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External Rotation Brace Combined with a Physiotherapy Program for First Time Anterior Shoulder Dislocators; A 2 year Follow-up

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CASE SERIES

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Abstract

Background

There are a multitude of international studies that have considered the rates of redislocation and instability of shoulders managed non-operatively vs. operatively after first time anterior dislocation. Initial management has included no treatment, internal rotation sling immobiliser, external rotation brace and early or late stabilisation. The majority of those managed in internal rotation or with no support initially have had poor long term results.

There are several small trials of the use of the External Rotation Brace that have shown promising results comparable to acute surgical stabilisation.

The use of the External Rotation brace for first time anterior dislocators in the 15-40 years age group was initiated to attempt to reduce the rates of redislocation and instability without requiring surgical intervention.

Method

Consecutive patients that fit the selection criteria were selected and followed over time. A physiotherapy program was initiated early in the management and regular clinic reviews undertaken. 2 years post first time anterior dislocation, patients were reviewed subjectively and a Quick DASH score performed. They were asked to give an estimate of their recovery and report any redislocations, instability or subluxation.

Results

There was 1 redislocation (3%) during this period in the 32 patients. The majority were functioning at predislocation levels at review and no surgical intervention for instability was required. Quick-Dash results were excellent, with a vast majority scoring less than 2/100 level of disability. Estimated recovery scores supported these findings with the majority of patients reporting 90-95% recovery compared with the unaffected side.

Conclusion

The external rotation brace has proven to be an excellent alternative to early shoulder stabilisation for first time anterior dislocators in the 15-40 years age group.

Key Words

Glenohumeral dislocation, instability, rehabilitation, recurrence, shoulder brace

Background

For thousands of years, shoulder dislocations have been managed conservatively, with a bandage or sling in an internally rotated position, or offered no definitive treatment. This has been proven in the literature to provide poor functional outcomes.[1,3,4,7,8,15,16,17,18,19,20] Recent improvements in surgical stabilisation have lead to research comparing shoulder stability post acute surgical stabilisation with traditional management. The results of these studies indicate a great reduction in instability and improved return to high level function with acute surgical intervention in this age group.[2,5,13,14,21]

The surgical stabilisation attempts to restore the anterior capsule and labrum to maintain the stability of the glenohumeral joint. Surgical stabilisation is an expensive, resource intensive operation, not without risks. An alternative has been sought that is not surgical but has comparable results in terms of redislocation and instability rates.

Itoi et al has proposed that bracing the Gleno-humeral joint in external rotation would restore the anatomy of the labrum and capsule in order to allow scar development and healing of soft tissues avoiding the necessity of surgical stabilisation.[10, 11, 12] He published several studies, showing anatomical dissection models and using magnetic resonance imaging (MRI) to confirm his theory. He then performed a randomised controlled trial of 42 patients, comparing the use of internal rotation slings (traditional) with external rotation braces for 1st time dislocators. His findings indicated redislocation rates of 26% at an average of 2 years post dislocation for the patients braced in external rotation, compared with approximately 50% when patients were managed in an internal rotation brace. These findings indicate that the requirement for shoulder stabilisation for recurrent dislocators may decrease by up to 50% if all patients are treated initially with an external rotation brace.

These results, allied with the need to utilise Orthopaedic and Emergency Department resources effectively, lead to the introduction of the external rotation brace for all first time anterior shoulder dislocators that fit our selection criteria. The protocol was initiated in conjunction with the Emergency Physicians and physiotherapy department.

The purpose of this study was to examine the rate of recurrence of shoulder dislocation, investigate patient satisfaction with outcomes achieved, and define functional return to activity at 2 years in the cohort of first time anterior shoulder dislocators, presenting at a metropolitan emergency department.

Method

Participants

The study involved a clinical cohort of consecutive patients presenting to a metropolitan emergency department during the period between January and July 2007. The inclusion criteria for participation in the study included; age between 15 and 40 years old, a traumatic first time anterior shoulder dislocation, confirmed with radiographic evidence of dislocation and subsequent relocation, and availability and application of an external rotation brace. Patients were excluded if they had a previous dislocation of the affected shoulder, refused to have the brace applied or no brace was available at time of joint reduction.

This study was conducted at a Metropolitan Public Hospital. Follow up was achieved for the majority of patients. 32 of the initial 35 treated were reviewed subjectively at a minimum of 2 years post dislocation in a clinic by an Orthopaedic Surgeon. The mean time until review was 2 years 3 months, with a range between 2 years 1month and 2 years 6 months. Three patients were unable to be followed as they had moved from the region and were unable to be contacted, or were unable to attend a review appointment.

The average age of patients was 26 years, with the youngest being 16 years old and the eldest being 38 years old at the time of initial dislocation. Males made up 29 of the 32 followed. Functional demand on the injured shoulder varied with 1 professional athlete (water skier) being involved, 26 social sportsmen or surfers and the remaining 5 were sedentary individuals who participated in no physical activities greater than walking before the dislocation was suffered. The mode of dislocation varied but significant trauma was involved in all cases. (See figure. 1)

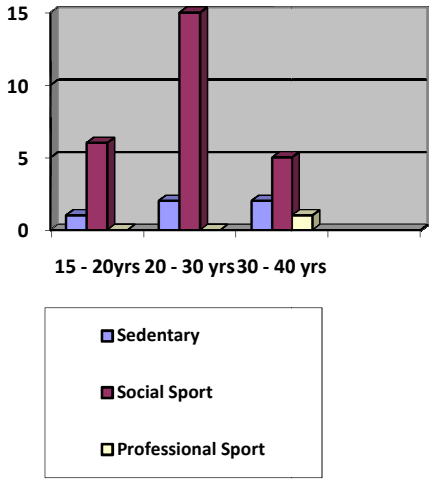

Figure 1.

Procedure

The Emergency physicians were responsible for the reduction of the dislocations, and the initial application of the brace. A variety of reduction techniques were used. The patients were then educated in the application of the brace, to approximate 10 degrees of external rotation, and given a handout of how to apply and remove the brace. A poster displaying the brace, its application and the program of rehabilitation was available in the Emergency Department. (Figure. 2)

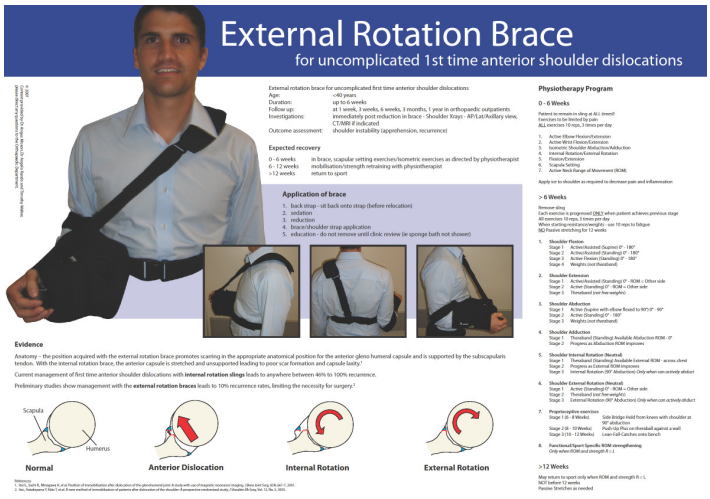

Figure 2.[6,10,11,12,16,18]

The Emergency Department physiotherapist was then involved to reinforce the importance of compliance with the brace for the full 6 weeks, and to indicate what the rehabilitation protocol entails. A second handout was then given, detailing the expected periods of immobilisation and rehabilitation, with the relevant clinic appointments.

At **1 - 2 weeks** post dislocation, the patients were reviewed in the Orthopaedic outpatients' clinic and the physiotherapy department. At this appointment, the position of immobilisation was checked, compliance with the brace encouraged and isometric exercises begun. Routine subjective and objective examination was performed. Regular physiotherapy follow up appointments were made with the goal of ensuring correct exercises were being performed to re-educate the scapula stabilisers, develop core stability and minimise rotator cuff wasting.

At **6 weeks** post dislocation, the patients were again reviewed and the rehabilitation program started in earnest, with the removal of the brace and progression to an exercise program to encourage range of motion and strengthen rotator cuff muscles in various shoulder positions. Compliance with the brace was checked and recorded, as well as any problems with the brace. Return to high level activity was restricted until 3 months post dislocation, and a full range of motion and return of strength achieved. The clinical reviews were then performed with the physiotherapist and the patients progressed through their rehabilitation protocol. We encouraged the physiotherapists to return the patients to the Orthopaedic Clinic if any problems were encountered.

Investigations;

Radiographs were performed initially in the emergency department, for suspected dislocations, as part of standard practice. If a dislocation was proved, then a second radiograph was taken to prove the reduction manoeuvre was effective.

Assessment Tools

At a minimum of **2 years** post dislocation, the patients were contacted and reviewed in the Orthopaedic clinic.

A Quick DASH questionnaire [9] was completed, including the employment and sports sections, and a score was totalled. A detailed history was taken and chart review performed for all patients reviewed. Any redislocations were recorded if proven via radiograph. Shoulder instability was assessed subjectively, and the results recorded.
An estimate of recovery was gathered for all participants. We asked the patients to give an estimate of return of function of the affected shoulder (in percentage form) when compared with their unaffected shoulder.

Results

Compliance

Of the 32 patients followed during the 2 year period, 20 wore the brace for the recommended 6 weeks, 8 managed 4 weeks in the brace, and 4 had removed the brace within the first 2 weeks.

Recurrence of Dislocation

There was **1** redislocation of the 32 patients followed for 2 years (3%).
The patient involved had remained in the brace less than 2 weeks and did not participate in the

physiotherapy program. They returned to professional waterskiing and had suffered the redislocation whilst attempting a backwards somersault at high speed. No patient reported any episodes of subluxation or instability at the 2 year review.

Return to High Level Activity

The vast majority of patients had returned to their pre-dislocation activity levels, with 3 of 32 (10%) taking on more physical activity at a higher level since the injury. Only 2 (6%) patients had not returned to all previously performed activities. This included 1 Motocross rider who refused to ride motorbikes due to having personal responsibilities, not related to his shoulder injury.

Quick-DASH scores[9]

<1 (Full Recovery) 20/32 patients (60%)

2–10 (>/=90% Recovery) 13/32 patients (40%)

5 patients had minor difficulty with return to sport/work. These patients were required to perform prolonged overhead work (e.g. Painter) or participate in overhead sports (eg. Basketball).

Recovery Estimate

All patients reported at least an 80% recovery post dislocation and treatment with the external rotation brace.
26 of 32 reported >90% recovery
14 of 32 reported > 95%.
Only 2 patients reported 80 % recovery when compared with the unaffected side.

Discussion

This limited cohort study has examined the rate of recurrence of shoulder dislocation in the 15 – 40 years age group when treated in an external rotation brace for a first time anterior shoulder dislocation. It has several limitations including the cohort size, lack of objective examination at review and a short follow up period to date. The subjective scoring systems used were simple and could have been repeated at multiple occasions to give an idea of progression.

Having stated this, the results have been extremely encouraging, supporting the earlier work of Itoi et al. The use of subjective estimates of patient satisfaction with outcomes achieved, whilst not specific, gave an excellent indication of the patients' personal recovery. All outcomes in medicine are ultimately assessed by the population treated, so these results cannot be ignored.

The results of treatment of first time anterior shoulder dislocators, in the younger age group, without requiring a surgical procedure have compared well with the literature supporting early surgical stabilisation for this condition.[2,5,13,14,21] Our results show excellent estimated recovery and an absolute minimum of disability associated with these patients. Using the Quick-DASH questionnaire [9] gave us reproducible and reliable scores across all patients.

The most satisfying result has been the success with regards to redislocation of the affected shoulder. Only 3% of patients have suffered a second dislocation using the external rotation brace and our rehabilitation protocol. This compares well with Kirkley et al's results of 18 % (3/16) sustaining redislocations post primary surgical stabilisation.[13] No patients have reported recurrent dislocations or instability. These results are at two years' post initial dislocation, which has previously been shown to be when the majority of redislocations have occurred.[17]

Compliance has always been an issue for this age group, but we believe we maximised this by including the physiotherapy and emergency departments in the education and rehabilitation of our patients. The involvement of our physiotherapy department was crucial to our success. They reinforced all education and kept regular contact with the patients to ensure compliance with the brace and their prescribed exercise program, and monitored results. The rehabilitation program was made more valuable with regular appointments and progression of exercises by the therapists. This cohort will continue to be followed through to the 5 year post initial dislocation stage.

Conclusion

The external rotation brace combined with a physiotherapy program has proven to provide excellent treatment for first time anterior shoulder dislocators in the 15-40 years age group. A variety of indicators including the Quick Dash scores [9], have provided support for our decision to treat young

adults with the external rotation brace, when compared with the results achieved by early surgical stabilisation.[2,5,13,14,21]

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.