



Orthopaedics

ANALYSIS OF INTRA-OPERATIVE AND POST OPERATIVE PARAMETERS OF SHOULDER ARTHROSCOPIC PROCEDURES IN BEACH CHAIR POSITION WITH REGIONAL ANAESTHESIA - A RETROSPECTIVE STUDY

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ABSTRACT **Aim:** Retrospective study of intraoperative and post operative factors of shoulder arthroscopic procedures in beach chair position with regional anaesthesia **Methods:** In the study a 75 cases presenting with Different shoulder conditions such as Rotator cuff tear, Shoulder Impingement, SLAP lesion, Shoulder Instability (Bankart's And Hill Sachs's repair) Routine investigations were carried out in order to get fitness for surgery. Consent of the patient was taken. Patients were evaluated clinically along with MRI study and were all operated with Shoulder Arthroscopic Surgery under Regional Block and in Beach chair position only. Evaluated for: VAS Score for pain; Comfort level Based on Sedation and with Beach Chair position; Anaesthesia parameters based on Bezold-Jarisch reflex. **Results:** Shoulder arthroscopic procedures done under interscalene regional block only in beach chair position have a good overall result in almost 80% of the patients in our study **Conclusion:** This study concludes that with good regional block and proper beach chair positioning the patients can undergo shoulder arthroscopic procedures without the need for general anaesthesia

KEYWORDS :

I. INTRODUCTION

Shoulder arthroscopy was first performed in 1931 by the American Dr Michael Burman [1]. He developed techniques on cadavers of which many principles are still practiced today. These include joint distension using fluid or air, the use of traction for distraction and the importance of positioning. The Second World War slowed progression until Dr Masaki Watanabe began to modify arthroscopic equipment in the 1950's [2]. Development during subsequent decades produced smaller diameter arthroscopes, higher quality lenses, fibre-optic light sources and the charge coupled device (CCD) camera [3].

Clinical shoulder arthroscopy developed at a slower rate to that used in the knee, with the first application described by Andren and Lundberg in 1965 for the treatment of frozen shoulder [4]. Watanabe described the posterior portal in 1978 [5] and began to describe the anatomy of the shoulder as viewed through the arthroscope [6]. Conti shortly after described the anterior portal [7]. Shoulder arthroscopy soon became popular, especially in the treatment of dynamic glenohumeral joint and subacromial disorders.

Its use has led to the description of several pathological entities, such as the Superior Labrum Anterior Posterior (SLAP) lesion. The glenohumeral joint (GHJ), subacromial space, acromioclavicular joint (ACJ) and scapulothoracic articulation are all accessible. In addition, neurovascular structures such as the axillary nerve, suprascapular nerve, brachial plexus and axillary vessels are all within reach. Following examination under anaesthetic, a systematic diagnostic arthroscopy should be performed in all cases, before therapeutic intervention is initiated. This ensures all relevant pathology and abnormal anatomy is identified. [8]

II. AIMS & OBJECTIVES

- To evaluate patients pain and comfort level during arthroscopic shoulder procedures in beach chair position, along with post operative pain evaluation.
- To evaluate anaesthetic parameters in all these patients treated with regional block only

III. MATERIALS & METHODS

Source & Method of Data:

It is a Retrospective study done in HOSMAT hospital, Bengaluru Between June 2017 to November 2017. In the study a 75 cases presenting with Different shoulder conditions such as Rotator cuff tear, Shoulder Impingement, SLAP lesion, Shoulder Instability (Bankart's And Hill Sachs repair) Routine investigations were carried out in order to get fitness for surgery. Consent of the patient was taken. Patient were evaluated clinically along with MRI study and were all operated with Shoulder Arthroscopic Surgery under Regional Block and Beach Chair position only.

Evaluated for: VAS Score for pain; Comfort level Based on Sedation and with Beach Chair position; Anaesthesia parameters based on Bezold-Jarisch reflex

VAS score : during procedure, every two hours after the procedure till max 10 hours

Comfort level of patient in beach chair position based on amount of sedation required (ramsay sedation scale)

Bezold-Jarisch reflex (after interscalene block) Comfort level of patient in beach chair position post operatively

Inclusion Criteria:

- Age group : 20 to 70 years
- Gender: Male and female patients.
- Arthroscopic Rotator cuff repair, Subacromial decompression (SAD), SLAP (Superior Labrum antero-posterior tear) lesion, Shoulder Instability (Bankart's And Hill Sachs repair)
- Regional Anaesthesia(Interscalene Block)

Exclusion Criteria:

- Children and adolescent patients <18yrs
- Patients not willing to participate.
- Fractures associated with dislocation

Protocol followed:

Once the patient presented to the OPD first a detailed history was taken about the mechanism of injury, pre-injury shoulder functional status, co-morbidities followed by a detailed clinical examination of the shoulder/ humerus, soft tissue was done. Trauma to other sites was ruled out. Neuro-vascular status was checked. X-Rays and MRI were done along with relevant blood investigations before surgery.

Patient Positioning And Anaesthesia

Two basic positions for shoulder arthroscopy have been described: the lateral decubitus and the "beach-chair" positions. The lateral decubitus position probably is more commonly used because of better access to the posterior shoulder and the relative ease and safety of positioning. [20]

The arm position for arthroscopy of the subacromial space and acromioclavicular joint is slightly different. The arm is brought down to 20 to 45 degrees of abduction and 0 degrees of flexion. This position permits mild inferior subluxation of the humeral head, opening up the subacromial space.

Beach- Chair Position

Skyhar, Altchek, and Warren reported the use of the beach-chair

position and interscalene block anesthesia for 100 shoulder arthroscopies. They noted faster and easier patient positioning, reduced risk of neurapraxias because traction was not used, less distortion of intraarticular capsular anatomy, improved mobility of the patient's arm, and easier conversion to open procedures because repositioning and reparation were not required. The disadvantage of this technique is difficulty in working from posterior portals and decreased cerebral perfusion when hypotensive anesthesia is induced.(25)



In the beach-chair position, either general anesthesia or interscalene block can be used. With an interscalene block, the patient is awake and can assist in controlling his or her head. A commercially available "beach-chair" attachment is used for better control of the patient's head, neck, and torso and increases access to the posterior shoulder. An assistant can control the arm, or a sterile arm-positioning attachment may be used.



Bone landmarks identified and outlined with sterile marking pen.

Portal Placement

The number of described arthroscopic portals for the shoulder has greatly increased as shoulder surgical procedures have become more complex. The nomenclature for various portals often is confusing because authors have used the same descriptive terms for anatomically different portal sites. Before making arthroscopic portals, a thorough understanding of the local anatomy is necessary to prevent damage to neurovascular structures

Arthroscopic portals can be made in the glenohumeral, subacromial, and acromioclavicular joints. The glenohumeral joint portals can be made posteriorly, superiorly, and anteriorly; the subacromial joint portals are placed anteriorly, posteriorly, and laterally; and the acromioclavicular joint can be approached from the subacromial space anteriorly or posteriorly. When making arthroscopic portals, especially if establishing an accessory instrument portal is contemplated, appropriate angle and spacing of the portals are crucial.[29]

Regional Anaesthesia

Interscalene nerve block is typically performed to provide anaesthesia or analgesia for surgery of the shoulder and upper arm. It is not as effective for surgery that involves the C8-T1 nerve roots (ulnar nerve distribution). Although it is possible to do shoulder surgery with interscalene block alone, many practitioners prefer to use it in conjunction with a light general anesthetic. [31]

Indications

Indications for interscalene nerve block include the following:

- Shoulder surgery, such as rotator cuff repair, acromioplasty, Bankart's, SLAP repair, hemiarthroplasty, and total shoulder replacement
- Humerus fracture

Contraindications

Contraindications for interscalene nerve block include the following:

- Patient refusal
- Infection at planned injection site
- Pre-existing neurologic defects
- Local anesthetic allergy
- Coagulopathy
- Contralateral phrenic nerve dysfunction
- Severe chronic obstructive pulmonary disease

Periprocedural Care

Equipment

Equipment for interscalene nerve block includes the following:

- Antiseptic solution: povidone iodine or chlorhexidine gluconate with skin swabs
- Block tray with sterile drape, 1.5% lidocaine ampule, 3-mL syringe, and 25-G needle
- A 22-G 40- to 50-mm insulated nerve block needle with attached injection tubing
- Nerve stimulator
- Ultrasound machine and transducer cover
- Sterile gloves
- Local anesthetic
- Local anesthetic additives

Anaesthesia

Typical local anesthetic solutions for peripheral nerve blocks include lidocaine 1-1.5%, mepivacaine 1-1.5%, bupivacaine 0.25-0.5%, and ropivacaine 0.5%. The author typically prepares 30 mL of local anesthetic for use. Because this block is commonly performed to provide postoperative analgesia, ropivacaine and bupivacaine solutions are more commonly used. They will provide 12-24 hours of postoperative pain relief.

Epinephrine is frequently added to possibly prolong the duration of the block, as well as to add a marker of intravascular injection. Typical ranges of epinephrine are 1:200,000 to 1:600,000. The more dilute 1:600,000 mix may be preferred because of concerns of epinephrine-induced neural toxicity in the case of an intraneural injection.

Positioning

The patient should be positioned with the back mildly elevated and head rotated away. If ultrasound is to be used, it is helpful to put a blanket behind the operative shoulder to elevate it off the bed.

Technique

Ultrasound Guidance

The use of ultrasound can make it easier to locate the brachial plexus, especially in obese patients. It also allows practitioners to see that the local anesthetic is going where they intend it to. For example, it is possible with nerve stimulation techniques to stimulate the plexus while outside the fascial compartment; thus, the local anesthetic injection will not surround the plexus appropriately. It is possible to reduce the total volume of local anesthetic injected if adequate spread is seen, or to redirect the needle if inadequate spread is seen. (33). An ultrasound probe is placed in a sterile sheath. The ultrasound probe is placed above and parallel to the clavicle to locate an image of the subclavian artery and brachial plexus. With the in-plane approach, the needle enters the skin on the lateral aspect of the transducer and is directed within the ultrasound plane towards the brachial plexus. It is also possible to do an out-of-plane approach, by centering the transducer over the plexus, and advancing the needle towards the plexus. With this variation, the needle is not actually visualized, but tissue distortion helps give feedback where the needle is located. See the image below.

Ultrasound and nerve stimulation can be used in conjunction. Once practitioners are comfortable with ultrasound guidance, they tend to be less reliant on nerve stimulation. There are some circumstances where it is desirable not to stimulate the patient so as to reduce movement-caused pain, such as fractures and in the postoperative setting. When using ultrasound guidance, a lower volume of local anesthetic may be

used (i.e., 15-25 mL). Visualization of the adequacy of the spread of local anesthetic helps to determine the volume used. An interesting concern is what constitutes adequate ultrasound location and spread of local of local anesthetic. Spence et al compared the effectiveness of an injection between the middle scalene muscle and brachial plexus sheath (periplexus) with an injection within the brachial plexus sheath (intraplexus) in 170 patients. There was no difference between the 2 groups in block onset times or block quality. After adjusting for sex, age, and volume injected, intraplexus blocks lasted a mean of 2.6 hours (16%) longer (95% confidence interval, 0.25-5.01, $P = .03$) than periplexus blocks.

Complications

Interscalene blocks are generally very safe. They have the same potential complications as any injection of local anesthetic (e.g., infection, hematoma, allergic reaction). However, there are other side effects or complications that are more specific to the interscalene location of injection. When other nearby nerves are contacted by local anesthetic, they may become anesthetized with resultant paresis of innervated structures. This effect is transient, with duration of about the same length as the brachial plexus block. It is possible that low-volume techniques performed with ultrasound may reduce the incidence of these side effects.

Intraoperative Use

Dexmedetomidine attenuates hemodynamic stress response to intubation and extubation by sympatholysis. In view of absent respiratory depression, it can be continued at extubation period unlike other drugs. Dexmedetomidine potentiates anesthetic effect of all the anesthetic agents irrespective of the mode of administration (intravenous, inhalation, regional block).

Intraoperative administration of dexmedetomidine in lower concentrations has reduced the requirement of other anesthetic agents; fewer interventions to treat tachycardia; and a reduction in the incidence of myocardial ischemia. However, side effects like bradycardia and hypotension are limitations to its use necessitating need for pharmacological rescue therapy.

These effects may be attributed to the combined properties of volatile anesthetics such as vasodilatation and myocardial depression. Dexmedetomidine administered in high concentrations may cause systemic and pulmonary hypertension because of direct peripheral vascular effects or may compromise myocardial function and blood pressure.

Bezold-Jarisch Reflex:

The concept of depressor reflexes originating in the heart was introduced by von Bezold in 1867 and was later revived by Jarisch. The Bezold-Jarisch reflex originates in cardiac sensory receptors with nonmyelinated vagal afferent pathways. The left ventricle, particularly the inferoposterior wall, is a principal location for these sensory receptors. Stimulation of these inhibitory cardiac receptors by stretch, chemical substances or drugs increases parasympathetic activity and inhibits sympathetic activity. These effects promote reflex bradycardia, vasodilatation and hypotension (Bezold-Jarisch reflex) and also modulate rennin release and vasopressin secretion.

Ramsey Sedation Scale

If Awake

Ramsey 1 Anxious, agitated, restless

Ramsey 2 Cooperative, oriented, tranquil

Ramsey 3 Responsive to commands only

If Asleep

Ramsey 4 Brisk response to light glabellar tap or loud auditory stimulus

Ramsey 5 Sluggish response to light glabellar tap or loud auditory stimulus

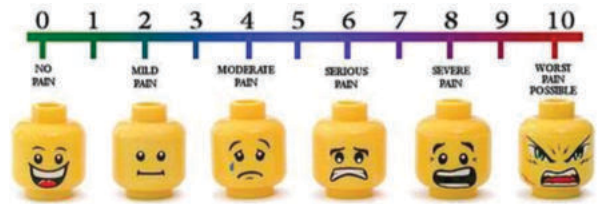
Ramsey 6 No response to light glabellar tap or loud auditory stimulus

Vas (Visual Analogue Score)

A Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured.

How severe is your pain today? Place a vertical mark on the line below to indicate how bad you feel your pain is today.

No pain | _____ | Very severe pain



IV. Data Analysis

We conducted a retrospective analysis of all shoulder arthroscopic procedures done under regional block in beach-chair position in our institute from June 2017 to November 2017. Total of 75 cases were operated. Our results and interpretation are as follows:

In our study, we found that out of 75 patients, 33.33% i.e. 25 patients were male whereas the rest 66.33% i.e. 50 were females.

Age Distribution:

4 patients - 21 years,
13 patients - 21 to 30 years,
18 patients - 31 to 40 years,
8 patients - 41 to 50 years,
18 patients - 51 to 60 years and
14 patients - 61 to 70 years.

Mechanism Of Injury:

32% i.e. 24 patients had degenerative tear,
36% i.e. 27 patients had sports injury and
The rest 32% i.e. 24 patients had accidental injuries or falls.

Vas Scoring As Per Number Of Patients In Percentage:

VAS Score	No pain	Mild	Moderate	Serious	Severe	Worst
VAS Intraoperative	77.33% (58)	16% (12)	4% (3)	1.33% (1)	Nil	Nil
VAS 2 Hour Post Operative	77.33% (58)	17.33% (13)	4% (3)	1.33% (1)	Nil	Nil
VAS 4 Hour Post Operative	73.33% (55)	18.67% (14)	5.33% (4)	1.33% (1)	1.33% (1)	Nil
VAS 6 Hour Post Operative	24% (18)	52% (39)	17.33% (13)	5.33% (4)	1.33% (1)	Nil
VAS 8 Hour Post Operative	2.67% (2)	21.33% (16)	50.67% (38)	18.67% (14)	5.33% (4)	Nil
VAS 10 Hour Post Operative	Nil	2.67% (2)	21.33% (16)	50.67% (38)	18.67% (14)	6.67% (5)

After the regional anaesthesia, the patients had post operative pain relief for an average of 6-8 hours after which they required additional pain relief.

Beach chair position comfort level intra operative based on Ramsey sedation scale

The patient comfort level was evaluated based on the amount of sedation required to make the patient free of intra operative pain and also restlessness in to beach chair position.

Ramsey Sedation Scale was transformed to,

A: No Sedation Needed

Ramsey 5

Sluggish response to light glabellar tap or loud auditory stimulus

Ramsey 6

No response to light glabellar tap or loud auditory stimulus

B: Needs Minimum Sedation

Ramsey 3

Responsive to commands only

Ramsey 4

Brisk response to light glabellar tap or loud auditory stimulus

C: Needs Maximum Sedation

Ramsey 1

Anxious, agitated, restless

Ramsey 2

Cooperative, oriented, tranquil

In our study we found that 73.33% of patient didn't need any sedation during the procedure, 18.67% needed mild sedation and 8% required maximum sedation.

Beach chair comfort level post operative (based on patients opinion)

All the patients were analysed after the procedure and enquired about the beach chair comfort level during the procedure. Our study showed that 71% of the patients were comfortable and 29% were not comfortable

Post-regional anaesthesia parameters

The patients were evaluated intraoperatively by anaesthetists for reflex bradycardia, vasodilatation and hypotension (BEZOLD-JARISCH REFLEX). In our study 82.67% of the patients did not have any variation in such parameters except 17.33 % patients' bradycardia, vasodilatation and hypotension which were managed immediately with no further complication and patient withstood the procedure well.

RESULTS

Evaluating all these above said criteria patients were further categorised. Shoulder arthroscopic procedures under regional block done in beach chair position showed Good result in 78.67 %, satisfactory result in 16% and Poor result in 5.33% patients.

V.CONCLUSION

In our study, Shoulder arthroscopic procedures done under interscalene regional block in beach chair position had a good overall result in almost 80% of the patients. As patient is awake, he has a feeling of comfort, safety and awareness regarding the procedure. According to anaesthetists, regional anaesthesia in shoulder arthroscopic surgery is safe and patients are easier to monitor. It also gives the patient good post operative pain relief as most of the patients had at least 6 to 8 hours of pain free period. The surgeon also has an option of discussing the intraoperative findings with the patient and changing the procedure if needed. Thus, this study concludes that with good regional block and proper beach chair positioning the patients can undergo shoulder arthroscopic procedures without the need for general anaesthesia

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