Role of regional anesthesia in orthopedic trauma

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ABSTRACT

Acromioplasty is often concomitant with severe postoperative pain. An interscalene brachial plexus block has performed to provide substantial analgesia. Regional anaesthesia techniques have been progressively used in orthopaedic surgery procedures. The present study aimed to evaluate the role of regional anaesthesia in orthopaedic trauma such as acromioplasty using interscalene brachial plexus block. A hospital-based prospective study conducted in Alhindia hospital, Iraq between November 2020 to February 2021. The individuals who reported "subacromial decompression" or "acromioplasty" was included in the present study. Preoperative oral and written consent was taken from the patients (n=10). The superficial interscalene groove was identified by a high-frequency linear array ultrasound transducer. Using the lateral modified approach, a short-bevelled insulated needle (5 cm, 22 gauge) was placed in the interscalene groove. The current sent to the groove by connecting the needle to a peripheral nerve stimulator. An injection of 2-3 ml local anaesthetic was provided cutaneous anaesthesia and their sensory contribution was blocked to the acromioclavicular joint for surgery. In the present study, about four patients reported the worst pain after the block has worn off. Hence, after surgery non-steroidal anti-inflammatory agent and paracetamol was given to the patients. Those patients were also provided with strong opioids in the first 48hr after block resolution. Regional anaesthesia in orthopaedic patients is related to a reduction in blood loss during operation and better postoperative pain control as compared with general anaesthesia. In a conclusion, we found that the interscalene brachial plexus block in acromioplasty surgery was found to be effective in post-operative pain relief, intraoperative blood loss and gives lesser discomfort. We recommend interscalene brachial plexus block (regional anaesthesia) as the crucial choice of regional nerve blockade during acromioplasty.

Keywords: Regional anaesthesia, Orthopedic trauma, upper limb surgery, Interscalene brachial plexus blockade, Trauma

غالبًا ما يصاحب رأب الأوعية الدموية آلام شديدة بعد الجراحة. تم إجراء كتلة الضفيرة العضدية بين التكلسات لتوفير تسكين كبير تم استخدام تقنيات التخدير الموضعي بشكل تدريجي في إجراءات جراحة العظام. الهدف من هذه الدراسة هو تقييم دور التخدير الموضعي في الرضوض العظمية مثل رأب الأخرم باستخدام كتلة الضفيرة العضدية بين النتوءات دراسة استطلاعية في المستشفى أجريت في مستشفى الهندية العراق بين نوفمبر 2020 إلى فبراير 2021 تم تضمين الأفراد الذين أبلغوا عن "تخفيف الضغط تحت الأخرم" أو "رأب الأخرم" في هذه الدراسة. تم أخذ الموافقة الشفوية والمكتوبة قبل الجراحة من المرضى (ع = 10). تم التعرف على الأخدود السطحي بين السلالات بواسطة محول طاقة بالموجات فوق الصوتية ذو صفيف خطي عالي التردد باستخدام النهج الجانبي المعدل تم وضع إبرة معزولة قصيرة المشطوف (5 سم ، 22 مقياس) في الأخدود بين التلال تم إرسال التيار إلى الأخدود عن طريق توصيل الإبرة بمحفز عصبي محيطي تم إعطاء حقنة من 2-3 مل مخدر موضعي للتخدير الجلدي وكانت مساهمتهم الحسية عبارة عن كتل في المفصل الأخرمي الترقوي للجراحة. في هذه الدراسة ، أبلغت أربع براءات اختراع عن أسوأ ألم بعد زوال الكتلة ومن ثم بعد الجراحة تم إعطاء العامل المضاد للالتهابات غير الستيرويدي والباراسيتامول للمرضى تم تزويد هؤلاء المرضى أيضًا بمواد أفيونية قوية في أول 48 ساعة

بعد حل الكتلة يرتبط التخدير الموضعي في مرضى العظام بتقليل فقدان الدم أثناء العملية وتحكم أفضل في الألم بعد الجراحة مقارنة بالتخدير العام. وجدنا أن كتلة الضفيرة العضدية بين النتوءات في جراحة رأب الشرايين أثبتت فعاليتها في تخفيف الآلام بعد الجراحة وفقدان الدم أثناء العملية وتقليل الانزعاج. نوصي بإحصار الضفيرة العضدية بين النتوءات (تخدير موضعي) كخيار حاسم لحصار العصب الموضعي أثناء رأب الشرايين.

1. INTRODUCTION

Orthopaedic trauma is referred to a serious injury of the muscular or skeletal (bones, joints, and/or soft tissue) system [1]. It is a very broad term because it encompasses a spectrum of injuries, from simple hairline fractures to life-threatening accidents. Trauma can also be occurred by overuse of any muscle such as hairline cracks in the lower leg and/or tibial stress fractures was observed after running long distances [2]. A number of traumatic orthopaedic injuries can occur and the surgeons' goal is to restore the injured body part(s) function as speedily and successfully as possible. Trauma is the principal cause of death (in the age 1-44 years) and the third principle reason of death (all age groups). It has 30% of all life years lost in the United States, which was more than heart disease, cancer, and HIV combined. More than $400 billion economic burden was estimated in the United States alone due to trauma.

Regional anaesthesia (RA) techniques have been progressively used in orthopaedic surgery. RA techniques can be categorized into three types, i.e. central neuraxial blocks, regional intravenous anaesthesia (RIVA), and peripheral nerve blocks. The central neuraxial blocks include spinal and epidural anaesthesia. While peripheral nerve blocks include upper extremity and lower extremity blocks. Various reports are available regarding the regional anaesthesia advantages over general anaesthesia in orthopaedic surgeries [3-7]. RA techniques provide adequate anaesthesia in orthopaedic surgical procedures. It is known for the fewer side effects, excellent postoperative pain control, minimum blood loss, and shortened hospital stay [3-8].

Some clinical studies have demonstrated that in shoulder surgery, anaesthesia and analgesia were usually given by using interscalene brachial plexus block [9,10]. When persisting the block with a patient-controlled interscalene analgesia (PCIA), the infusion of ropivacaine or bupivacaine (0.15%) gives acceptable pain control with great patient satisfaction [10]. Eroglu, [10] reviewed that after shoulder surgery, patient-controlled interscalene analgesia was superior over other methods regarding pain control effectiveness, side effect incidence, and patient satisfaction. In the present study, the role of regional anaesthesia in orthopaedic trauma was evaluated.

2. MATERIAL AND METHODS

2.1 Ethical Permission and Patient Enrollment

The present study was a hospital-based prospective study conducted in Alhindia hospital, Iraq between November 2020 to February 2021. Ethical approval had taken from the ethical committee of Karbala University. The individuals who reported “subacromial decompression” or “acromioplasty” was included in the present study. Preoperative oral and written consent was taken from the patients (n=10). They were operated on with regional anaesthesia during their surgery. The patients were made aware of the regional anaesthetic technique, consciousness while undertaking surgery, postoperative recovery period and pain management plans.

2.2 Preoperative Condition

There was a loss of cervical lordosis and alignment of the cervical vertebrae. There was mild intervertebral disc space between C5-C6. Fused C3 and C4 vertebrae. The posterior element, including the pedicles, laminae, transverse and spinous processes appear normal. Faceteal sclerosis with posterior margin osteophytes. The atlanto-dental interval appears

normal. The craniovertebral junction appears normal. There was no thickening of the prevertebral soft tissues seen. The straightening of the cervical spine due to muscular spasm. Mild intervertebral disc space between C5-C6 was present. Fused C3-C4 vertebrae (congenital fusion) was seen. Early spondylotic changes cervical spine was observed (Figure 1).

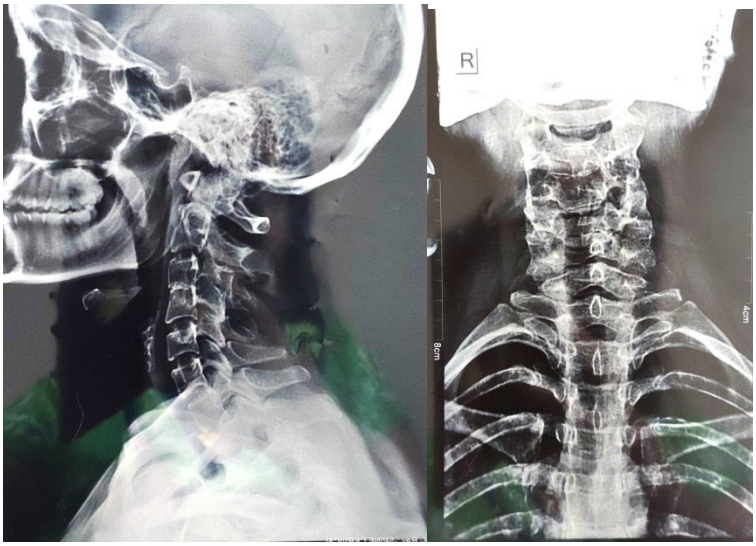

Figure 1: X-ray photograph of preoperative conditions

2.3 Shoulder Anatomy

The shoulder receives nerve retention from the cervical (C3, C4) and brachial plexuses (C5, C6). The suprascapular nerve comes off the upper trunk, from roots C5-C6, and innervates the supraspinatus and infraspinatus, which are contributors to the rotator cuff apparatus. A slight distribution of the shoulder capsule, upper thoracic region and nerve impact on the acromioclavicular and sternoclavicular joints arises from the supraclavicular arteries (descending branches of the cervical plexus; C3, C4). Minor nerve retention occurs in the lateral pectoral, musculocutaneous, and subscapular arteries.

The motor and sensory innervation of the shoulder arises from the main artery (upper stem of the brachial plexus) and the axillary nerve (posterior cord of the brachial plexus). The cutaneous supply distal to the glenohumeral joint arises from the superior periphery of the lateral skin (from the axillary nerve), the medial cutaneous nerve of the arm (from the medial cord of the brachial plexus), and the lateral cutaneous branch of the second intercostal nerve [11].

2.4 Regional Anaesthetic Techniques

Peripheral regional anaesthesia was used in this study. An injection of a local anaesthetic was introduced into a nerve root via its sheath. Anatomical markers were used for the localization of nerves to be anaesthetized.

2.5 Interscalene Brachial Plexus Blockade Surgery methods

Interscalene brachial plexus blockade (ISB) is conducted in a conscious patient. The patient was positioned at 30° supine and the head was turned to the opposite side. The ipsilateral neck was exposed and skin asepsis was performed. The superficial interscalene groove was identified by a high-frequency linear array ultrasound transducer. Using the lateral modified approach, a short-bevelled insulated needle (5 cm, 22 gauge) was placed in the interscalene groove. The current sent to the groove by connecting the needle to a peripheral nerve

stimulator. An injection of 2-3 ml local anaesthetic was provided cutaneous anaesthesia and their sensory contribution was blocked to the acromioclavicular joint for surgery.

2.6 Study Parameters

The preoperative and postoperative parameters were recorded in the enrolled patients. Postoperative pain, need for strong opioids, postoperative complications and hospital discharge was considered in the present study. Various parameters such as pain (severe, moderate, mild or none), activity level (unaffected sleep, full recreation, full work), arm positioning (up to waist, xiphoid, neck, head), forward flexion (31 to 180 degree), external rotation (hand behind or top of head), lateral elevation (31 to 180 degree), etc. were considered.

2.7 Pain Assessment

Postoperative pain score and grading were recorded after 3 weeks. Pain score was assessed as per the protocol described by Constant and Murley [12]. The pain grade was evaluated as per the Fabre et al. [13].

2.8 Statistical Analysis

The values were represented as the percentage of the patients.

3. RESULTS

In the present, the role of regional anaesthesia was evaluated in the acromioplasty using interscalene brachial plexus block surgery. Based on the results obtained in the study, the patients were divided into two groups viz. opioids group (patients reporting the severe pain and need opioids) and non-opioids groups (patients reporting mild pain and no need for opioids). Both the groups were received different postoperative treatment.

3.1 Postoperative parameters

In the present study, ten patients were evaluated for the effect of regional anaesthesia in orthopaedic trauma after surgery. The enrolled patients were divided into two groups viz. opioids group (patients reporting the severe pain and need opioids) and non-opioids groups (patients reporting mild pain and no need for opioids).

About four patients (40%) reported the worst pain after the block has worn off. Hence, after surgery non-steroidal anti-inflammatory agent and paracetamol was given to the patients (Table 1). Those patients were also provided with strong opioids in the first 48hr after block resolution. Around six patients (60%) reported minor (tolerable) pain after surgery. So, these patients were not given strong opioids. None of the patients showed postoperative complications. The patient discontinued opioid pain medications in 3-4 days after hospital discharge

Table 1: Postoperative parameters

Parameters	Opioids group	Non-opioids group
Post operative pain	04 (40%)	06 (60%)
Need of strong opioids	Required	Not required
Postoperative complications	No	No
Hospital discharge	On 8th days	On 6th days

The shoulder surgery, a medical procedure by and large outcomes in huge postoperative torment requiring narcotics, territorial sedation shapes a significant piece of the sedative strategy by improving patient experience and expanding the accomplishment of day case

pathways. Provincial sedation has benefits over broad sedation, for example, decreases working auditorium time, permits prior release from the postanaesthesia care unit, and lessens postoperative intricacies, like torment, sedation, sickness, and heaving, and the requirement for overnight stay. RA was utilized as a sole sedative method. Undertaking shoulder a medical procedure in cognizant patients offers a few benefits.

The enrolled patients showed pain grade score between 11-20 except for one patient who showed a grade score below 11.

Table 2. Grading the constant shoulder score

Sr. No.	Grading	Interpretation
1	>30	Poor
2	21-30	Fair
3	11-20	Good
4	<11	Excellent

4. DISCUSSION

The shoulder surgery is frequently connected with severe postoperative pain, predominantly within the first 48 hours. Due to this, the patient becomes discomfort and also hamper functional recovery. Hence, after surgery, adequate pain relief is essential for both the early use of rehabilitation exercise and patients comfort [8,14]. Some clinical studies have been demonstrated that interscalene brachial plexus block is often used to provide anaesthesia and analgesia for shoulder surgery [9,10]. In several clinical studies and case reports, the use of RA techniques in postoperative orthopaedic outcomes has been investigated. Although there is excellent postoperative analgesia given by the regional anaesthetic procedure, one-fifth of patients report postoperative pain after shoulder surgery as the 'worst pain you can imagine once the block is gone [15]. In the present study also, about four patients reported the worst pain after the block has worn off. Our findings are following this report [15]. Used of strong opioids were also recommended by Hewson et al. [11]. RA reduces the duration of the theatre, allows premature discharge from (or pass) of the postanaesthesia care unit, and reduces postoperative complications such as pain, dizziness, nausea and vomiting, and the need to stay overnight [16].

In orthopaedic trauma, patient's pain managing is an intricate but essential task. Insufficient pain management can have harmful consequences. The evidence of the inadequacy of morphine as a sole treatment of pain has recently expanded and the treatment of pain based on morphine as the primary agent has undergone extensive revision [17]. It is thought that postoperative pain control, especially regional anaesthesia, may mask the symptoms of compartment syndrome and delay diagnosis. Because unrecognized and untreated compartment syndrome can result in permanent nerve damage within 8 hours, caution is needed when the possibility exists.

Patient-controlled interscalene analgesia (PCIA) use of both bupivacaine (0.15%) and ropivacaine (0.2%) was shown to provide a better quality of pain management, reducing the incidence of side effects than in opioid patient-controlled analgesia (PCA) after major shoulder surgery [18,19]. Borgeat et al. [20] reported that after shoulder surgery, PCIA containing ropivacaine (0.2%) and bupivacaine (0.15%) provided similar pain relief. Eroglu [21] compared analgesics with specific techniques. In this study, Eroglu [21] reported that PCA techniques using subacromial ropivacaine or fentany iv provided similar and adequate pain relief and adverse effects after open acromioplasty surgery. However, patient-controlled analgesia (PCA) using subacromial fentanyl did not work as subacromial ropivacaine or iv fentanyl. Patient-controlled postoperative analgesia techniques using interscalene,

subacromial, and intravenous catheter were compared with a mini-review article after shoulder surgery. As a conclusion of the review article reported that in terms of pain management effectiveness, side effects, and patient satisfaction interscalene analgesia can be controlled [14].

5. CONCLUSION

In orthopaedic surgeries, regional anaesthesia techniques can be used as a desirable anaesthetic technique. In the present study, we found that the interscalene brachial plexus block in acromioplasty surgery was found to be effective in post-operative pain relief, intraoperative blood loss and gives lesser discomfort. We recommend that the interscalene brachial plexus block (regional anaesthesia) as the crucial choice of regional nerve blockade during acromioplasty.

Abbreviations

PCIA: Patient-controlled interscalene analgesia
ISB: Interscalene brachial plexus blockade
RA: Regional anaesthesia
RIVA: regional intravenous anaesthesia

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