Clinical News and Views

Study Compares Clinical Effects of Hyperosmolar, Isotonic Irrigation Solutions in Shoulder Arthroscopy

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Excessive fluid extravasation has been associated with technical difficulties and complications during arthroscopic procedures. According to research presented at the AAOS Annual Meeting, hyperosmolar irrigation solution is a safe and effective method for decreasing periarticular fluid retention associated with arthroscopic rotator cuff surgery.

“Previous studies have shown that a hyperosmolar irrigation solution used during arthroscopy is safe and can provide a chondroprotective effect,” said coauthor Nicholas Capito, MD. “Our research was taken from the laboratory and applied clinically in shoulder arthroscopy for patients undergoing rotator cuff repair.”

Study methods
The researchers conducted a prospective, double-blind randomized controlled trial to compare the effects of standard isotonic and hyperosmolar irrigation solutions used in arthroscopic rotator cuff repair. The study involved 50 adult patients scheduled for shoulder arthroscopy for inspection of the glenohumeral joint and subacromial space with rotator cuff repair. Patients undergoing concomitant biceps tenotomy or tenodesis were also included in the study. Patients who were younger than age 18 years, pregnant, mentally disabled, or undergoing labral repair, capsular release, or distal clavicle excision were excluded. Demographics were similar in each patient population.

All surgeries were performed as same-day procedures by one of two fellowship-trained orthopaedic surgeons at a university-based tertiary referral center. Diagnostic arthroscopy of the glenohumeral joint and subacromial space was performed with the patients in the beach chair position using standard arthroscopy portals. The irrigation solution was delivered by a fluid pump at a pressure of 40 mm Hg. Twenty-five patients were randomized to receive a hyperosmolar (593mOsm/L) irrigation solution and 25 patients were randomized to receive Lactated Ringer’s (273mOsm/L) irrigation solution. Epinephrine (1mg/L) had been added to both types of irrigation solutions.

The amount of intravenous fluid administered, amount of irrigation solution used, number and location of portals used, duration of surgery, and number and type of surgical procedures performed were recorded for each patient. Pre- and postoperative patient weight and shoulder girth measurements were also documented.

Primary outcomes included the amount of periarticular fluid retention based on patients’ net weight gain, change in shoulder girth, and immediate postoperative pain as measured by the Visual Analog Scale (VAS). Patients in both groups were evaluated at 2- and 6-week and 3- and 6-month follow-up. American Shoulder and Elbow Surgeon (ASES), VAS, and Single Assessment Numeric Evaluation (SANE) scores were also assessed at 1-year follow-up.

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Hyperosmolar irrigation found safe, effective
Statistical analysis revealed that, compared to the control group, patients in the hyperosmolar group experienced significantly less weight gain ($P = 0.005$), significantly less increase in medial-to-lateral and anterior-to-posterior shoulder girth measurements ($P = 0.013$ and $P < 0.05$, respectively), and significantly lower immediate postoperative VAS pain score ($P = 0.036$) (Table 1).

Overall, only 17 of 25 patients in the hyperosmolar group and 16 of 25 patients in the control group were available for 1-year follow-up. At that time, no significant differences were found between the two groups in ASES, VAS, and SANE scores ($P > 0.2$).

“We found there was a significantly reduced increase in shoulder size and weight gain after surgery.

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### Table 1: Initial Postoperative Assessment

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control</th>
<th>Hyperosmolar</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Weight Gain (kg)</td>
<td>2.25 ± 0.77</td>
<td>1.6 ± 0.82</td>
<td>$t$-Test $P = 0.005$</td>
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<tr>
<td>Change in SGML (cm)</td>
<td>2.1 ± 1.3</td>
<td>1.3 ± 1.1</td>
<td>$t$-Test $P = 0.013$</td>
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<tr>
<td>Change in SGAP (cm)</td>
<td>2.8 ± 1.6</td>
<td>1.6 ± 1.2</td>
<td>$t$-Test $P = 0.007$</td>
</tr>
<tr>
<td>Immediate Postop Pain (VAS)</td>
<td>Median = 5</td>
<td>Median = 0</td>
<td>Rank sum $P = 0.036$</td>
</tr>
<tr>
<td></td>
<td>Range = 0-10</td>
<td>Range = 0-7</td>
<td></td>
</tr>
</tbody>
</table>