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Research Article

Effect of pregabalin on postoperative pain after shoulder arthroscopy

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KEYWORDS

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Abstract *Background:* Postoperative pain is difficult to be managed with the use of opioids analgesia alone, so multimodal pain management is a method to improve postoperative analgesia with minimal side effects. Pregabalin has an analgesic and opioid sparing effects in postoperative analgesia. The objective of the present study was to evaluate the effect of premedication with pregabalin on postoperative analgesia in patients undergoing shoulder arthroscopy.

Methods: Eighty patients ASA I-II and aged 18–60 years undergoing elective shoulder arthroscopy were randomized to receive two doses of either placebo or pregabalin 300 mg 12 h and 1 h before surgery. Anesthesia was induced with thiopental (3–5 mg/kg) and atracurium (0.5 mg/kg) and maintained with isoflurane with O_2. Patients were studied at 1, 4, 8, 12 and 24 h postoperatively for Visual Analogue Scale (VAS), nalbuphine consumption (was given when VAS > 4), satisfaction score and side effects of pregabalin.

Results: The VAS scores of the pregabalin group were significantly lower than the control group at 1, 4 and 8 h after surgery. The total nalbuphine consumption at 24 h postoperatively of pregabalin group (33.8 + 6.89) was highly significant lower than the control group (46.4 + 5.72) ($p < 0.001$). There were no significant differences between groups in somnolence-dizziness and nausea-vomiting. The satisfaction score was higher in the pregabalin group.

Conclusion: A 300 mg pregabalin administered 12 h and 1 h preoperatively is a safe and effective method in management of pain after shoulder arthroscopy.

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1. Introduction

Advances in surgical techniques have led to increasingly more procedures being performed on an outpatient basis [1–4] as shoulder arthroscopy. Postoperative pain is the most common reason for delayed discharge, and the main reason for unanticipated hospital admission [5]. Opioid medications have been still the mainstay of postoperative pain management, but these medications have serious adverse effects [6].

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Shoulder surgery often results in bone removal, extensive resection of bursal tissue, insertion of hardware, and soft tissue distension from irrigation fluid. Many patients are hospitalized overnight to control pain that results from this intervention. This may be because the postoperative pain is under-treated in the outpatient setting [7].

Pregabalin is the active S-enantiomer of racemic 3-isobutyl GABA [6] and binds to the alpha 2-delta (α2-δ) subunit of the presynaptic, voltage-gated calcium channels that are widely distributed throughout the peripheral and central nervous system [8–10]. The probable mechanism of action of pregabalin via, potent binding at this site reduces calcium influx at nerve terminals and therefore reduces the release of several neurotransmitters including glutamate, norepinephrine and substance P [11,12]. Pregabalin was used in the treatment of chronic pain conditions, but recently it has used in the treatment of acute postoperative pain [13–18], but there was not any research has been done to study its effect on acute postoperative shoulder pain. The aim of the study is to evaluate the efficacy and safety of preoperative pregabalin on acute postoperative pain in patients scheduled for shoulder arthroscopy.

2. Methods

After approval from the local ethical committee of the Faculty of Medicine, Menoufiya University, written informed consents were obtained from the patients who were scheduled to undergo elective shoulder arthroscopy. Patients with the following characteristics were excluded from the study: age <18 years; age >60 years; pregnant; allergic and/or contraindicated to the study drugs; American Society of Anesthesiologists (ASA) score III and above; having drug and/or alcohol addiction, renal failure, diabetes mellitus or epilepsy; and currently using opioids for chronic pain and/or any of the drugs studied. A total of 80 patients, ASA I-II and aged 18–60 years were included in the study. Patients were randomly assigned to one of two groups using a closed envelope randomization schedule. The patients in Group I (placebo, $n = 40$) received 'placebo' two doses, 12 h apart prior to the operation (one 12 h and the other 1 h preoperative). Patients in Group II (pregabalin $n = 40$) received pregabalin 300 mg at the same time intervals as Group I patients. In the operating room, a crystalloid infusion was started through an IV cannula and the mean arterial blood pressure (MAP), heart rate (HR) and peripheral oxygen saturation (SpO2) were monitored. General anaesthesia was induced with thiopental sodium (3–5 mg/kg), fentanil (1 μg/kg) and atrachurium (0.5 mg/kg) and maintained with isoflurane and O2. Isoflurane concentration was adjusted to maintain adequate depth of anaesthesia. Before onset of surgery, intra-articular injection of 10 ml adrenalized 1:200000 bupivacaine 0.25% was performed to all study patients (adrenaline was giving due to its vasoconstrictor effect allowing reduction of bleeding at the operative field and better arthroscopic view). No other analgesic was administered during the surgery. After the end of surgery, all patients received intravenous diclofenac 75 mg as a routine analgesic. The patients were taught how to express the level of pain they experienced using a 10-point Visual Analogue Scale (VAS), with 0 indicating no pain and 10 indicating the worst possible pain. Incremental titrating doses of nalbuphine (4 mg/dose) were given when indicated (if VAS $\geqslant 4$) due to unavailability of PCA modality in our institute. Anxiety scores, vital signs, pain scores, Numeric Sedation Scores (NSS; 1 = completely awake, 2 = awake but drowsy, 3 = asleep but responsive to verbal commands, 4 = asleep but responsive to tactile stimulus, 5 = asleep and not responsive to any stimuli), nalbuphine consumption and adverse effects such as nausea, vomiting, pruritus, urinary retention, somnolence, dizziness, vision abnormalities (double or blurred) and headache were recorded. Except for patient satisfaction score which was measured at 24 h postoperatively on a numerical score of 1–4 (1 = poor, 2 = fair, 3 = good, 4 = very good) and recorded only once before patient discharge from the hospital, all postoperative variables were recorded on the 1st, 4th, 8th, 12th and 24th hours after end of surgery.

2.1. Statistical analysis

A power analysis was performed using a power of 80% and an α value 0.05. We assumed that the difference between means of the two groups for VAS would be 0.77 with an average standard deviation 1.19. The sample size was calculated to be 38 patients, so we decided to include 40 patients in each group in the study. We used GraphPad Stat Mate version 2 statistics program for power analysis.

Statistical analysis was done using SPSS program. Descriptive statistics were expressed as mean + SD unless otherwise stated. Student's *t*-test was used for comparison of the means of continuous variables and normally distributed data. The Mann–Whitney *U*-test or Chi-square test was used otherwise. *P*-value < 0.05 was considered statistically significant.

3. Results

The two groups were comparable with respect to age, sex, weight, height and duration of surgery (Table 1). For VAS of pain at rest, there was a significant decrease in pregabalin group (group II) at 1 h, 4 h and 8 h postoperatively compared to placebo group (group I) and insignificant difference between the two groups at 12 h and 24 h after the end of surgery (Table 2). Also, nalbuphine consumption (Table 3) showed a significant decrease in pregabalin group at 1 h, 4 h and 8 h postoperatively compared to placebo group with a significant difference between the two groups in relation to total nalbuphine consumption during the whole 24 h ($P < 0.003$). The study showed a significant increase in NSS (Table 4) in pregabalin group at 1st and 4th postoperative hrs and insignificant increase at 8th, 12th and 24th postoperative hrs compared to placebo group. In relation to patient satisfaction to pain and

Table 1 Demographic data and duration of surgery.

	Group I	Group II
Age	42.15 ± 13.08	41.3 ± 14.7
Sex M/F	16/24	22/18
Weight	79.3 ± 7.88	75.2 ± 7.54
Height	170 ± 7.11	166.15 ± 6.38
Duration of surgery (min)	82.5 ± 15.52	77 ± 19.89

Group I: placebo, Group II: pregabalin, M: male, F: female. Data were expressed as mean ± standard deviation and number of patients.