
INTRODUCTION

More than 40% of patients undergoing orthopedic procedures experience moderate to severe postoperative pain.1 Open shoulder procedures are often associated with severe postoperative pain, especially within the first 48 hours.2 Opioid use for control of the postoperative pain has limited value because of the adverse effects of opioids. Nerve blocks have great value among different postoperative analgesic methods, of which interscalene nerve block is the mostly recommended technique.3 A single injection peripheral nerve block provides up to 12-15 hours analgesia after upper extremity procedures.4 Interscalene brachial plexus block (ISBPB) has been shown to provide a safe and effective pain relief after open shoulder surgery.5 After surgery, quality of pain control is better, degree of patient satisfaction is higher and the incidence of side effects is decreased with ISBPB.57

ABSTRACT

Objective: Excellent postoperative pain control plays central role in the outcome of open shoulder surgery which provides early rehabilitation and accelerates functional recuperation.

Methodology: Fifty patients who were candidate for elective shoulder surgery were enrolled in this study. Patients were randomized to two 25-patient groups. One group received morphine sulfate and in the other group small volume Interscalene Brachial Plexus Block (ISBPB) was performed. Pain severity, patient satisfaction scores and post anesthesia recovery parameters were assessed.

Results: Patients satisfaction score was significantly improved in ISBPB (P<0.001). Agitation in ISBPB group was significantly reduced compared to the other group (P: 0.009). Pain severity score was significantly reduced with ISBPB (P=0.001). ISBPB did not have any side effects on post anesthesia recovery parameters.

Conclusion: Small volume ISBPB may be considered as a suitable technique for reducing intermediate postoperative pain without any effect on post anesthesia care unit parameters and stay in patients undergoing open shoulder surgery.

KEY WORDS: Shoulder Surgery, Interscalene Brachial Plexus Block, Anesthesia, Recovery.
Klein S.M et al in 2000 showed that benefits of interscalene perineural catheters last more than 24 hours in hospitalized patients. Continuous interscalene nerve block is considered the gold standard for postoperative analgesia after shoulder surgery by some authors, because of better efficacy on pain control. Catheter placement for interscalene brachial plexus block has some challenges include avoiding the external jugular vein, inclusion of catheter site in the sterile surgical field and superficial placement which leads to catheter dislodgment. However this technique leads to administration of large volume of local anesthetic which may have potential toxic effect because of accumulation after prolonged period of infusion. However a 100% of Phrenic nerve palsy limits the application of this block in patients with boarderline respiratory reserve.

In this study we evaluated the efficacy of low dose interscalene nerve block on postoperative pain and recovery parameters in patients undergoing open shoulder surgery.

**METHODOLOGY**

The study was approved by the institutional ethical review board and local ethics committee of Tabriz University of Medical Sciences. After obtaining the informed consent from patients, 50 patients who were candidates for open shoulder surgery in Shohada Hospital (September 2008 to September 2009) were enrolled in this study. Patients with severe bronchopulmonary disease, Coagulopathy, infection in block site, neuropathy, previous history of brachial plexus block and allergy to local anesthetic were excluded.

Using a computer sequence of numbers, 25 patients were randomly assigned to receive general anesthesia for shoulder operation and receive morphine sulfate 5 mg in incremental doses for post operative pain and the other 25 patients received general anesthesia with same drugs (all patients received propofol 2.5 mg/kg, midazolam 0.05mg/kg, fentanyl 2 ì/kg and atracurium 0.5 mg/kg for induction of anesthesia and O₂, N₂O and isoflurane for maintenance of anesthesia) and the other 25 patients received general anesthesia with with multiple negative aspirations for blood. The onset of block was detected by the deletion of twitch response to nerve-stimulator and the signs of neck sympathetic ganglion blockade as increasing in skin temperature and skin blood flow and unequal pupil size. After that patients were extubated and transferred to PACU (Post Anesthesia Care Unit) and were assessed by nurse who was blind to the study. Demographic data, pain severity, agitation, patient satisfaction were recorded. Pain intensity was assessed with visual analog scale (0: no pain and 10: worst possible pain), while asking the patients to move the hand and flex the elbow joint and the degree of pain was recorded. Breakthrough pain was treated with morphine sulfate (10 mg). Patient satisfaction was evaluated with a two point score:1=satisfied; if operated in the future, I will ask for the same procedure, 2=unsatisfied; if operated again in the future, I will ask for a different technique. Patients were discharged from PACU based on modified Aldrete score. Statistical analysis was performed with SPSS 15. Data were expressed as mean (range) or as a number (percentage). A P value less than 0.05 was considered statistically significant. Data distribution was first evaluated using the Kolmogorov-Smirnov test. Variables were compared with the use of Fisher exact test, Chai Square, Kruskal-Wallis, Independent sample T-test and the Mann–Whitney U test, as appropriate.

**RESULTS**

Demographic characteristic of patients in both groups are shown in Table-I. As seen patients of two groups had no significant difference in age, sex and duration of operation. In the general Anesthesia group (GA), pain severity had no significant relation with age and operation time (P=0.403, P=0.798 in order). Agitation also had no significant relation with age and sex. (P=0.440, P=0.496 in order). Our study showed that time to eye opening and time to respond verbal stimuli in PACU were not prolonged with ISBPB.

In general anesthesia plus interscalene brachial plexus block group (GA+ISBPB) pain severity had no significant relation with age and duration of
Efficacy of ISBPB on recovery parameters

operation. (P=0.240, P=0.748 in order). Also agita-
tion had no significant relation with age and sex
(P=0.274, P=0.606 in order). Between two groups there
was no significant difference in order of duration of
recovery stay. In GA group seven patients had score
one of patients satisfaction, but in GA+ISBPB 23
patients had score one of patient satisfaction which
is statistically important (P<0.001 Table-II). Postop-
erative pain score in group GA is significantly more
than group GA=ISBPB. (P=0.001, Table-II)
Agitation in group GA is significantly more than
group GA+ISBPB (P=0.009, Table-II).

DISCUSSION

As major shoulder surgeries have moderate to
severe pain during 24-48 hours after surgery and
intensive postoperative rehabilitation is necessary for
ideal functional result, pain control after such opera-
tions is crucial. ISBPB is ideal for proximal upper
extremity but it is not devoid of side effects. Singelyn F
et al showed that single shot interscalene block pro-
vides ideal postoperative pain control after shoulder
surgery.14 We performed this block to patients who
were candidate for open shoulder surgery for reduc-
ing pain and early onset of physiotherapy. This block
is usually performed before surgery and some
perform it via catheter for continuous infusion of
local anesthetic. But because of catheter problems and
possible toxicity of local anesthetics, we performed
this block with low dose of local anesthetic via single
shot at the end of surgery. Borgeat et al. in some stud-
ies failed to show that lower concentration of local
anesthetic could suppress the operation pain,5,15 but
in this study we showed that small volume of med-
ium concentration of local anesthetic might be used
for ISBPB. Rosenberg and Hoinonen showed that
in small concentration, Rupivacaine produces more
potent block than Bupivacaine.16 Continuous ISBPB
is recommended by some authors for open shoulder
surgeries but has the failure rate of 12-25% which
seems to be high,17-21 so they recommended additional
techniques and equipments like ultrasound technique.
Previous studies showed that continuous ISBPB, even
in small doses, cannot be recommended for patients
with respiratory compromise. Our study showed that
small dose ISBPB significantly reduced pain and agi-
tation score of patients after shoulder surgeries, so
significantly improved patient satisfaction score. In
this study, ISBPB didn’t have any effect on recovery
parameters like time to respond to verbal stimuli and
time to eye opening, so didn’t have any adverse effect
on prolong PACU stay of patients. Riazi S, et al
showed that use of low-volume ultrasound-guided
SBPB is associated with fewer respiratory and other
complications with no change in postoperative
analgésia compared to standard volume which
similar to our results.22

Table-I: Demographic data of patients in two groups.

<table>
<thead>
<tr>
<th></th>
<th>GA</th>
<th>GA+ISBPB</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>44.04±16.41</td>
<td>37.87±13.17</td>
<td>0.163</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>17/8</td>
<td>20/5</td>
<td>0.333</td>
</tr>
<tr>
<td>Duration of operation</td>
<td>143.91±65.63</td>
<td>121.91±48.39</td>
<td>0.190</td>
</tr>
</tbody>
</table>

Table-II: Characteristics of patients in two groups during PACU stay.

<table>
<thead>
<tr>
<th></th>
<th>GA</th>
<th>GA+ISBPB</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s satisfaction</td>
<td>Satisfied</td>
<td>7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Unsatisfied</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Pain (VAS)</td>
<td>Mild(0-4)</td>
<td>11</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Moderate(5-7)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe(8-10)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Agitation</td>
<td>14</td>
<td>5</td>
<td>0.009</td>
</tr>
<tr>
<td>Duration of PACU stay</td>
<td>37.88±16.81</td>
<td>48.26±26.43</td>
<td>0.108</td>
</tr>
<tr>
<td>Eyes opening</td>
<td>10.75±6.82</td>
<td>17.13±17.01</td>
<td>0.096</td>
</tr>
<tr>
<td>Reply to verbal stimulation</td>
<td>17.08±10.14†</td>
<td>27.65±21.17</td>
<td>0.030</td>
</tr>
</tbody>
</table>

GA: general Anesthesia, ISBPB: interscalene brachial plexus block,
VAS: visual analog scale, †: mean±standard deviation
In conclusion, this study showed that administration of small dose ISBPB provides good and comparable control of immediate postoperative pain without any side effect on patients’ recovery parameters, especially in patients with respiratory compromise. This benefit doesn’t translate into lower overall pain for the first 48 hours after operation. However for inducing more pain relief, we recommend future studies with long-acting local anesthetics to facilitate rehabilitation and improvement of patient’s well being.

REFERENCES