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Original Research Article

A comparative study between combination of platelet rich plasma (PRP) and suprascapular nerve block vs steroid and suprascapular nerve block in management of periarthritis of shoulder joint

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ABSTRACT

Background: Adhesive capsulitis, another name for periarthritis or frozen shoulder. Periarthritis affects over 2–5% of people, with a higher prevalence in those between the ages of 40 and 60. It is managed using a variety of therapy approaches.This study compared the effects of PRP and suprascapular nerve block versus steroid and suprascapular nerve block in the treatment of periarthritis.

Aim and Objectives: To compare the efficacy of PRP and suprascapular nerve block VS steroid and suprascapular nerve block in the management of periarthritis shoulder joint.

Materials and Methods: 60 patients who were clinically diagnosed with periarthritis shoulder and willing to participate were divided into two groups at random from the outpatient department (OPD) of the orthopedic department at Tezpur Medical College and Hospital. Prior to recruiting, a formal informed consent form was acquired**.**

Results : Significant clinical improvement was found in the study comparing the effectiveness of PRP and suprascapular nerve block versus steroid and suprascapular nerve block in treating frozen shoulder. Group 1 (the steroid group) had better early outcomes at 4 and 12 weeks based on VAS scores ($p = 0.0048$, $p = 0.0001$), while Group 2 (the PRP group) had better results at 24 weeks in both VAS and DASH scores ($p = 0.0001$). Periarthritis was more common in females and primarily affected the non-dominant side in both groups.

Conclusion: For periarthritis, intra-articular injections of PRP and suprascapular nerve block, as well as steroid and suprascapular nerve block, are useful in lowering pain and disability scores as measured by VAS and DASH ratings. While PRP demonstrated superior results in long-term outcomes (24th week analysis), the triamcinolone group demonstrated superior effects in short-term outcomes (12th week analysis). Future studies comparing single versus numerous injections, as well as simultaneous steroid and PRP injections, must have a large sample size in order to improve the study's power and robust design.

1. Introduction

Adhesive capsulitis, another name for periarthritis shoulder, is a disorder characterized by stiffness and pain in the shoulder joint that restricts range of motion and everyday activities.[1] With a complicated etiology and multiple underlying causes, such as trauma, post-operative disorders, or even extended immobility, the management of frozen shoulder is still up for discussion among medical professionals and researchers.[2] Of the many potential therapies, two methods—intraarticular corticosteroid injection and suprascapular nerve block—have become

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well-known for their ability to effectively manage pain and enhance function.[3] There are so many uncertainty surrounds the pathophysiology of frozen shoulder.

Fibrosis and rigidity of the glenohumeral joint capsule are the disease's hallmarks, but inflammation is increasingly thought to be a key factor in both its genesis and progression.[4] The inflammation, which frequently manifests without a discernible cause, causes pain and impairs function, which emphasizes the need for anti-inflammatory treatments such corticosteroid injections.[5]For many years, orthopedic practitioners have used intraarticular corticosteroid injections as a common treatment for a number of excruciating joint disorders, including frozen shoulder.[6] By decreasing inflammation, these injections relieve pain and improve joint function. Corticosteroid injections have been shown in numerous studies to improve range of motion and pain scores in patients with adhesive capsulitis both immediately and over time.[7] Though the symptom relief is evident, some detractors contend that it is unclear how it will affect long-term functional outcomes and disease resolution.[8] suprascapular nerve block, on the other hand, has become a useful treatment choice. From the top trunk of the brachial plexus, the suprascapular nerve supplies sensory innervation to much of the shoulder joint.[9] It is possible to greatly decrease shoulder pain signals by inhibiting this nerve. It is a good substitute for corticosteroid injections because clinical studies have shown both instant pain alleviation and increased range of motion after the block.[10] In addition, a number of physicians are increasingly promoting its wider application in clinical practice due to its comparatively low systemic adverse effects and capacity to provide long-lasting comfort.[11]The purpose of this trial was to determine how well prp and suprascapular nerve block worked together against steroid and suprascapular nerve block for the treatment of periarthritis.

2. Materials and Methods

2.1. Setting

Dept of Orthopedics, Tezpur Medical College, Tezpur, Assam

2.2. Study design

The effects of two distinct periarthritis management methods on patients were examined in this study using a comparative design.

It was a prospective, open, blinded end-point (PROBE), parallel-group, single-center clinical investigation. Utilizing a computer-generated sealed envelope website, randomization was carried out in permuted blocks of different.[12,13] The randomization process was central, and the individual conducting it was not involved in the research. For each new patient recruited, the intervention assigning investigator called the randomizer to inquire about the patient's allocated group. A different researcher (not the one who assigned the intervention) evaluated the patients' results without knowing which trial group they were in. After ensuring adequate randomization, patients were recruited to various treatment regimens. The treatment plans were identifiable to patients and doctors, in contrast to double-blind research. Group 1 showed a little better improvement in DASH scores after four weeks of injection, but there was no significant difference between the two groups ($p = 0.069$).

2.3. Participants

Two groups of sixty patients who were willing to participate and had a clinical diagnosis of periarthritis shoulder from the outpatient department (OPD) of the orthopedic department at Tezpur Medical College and Hospital were randomly assigned. Prior to recruitment, signed informed consent about participation was acquired. Prior to recruiting, the researcher presented the entire study process to each participant in their native language.

An open-source calculator called Open Epi, Version 3, was used to determine the sample size. It was based on the results of a study by Kothari et al., which showed that the mean VAS score for the PRP and steroid groups was 17. Each group's estimated sample size was 29 (Table 2). 60 people (30 in each group) was the final sample size, rounded to the nearest.

No of patients n=138

Investigated n=111

Denied participation n= 27

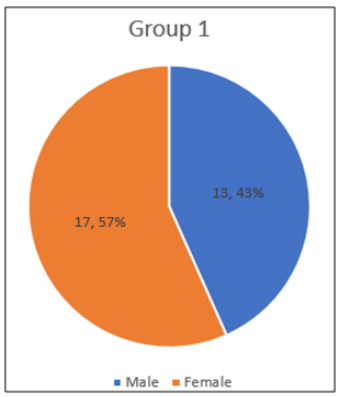
Total excluded n= 51, n=7 History of injection in shoulder joint in last six months

n=12 used NASID in last six months n=3 patients having hematological disorder

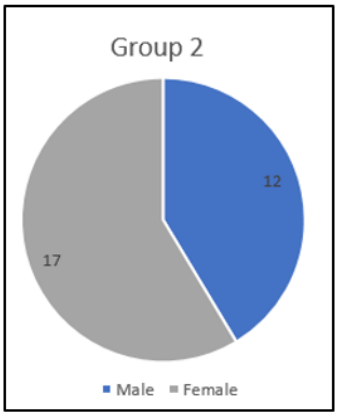
n=29 other reasons included n=60

PRP and suprascapular nerve block group n=30, steroid and suprascapular nerve block n=30

So the total sample size was 60



Graph 1: Group 1: Steroid and suprascapular nerve block



Graph 2: Group 2: PRP and suprascapular nerve block

2.4. Procedure

Under aseptic conditions, platelet-rich plasma (PRP) is prepared from the patient's blood through centrifugation. (Figure 1) The PRP is then injected into the affected shoulder area, targeting tendons or joints, followed by a suprascapular nerve block administered using local anaesthetic near the suprascapular notch under ultrasound guidance. (Figure 2a,b)

Figure 1: platelet concentrate at bottom after second centrifuge

A corticosteroid (e.g., triamcinolone with lignocaine) is injected into the target area to reduce inflammation. This is followed by a suprascapular nerve block using local anaesthetic.

Both procedures aim to alleviate pain and improve shoulder function, with distinct mechanisms of action.

3. Results

The patients with frozen shoulders were aged from 33 to 67 years. The Table 1 shows the incidence of the disease was higher in the fifth decade of life (46.67%). The mean age of the patients was 47.25 ± 8.38 years (in Group 1 and group 2 treatment groups). The incidence of the disease was

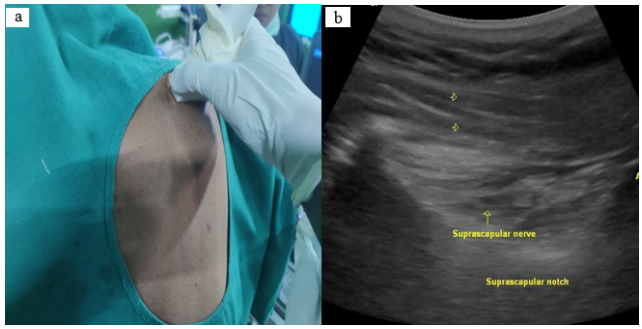


Figure 2: a: Method of SSNB; **b**: Suprascapular notch under USG

higher in females (58.33%) compared to males (41.67%). In the triamcinolone group, there were 56.67% females, while in the PRP group, there were 60% females.Among 60 patients, 30 received prolotherapy prp and suprascapular nerve block and 30 received steroid and suprascapular nerve block for frozen shoulder. (Graph 1) Table 2 represents the outcome analysis of both groups. In the first follow-up (four weeks), the mean VAS score in the triamcinolone group (Group 1) was 46.27 ± 8.17 while it was in 51.70 ± 6.02 in the PRP group (Group 2). This significantly shows better improvement of pain with triamcinolone injection ($p = 0.0048$)

In the second follow-up (12 weeks), the mean VAS score in the PRP group was 43.23 ± 4.01 while it was 31.83± 10.31 in the group 1 This significantly showed better improvement of pain with Steroid and suprascapular nerve block injection ($p = 0.0001$) after 12 weeks. However, in the third follow-up (24 weeks), the mean VAS score PRP groups was 14.33 ± 3.79 and steroid group was31.63 ± 7.62,whichshowed a significantly better improvement in the VAS score in the group 2 ($p = 0.0001$).

For DASH scores (Table 2), after four weeks of injection, the group 1 shows somewhat better improvement, although there was no significant difference in both groups ($p = 0.069$). After 12 weeks of injection, the group 2 showed somewhat better improvement, although no significant difference was found between the groups ($p = 0.075$). At the third follow-up (24 weeks), the mean DASH score in both the groups was31.76± 3.63 and18.08 ± 8.08, respectively, which showed significant improvement in the DASH score in the PRP group ($p = 0.0001$).

Figure 3 (a) to (c) showing the clinical image of Flexion, Abduction and External rotation of shoulder before the intervention of PRP and SSNB

Figure 4 (a) to (c) showing the clinical image of Flexion, Abduction and External rotation of shoulder before the intervention of Steroid and SSNB

Figure 5 (a) to (c) showing the clinical image of Flexion, Abduction and External rotation of shoulder after the intervention of PRP and SSNB and Figure 6 (a) to (c) showing the clinical image of Flexion, Abduction

Table 1: Clinicodemo graphic characteristics

Variables	Group 1	Group 2	p value
Age	46.70 ± 7.13	47.8 ± 9.56	0.615*
Sex			
Male	13	12	0.793*
Female	17	18	
Involved side			
Dominant	12	10	0.592*
Non dominant	18	20	
Duration of symptoms in months	3.217 ± 0.887	3.567 ± 1.015	0.160*
History of diabetes mellitus			
Present	14	13	0.7952*
Absent	16	17	

Table 2: Outcome assessment

Vas score	Group 1	Group 2	Mean difference	P value
Baseline	69.63 ± 6.46	67.40 ± 4.87	2.23(-0.73, 5.18)	0.136
4^{TH} Week	46.27 ± 8.17	51.70 ± 6.02	5.43 ±(-8.89,-1.97)	0.0048*
12^{TH} Week	31.83 ± 10.31	43.23 ± 4.01	11.40 (7.36, 15.44)	0.0001*
24^{TH} Week	31.63 ± 7.62	14.33 ± 3.79	17.30 (-20.41, -14.19)	0.0001*
Dash score				
Baseline	75.36 ± 6.49	77.63 ± 7.18	2.27 (-1.26, 5.81)	0.2040
4^{TH} Week	42.40 ± 5.58	45.03 ± 5.45	2.63 (-0.22, 5.48)	0.0699
12^{TH} Week	36.50 ± 4.86	34.36 ± 4.27	2.14 (-4.504, 0.224)	0.0752
24^{TH} Week	31.76 ± 3.63	18.08 ± 8.08	13.70 (-16.93, 10.46)	0.0001*

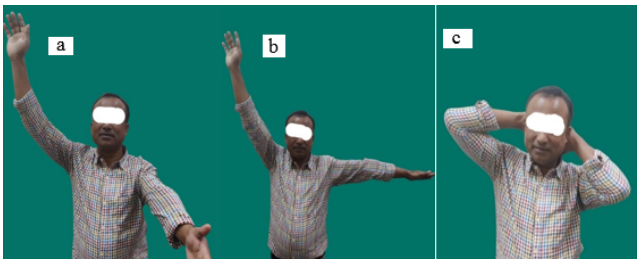


Figure 3: Day 0 in PRP and suprascapular nerve block: **a:** Flexion; **b:** Abduction; **c:** External rotation

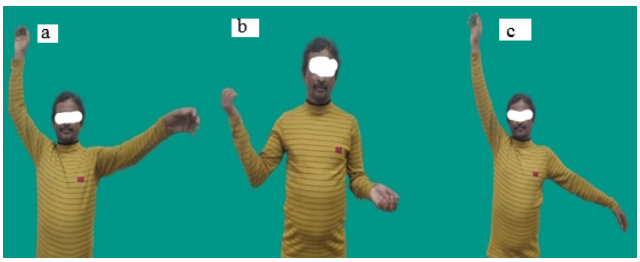


Figure 4: Day 0 in Steroid andsuprascapular nerve block; **a:** Flexion; **b:** External rotation; **c:** Abduction

and External rotation of shoulder after the intervention of Steroid and SSNB.

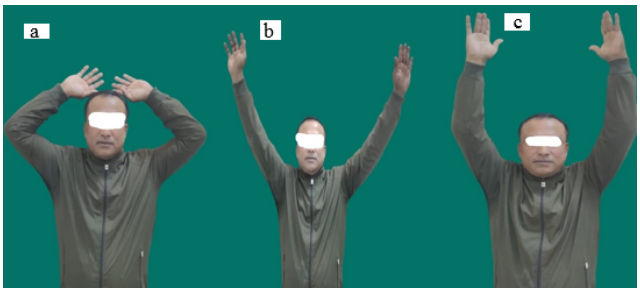


Figure 5: 6 month in PRP and suprascapular nerve block group; **a:** External rotation; **b:** Abduction; **c:** Flexion

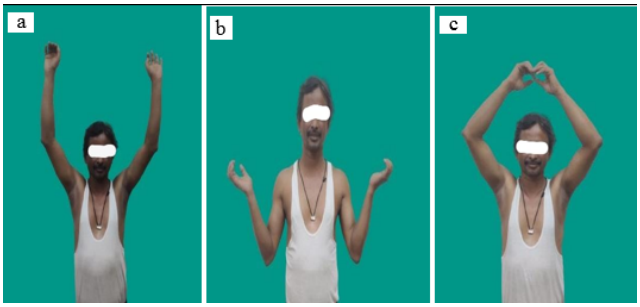


Figure 6: 6 month in Steroid and suprascapular nerve block group; **a:** Abduction; **b:** External rotation; **c:** Flexion

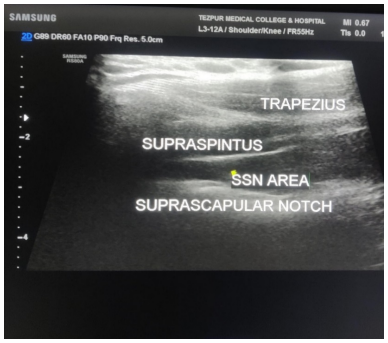


Figure 7: USG of Suprascapular area after 6 months

4. Discussion

Frozen shoulder is one of the most common cause of the gradual onset of pain and stiffness with loss of active and passive movement of the glenohumeral joint.[12] Various treatment modalities are used for the management of periarthritis, e.g., physiotherapy, intra-articular injections, oral and injectable corticosteroids, MUA, hydro dilation, and surgery. This study compares the effect of intra articular injections PRP and suprascapular nerve block group of versus steroid and suprascapular nerve block.

Our study reported that periarthritis mostly occurred in female patients than males, which is similar to a previous study.[13]The side of the joint affected by periarthritis was higher on the non-dominant side. A total of 38 (63.33%) patients had affected joints by periarthritis on the non-dominant side. Moreover, the majority of the studies showed a higher prevalence rate on the non-dominant side.[14] About 45% of patients with periarthritis had diabetes mellitus as comorbidity, while 8.33% of patients had hypertension.

In our study, we assessed the VAS and DASH scores at baseline, 4th, 12th, and 24th weeks. We found that the VAS score showed significant improvement in the group 1 ($p = 0.0048$ and $p = 0.0001$, respectively) than in the group 2 at four and 12 weeks. The DASH score was reduced in both groups in the4th week ($p = 0.0699$) and 12th week ($p = 0.0752$), but the improvement was statistically not significant.

However, in a study by Barman et al., there was no significant difference at the end of three weeks after a single dose of PRP injection or steroid injection. However, PRP was found to be more effective than corticosteroid injection at 12 weeks in pain and disability score improvement.[15] At 24 weeks, both the VAS and DASH scores showed significant improvement in the group 1 to the as compared to group 2 ($p = 0.0001$). Our result was similar to previous studies by Kothari et al. and Kumar et al. A case study by Aslani et al. in 2016 also reported good results with PRP in the frozen shoulder. Evidence of PRP administration in periarthritis is continuously emerging.[16]

In their systematic review, Griesser et al. reported that the use of steroids significantly improved the forward elevation and abduction temporarily, as well as short-term and long-term pain reduction assessed through the Shoulder Pain and Disability Index (SPADI) and VAS scores.[17] Our study has added support to this growing technique. The study showed that at the 12th week, both the steroid and PRP groups improved the VAS and DASH scores. However, the steroid group had a better outcome in the 12th week, while in the 24th week, the PRP group showed better outcomes.

5. Strength and Limitations

In this study, the standardized technique for PRP preparation was used and comparisons were done with the conventionally used treatment. All intra-articular injections were administered by a single experienced clinician. Evaluation of pain and disability outcomes was done at several time points over up to 24 weeks for high-quality evidence of the effect of PRP and corticosteroid injections. Despite the carefully designed protocol for the study, there are some limitations to this study. The study did not explore cost analysis. All stages of periarthritis were included in our study; therefore, further studies are needed to compare the effect of these interventions in different stages of periarthritis. This study was conducted on single injections of steroids and PRP as most of the studies on periarthritis were based on single intra-articular injections.[17]

6. Conclusions

Intra-articular injections of PRP and suprascapular nerve block injection and steroid and suprascapular nerve block for periarthritis are effective in reducing pain and disability scores in terms of VAS and DASH scores. The triamcinolone group showed a better effect in short-term outcomes (12th-week analysis) whereas PRP showed better results in long-term outcomes (24th-week analysis). (Fig.7) A large sample size study to enhance the power of the study with robust design must be conducted in the future that compares single versus multiple injections as well as both steroid and PRP injections simultaneously.

7. Ethical No.

083/2023/TMC&H

8. Source of Funding

None.

9. Conflict of Interest

None.

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