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Original Research Article

Intra-Substance Steroid Injection for Full-Thickness Supraspinatus Tendon Rupture

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Abstract: *Full-thickness rotator cuff tears, particularly of the supraspinatus tendon, cause significant pain and disability. Although corticosteroid injections are widely used for shoulder pathologies, their role in managing complete tendon ruptures remains controversial.* ***Objective:*** *To evaluate the efficacy and safety of local corticosteroid injection in improving pain and functional outcomes among patients with full-thickness supraspinatus tears.* ***Methods:*** *This prospective interventional study was conducted in the Orthopedic Unit of Hayatabad Medical Complex, Peshawar, from February 20 to September 21, 2024. A total of 18 patients with full-thickness supraspinatus tears, as determined by clinical assessment and MRI findings, were enrolled after obtaining informed consent. Each patient received an ultrasound-guided injection of 1 ml of 2% xylocaine mixed with 1 ml of Depo-Medrol® (methylprednisolone acetate 40 mg/ml) at the tear site. Pain and functional outcomes were assessed using the Visual Analogue Scale (VAS) and the Shoulder Pain and Disability Index (SPADI) before the injection, 2 weeks after, and 3 months after. Data were analyzed using descriptive statistics and comparative analysis of pre- and post-injection scores.* ***Results:*** *The mean baseline SPADI pain score was 63 (range: 52–72), SPADI disability score 49.66 (34–65), SPADI total score 47.4 (31–62), and VAS score 6.5 (5–8). At three months post-injection, significant improvement was observed, with the SPADI pain score reduced to 34.5 (20–49), the disability score to 30.5 (18–43), the total score to 32.5 (19–47), and the VAS score to 4 (3–6). No serious adverse effects were reported.* ***Conclusion:*** *A combined injection of corticosteroid and local anesthetic directly into the ruptured supraspinatus tendon significantly reduces pain and enhances shoulder function in patients with full-thickness rotator cuff tears, offering a safe and minimally invasive therapeutic option.*

Keywords: Steroid injection, Supraspinatus tears, Shoulder pain

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Introduction

A vital collection of tendons and muscles that envelop the shoulder joint, the rotator cuff is essential for stabilising and enabling a variety of shoulder motions. The rotator cuff, which is made up of the supraspinatus, infraspinatus, teres minor, and subscapularis, functions in concert with the other muscles to preserve the structural integrity and functionality of the shoulder complex. This complex web of tissues permits motions such as raising, extending, and turning the arm, as well as stabilising the shoulder joint.

Rotator cuff injuries are frequently brought on by trauma, degenerative changes, wear and tear from ageing, and repetitive overhead motions. Overuse injuries can cause gradual deterioration of the rotator cuff tendons, leading to inflammation or microtears. These injuries are frequently seen in athletes who play sports such as baseball, tennis, or swimming. On the other hand, acute injuries can occur rapidly and result in tears of one or more rotator cuff tendons. Examples of these injuries include falls and carrying heavy objects. As people age, their risk of rotator cuff injury rises.

Any therapy aims to lessen discomfort and restore function. NSAIDs, physical therapy, strengthening exercises, rest, activity adjustment, and steroid injection are examples of nonsurgical treatment alternatives. The main benefit of nonsurgical treatment is avoiding surgical risks, such as infection, postoperative stiffness, a prolonged recovery period, and complications from anesthesia. The primary indication for surgery is persistent pain. Surgical surgery or joint replacement may be necessary if conservative measures to treat the torn rotator cuff are unsuccessful.

A torn rotator cuff releases inflammatory cytokines, such as tumour necrosis factor α, interleukin 1β, and interleukin 6, which can be suppressed with steroids. Steroid injection therapy for full-thickness rotator cuff tears is still debatable, though. Steroids have been demonstrated in vitro to cause necrosis in fibroblasts and tenocytes (1). Steroids can reduce cellular capacity for tendon repair and alter cellular differentiation (2). Some animal Model studies of rotator cuff tears showed that a single dose of steroid injection significantly weakened injured rat rotator cuff tendons in the acute phase. Still, this effect is transient, as biomechanical properties returned to control levels (3). However, repeated steroid injections may damage rat rotator cuffs and potentially harm tendon cells (4, 5).

Methodology

The study was conducted in the orthopedic unit of Hayatabad Medical Complex from 20 February 2024 to 21 September 2024, after approval from the hospital ethical committee. Eighteen patients with a full-thickness supraspinatus tear were enrolled in the study after providing informed consent. Of these 18 patients, 16 (88.88%) were male, while 2 (11.11%) were female. The mean age of the patients was 43.27±2.9 years. 12 (66.66%) out of 18 patients had right shoulder involvement, while 6 (33.33%) had left shoulder involvement. Of the 18 patients, 14 (77.77%) had traumatic rupture, while 4 (22.22%) had sports-related rupture. Diagnosis of a full-thickness supraspinatus tear was made with the patient's history, physical examination, and MRI of the shoulder. Patients with a prior history of fracture around the shoulder, dislocation, or prior shoulder surgery were excluded from the study. A cocktail of 1ml of Local anesthetic (2% xylocaine) mixed with 1ml of Corticosteroid (Depo-Medrol®, containing Methylprednisolone acetate 40mg/ml) was used. The Pain Visual Analogue Scale (VAS) and Shoulder Pain and Disability Index (SPADI) scores were measured and compared at baseline, 2 weeks, and 3 months after the injection.

A 5cc syringe was filled with a mixture of 1ml of 2% xylocaine and 1ml of methylprednisolone acetate (Depo-Medrol® 40mg/ml). The skin was cleansed using alcohol and chlorhexidine wipes (medipal®). The injections were done from the lateral side. While the patient was sitting upright, a 22-gauge needle was guided to the subacromial bursa adjacent to the supraspinatus tendon. The corticosteroid-local anesthetic cocktail was injected. Saniplast bandage® was applied to the injection site.

Results

The average SPADI pain score was 63 (ranging from 52 to 72), the average SPADI disability score was 49.66 (ranging from 34 to 65), the average SPADI total score was 47.4 (ranging from 31 to 62), and the average VAS score was 6.5 (ranging from 5 to 8).
The average SPADI pain score was 34.2 (ranging from 25 to 48), the average SPADI disability score was 27.6 (ranging from 20 to 39), the average SPADI total score was 30.0 (ranging from 21 to 43), and the average VAS score was 4.5 (ranging from 3 to 7).
The average SPADI pain score was 34.5 (ranging from 20 to 49), the average SPADI disability score was 30.5 (ranging from 18 to 43), the average SPADI total score was 32.5 (ranging from 19 to 47), and the average VAS score was 4.5 (ranging from 3 to 6).

Table 1: Gender based frequencies and percentages

Gender	Frequency	Percentage
Male	16	88.88%
Female	2	11.11

Table 2: Laterality of the involved shoulder

Laterality	Frequency	Percentage
Right	12	66.6%
Left	6	33.3%

Table 3: Causes of supraspinatus tendon rupture

Cause of rupture	Frequency	Percentage
Trauma related	14	77.77%
Sports related	4	22.22%

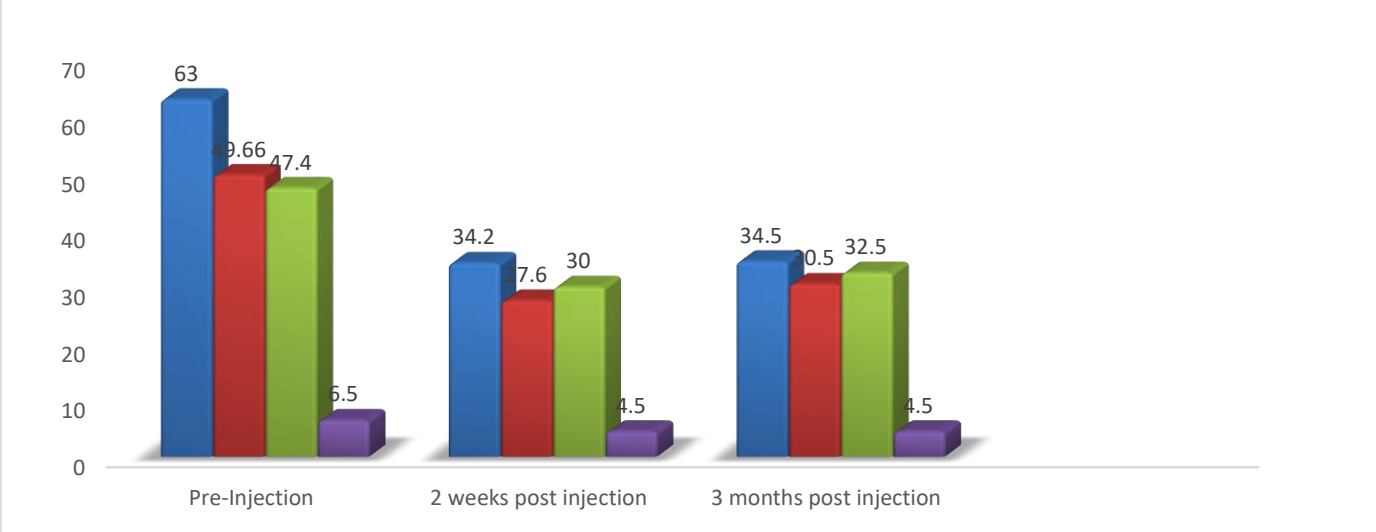

Figure 1: Graphical representation of pre- and post-injection scores statistics

Discussion

According to our research, an injection into the region where the supraspinatus tendon ruptured successfully decreased discomfort and enhanced shoulder function. This course of treatment is still controversial, though. Numerous studies have been conducted both in favor of and against the usage of steroids.
Steroids are a useful treatment for rotator cuff problems, according to numerous studies. Cook et al. demonstrated that steroid injections were more effective than local anesthesia alone for short-term outcomes up to 8 weeks, but no difference was observed beyond that time. Hart discovers that steroids are more effective than placebos at temporarily relieving pain (7). Arroll et al., however, demonstrate the effects of steroid injections for up to nine months (8). In our study, despite a short time frame, there was a significant improvement in pain and functional status.
Moreover, rotator cuff issues can be safely treated with steroid injections (but not tears). Lopez-Chavez et al. have demonstrated that shoulder discomfort can be quickly and effectively treated with ultrasound-guided steroid injections (9). In Yamaguchi et al.'s study, Injections of hyaluronic acid or steroids have been shown to reduce pain more effectively than saline (10). Steroid injections and hyaluronic acid can both lessen discomfort (10). Additionally, a study by Garg et al. found that steroids rapidly reduced pain in rotator cuff tendonitis (11). Pedro et al. discovered that following rotator cuff rupture surgery, steroid injection offered instant pain relief and avoided the need for morphine without carrying a sizable risk (12). Kim et al. additionally demonstrated that steroid injection is useful for reducing discomfort, stiffness, and range of motion in the shoulder following arthroscopic rotator cuff surgery without compromising the structural integrity of the procedure (13).

Conclusion

Injecting a cocktail of steroid and local anesthetic into the ruptured portion of the supraspinatus tendon can alleviate discomfort and improve function in patients with full-thickness rupture. A small sample size and fewer follow-ups were the main limitations of this study. Further studies with large sample sizes and long follow-up are needed to fully assess the efficacy of steroid injection in full-thickness supraspinatus rupture.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-23)

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Conflict of interest

The authors declared no conflicts of interest.

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Manuscript drafting, Study Design,
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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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