significance between groups | 20mL 1% lidocaine; Morphine 10mg and midazolam 2mg |
| Suder 1995 | A, RCT | 52 | IAL-18/26 IVS-22/26 | IAL-0 IVS-3 | Not reported | Not reported | Not reported | No statistical significance between groups | 20 mL 1% lidocaine; IV pethadine/ diazepam |
| Kosnik 1999 | A, RCT | 49 | No statistical significance between groups | IAL-0 IVS-1 | Not reported | No statistical significance between groups | Not reported | No statistical significance between groups | 4 mg/kg 1% lidocaine; 10-30 mg diazepam and 5 to 20 mg morphine |
| Miller 2002 | A, RCT | 30 | 100% | IAL-0 IVS-0 | IAL-75 min +/- 48 min IVS-185 min +/- 26 min | No statistical significance between groups | IAL-\$0.52 IVS-\$97.64 | No statistical significance between groups | 20mL lidocaine; 2mg midazolam 100ug fentanyl |
| Orlinsky 2002 | A, RCT | 54 | 100% | IAL-1 IVS-1 | IAL-103 min +/-63 min IVS-154 +/- 76 min | IAL-7% pain interfered IVS- 5% pain interfered | Not reported | No statistical significance between groups | 20mL 1% lidocaine; 1-2mg/kg meperidine and 5 to 10 mg diazepam |
| Moharari 2008 | A, RCT | 48 | 100% | IAL-3 IVS-14 | IAL-140.6min IVS-216 min | No statistical significance between groups | Not reported | No statistical significance between groups | 20 mL 1% lidocaine; 25 mg meperidine and 5mg diazepam |

Key: IAL - Intra-articular lidocaine; IVS-Intravenous sedation

assess because each study defined complications differently. None of these studies in the IVS groups used anesthetics now commonly used for procedural sedation.^{4,8,10,12} The most common agents used today include propofol, ketamine, etomidate, and versed, as well as narcotic analgesics such as morphine and fentanyl.^{1,2}

Complications were reported in 5 of the 6 studies.^{4,6,8,10,12} Moharari et al⁸ reported the highest rate of complications in the IVS group; drowsiness was reported as a complication (5 of 14). Respiratory depression as well as hypotension⁸ was seen in 4 studies^{6,8,10,12}; some patients required reversal agents. In 4 of the 6 IAL studies, there were no complications.^{4,6,7,12} Drowsiness and agitation were seen in the IAL group.^{8,10} There were no infections, neurovascular damage, or systemic side effects from lidocaine. Overall, the complication rate in the IAL group was 0.9%, compared with 16.4% in the IVS group.⁵

There was reduced length of stay in the IAL group (75-166 minutes vs 154-230 minutes for the IVS groups). Two studies showed reduced cost for IAL^{6,7} (\$117-\$133 vs \$159-\$240 for the IVS). Miller et al⁶ noted that the cost was significantly less for IAL (\$0.52) versus IVS (\$97.64).

No statistically significant differences were noted in pain control, success rates, or ease of reduction between the IAL and IVS groups despite several methods (Kocher,¹² Hippocratic,¹² traction-countertraction,^{4,6,8,10} external rotation,¹²

scapular rotation,⁶ modified Stimson technique⁷). The Hippocratic and Kocher methods are now rarely used because of their complication rate, including fracture, soft tissue damage, and neurovascular compromise.¹³

CONCLUSIONS

There are no statistically significant differences in outcomes (success rate, ease of reduction, and pain control) between the IAL and IVS groups. There were significant differences in length of stay and cost between the 2 groups. IAL is cheaper and requires less time overall. There were also fewer reported complications in the IAL groups. There is a theoretical risk of septic arthritis or systemic lidocaine toxicity; however, there have been no documented cases.

The 6 randomized controlled trials reviewed in this article did not address the effects of chondrolysis and intra-articular local anesthetic. Piper et al¹¹ recently reviewed the effects of local anesthetic on cartilage and noted that most of the current research suggests that the risk of chondrolysis increases with longer exposure and higher concentrations of local anesthetics and that there are very few data on the long-term effects of a single intra-articular anesthetic injection, as was done in the review of our studies. This is an area of needed further research and must be considered with use of intra-articular local anesthetic for shoulder reduction.



Clinical Recommendations

SORT: Strength of Recommendation Taxonomy

A: consistent, good-quality patient-oriented evidence

B: inconsistent or limited-quality patient-oriented evidence

C: consensus, disease-oriented evidence, usual practice, expert opinion, or case series

| Key Clinical Recommendation | Strength of Recommendation |
|---|----------------------------|
| Use of intra-articular lidocaine for reduction of anterior shoulder dislocations should be considered in the outpatient clinical setting. ^{4,6-8,10,12} | A |
| Intra-articular lidocaine injection for anterior shoulder dislocations results in decreased cost, length of stay, and complication rate. ^{4,6-8,10,12} | A |
| Success rate, ease of reduction, and pain control are similar for both intra-articular lidocaine injection and intravenous sedation to treat anterior shoulder dislocations. ^{4,6-8,10,12} | A |

REFERENCES

- Bahn EL, Holt KR. Procedural sedation and analgesia: a review and new concepts. *Emerg Med Clin North Am.* 2005;23:503-517.
- Baker SN, Weant KA. Procedural sedation and analgesia in the emergency department. *J Pharm Pract.* 2011;24(2):189-195.
- Fitch RW, Kuhn JE. Intra-articular lidocaine versus intravenous procedural sedation with narcotics and benzodiazepines for reduction of dislocated shoulder: a systematic review. *Acad Emerg Med.* 2008;15:703-708.
- Kosnik J, Shamsa F, Raphael E, Huang R, Malachias Z, Georgiadis GM. Anesthetic methods for reduction of acute anterior shoulder dislocations: a prospective, randomized study comparing intra-articular lidocaine with intravenous analgesia and sedation. *Am J Emerg Med.* 1999;17(6):566-570.
- Kuhn JE. Treating the initial anterior shoulder dislocation-an evidence-based medicine approach. *Sports Med Arthrosc.* 2006;114:192-198.
- Mathews DE, Roberts T. Intraarticular lidocaine versus IV analgesic for reduction of acute anterior shoulder dislocations: a prospective randomized study. *Am J Sports Med.* 1995;23:54-58.
- Miller SL, Cleeman E, Auerbach J, Flatow EL. Comparison of intra-articular lidocaine and intravenous sedation for reduction of shoulder dislocations. *J Bone Joint Surg Am.* 2002;84:2135-2139.

8. Moharari RS, Khademhosseini F, Espandar R, et al. Intra-articular lidocaine versus intravenous meperidine/diazepam in anterior shoulder dislocation: a randomized clinical trial. *Emerg Med J.* 2008;25:262-264.
9. Ng VK, Hames H, Millward JM. Use of intra-articular lidocaine as analgesia in anterior shoulder dislocation: a review and meta-analysis of the literature. *Can J Rural Med.* 2009;14(4):145-149.
10. Orlinsky M, Shon S, Chiang C, Chan L, Carter P. Comparative study of intra-articular lidocaine and intravenous meperidine/diazepam for shoulder dislocations. *J Emerg Med.* 2002;22(3):241-245.
11. Piper SL, Kramer JD, Kim HT, Feeley BT. Effects of local anesthetics on articular cartilage [published online ahead of print April 22, 2011]. *Am J Sports Med.*
12. Suder PA, Mikkelsen JB, Hougaard K, Jensen PE. Reduction of traumatic secondary shoulder dislocations with lidocaine. *Arch Orthop Trauma Surg.* 1995;114:233-236.
13. Ufberg JW, McNamara RM. Management of common dislocations. In: Roberts JR, Hedges JR eds. *Clinical Procedures in Emergency Medicine.* 5th ed. Philadelphia, PA: Saunders Elsevier; 2009:869-908.
14. Zacchilli MA, Owens BD. Epidemiology of shoulder dislocations presenting to emergency departments in the United States. *J Bone Joint Surg Am.* 2010;92(3):542-549.

For reprints and permission queries, please visit SAGE's Web site at <http://www.sagepub.com/journalsPermissions.nav>.