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Chairman: Mr N. Maruthainar
The Royal National Orthopaedic Hospital Journal Club

**Long-term follow-up of replacement compared with internal fixation for displaced femoral neck fractures.**
Results at ten years in a randomised study of 450 patients
Leonardsson O, Sernbo I, Carlsson A, Akesson K, Rogmark C.
J Bone Joint Surg [Br] 2010;92-B:406-12

Reviewer: Stephen Tai – ST5 Royal National Orthopaedic Hospital, Stanmore

## Introduction

A number of previous studies have shown advantage for replacement over internal fixation in displaced intra-capsular fractures of the femoral neck. Furthermore, comparative cost analyses show replacement to be more cost-effective. Despite this, anecdotally, it is often suggested that where possible, the orthopaedic surgeon should attempt to preserve the native femoral head, because of the higher prevalence of osteoporosis, peri-prosthetic fracture and aseptic loosening presumed to occur in replacement surgery.

The study had two aims. The primary aim was to compare the long-term failure rates in patients with fractured necks of femur treated by internal fixation and replacement. The secondary aim was to perform a subgroup analysis comparing patients treated successfully by internal fixation and successfully by replacement in terms of patient-reported outcome.

The authors hypothesised that replacement overall would be superior to internal fixation up to ten years after fracture both in terms of failure rate and patient-reported outcome. The authors' secondary hypothesis was that of the patients treated successfully in each group, it would be the replacement group that would have better patient-reported outcomes.

The two-year results from this study were published in 2002.

## Patients and Methods

This multi-centred (12 hospitals) randomised controlled trial included 409 patients aged 70 or older. All had displaced intra-capsular fractures of the neck of femur (Garden 3 or 4). Treatment occurred between 1995 and 1997. Exclusion criteria included patients with Rheumatoid Arthritis or mental Impairment, Bed-ridden or institutionalised patients, and those with fracture older than 2 days at presentation.

Patients were randomised using sealed envelopes, with 217 in the internal fixation group and 192 in the replacement group. Patients in the replacement group were allocated to total- or hemi-arthroplasty on the basis of their Sernbo Score (age, walking ability, home situation and mental status).

All surgeons taking part in the study were experienced with both methods of treatment. Two different types of internal fixation were utilised. 4 different types of total hip replacement were used. 5 different types of hemi-arthroplasty were used.

Failure in the internal fixation group was defined as non-union (including early failure of fixation), avascular necrosis or deep infection. In the replacement group, failure was defined as the occurrence of two or more episodes of dislocation, peri-prostheitc fracture, aseptic loosening or deep infection.

| | Internal Fixation Group | Replacement Group |
|---|---|---|
| Number of Males | 47 | 38 |
| Number of Females | 170 | 154 |
| TotalNumber | 217 | 192 |
| Mean age | 81.5 years | 81.6 years |
| Mean Follow-up time | 124 months | 123 months |

Patients were followed up with clinical and radiological examination at 4, 12 and 24 months post-operatively. At 5 years, assessment was made using a standardised questionnaire, supplemented with a telephone interview where necessary. The ten-year follow-up was variable depending upon the individual patient's ability to attend a clinical assessment. Those who were unable to attend due to poor health or mobility returned a standardised questionnaire. At 10 years, only 96 patients had survived, with 4 of these unavailable for follow-up. Any patient who died before the study was completed was included in the results with their last recorded status.

## Statistics

The authors utilised standard methods of statistical analysis including The Kaplan-Meier survival analysis, the log-rank test, the chi-squared test, and Cox regression analysis. Results were presented as the mean and SD. Calculations were made using Statisa version 7.1 and SPS version 15.0. A p-value $\leq 0.05$ was considered significant. The limit for significance for mortality and patient-reported outcome was defined as $p< 0.01$.

## Results

### Failure

The 10-year results show a significant difference between the internal fixation and replacement groups, with 45.6% of the internal fixation group and 8.8% of the replacement group having failed at 10 years.

The most common reasons for failure in the internal fixation group were non-union and vascular necrosis. Only 4 of 99 failures in the internal fixation group occurred between 2 and 10 years.

The most common reason for failure in the replacement group was dislocation. 5 of the 17 failures in this group occurred between 2 and 10 years.

The authors observed that notable differences in data were apparent between the various implants. For example, the rate of failure between the replacement group varied between 1.9% and 23.5%.

### Patient-Reported Outcome

There was no difference between the treatment groups at 5 and 10 years regarding pain when walking, reduction in mobility because of hip problems, the need for walking aids, ability to remain in pre-fracture accommodation or occupation with the hip fracture.

In the sub group analysis, more patients in the internal fixation group reported adverse outcomes because of symptoms in the hip at 4 months. At later follow-up, there was no statistical difference.

## Discussion

The Authors concluded that the gold-standard treatment for displaced intra-capsular fractured neck of femur or replacement, either with hemi- or total arthroplasty. Replacement is not associated with excess long-term complications such as aseptic loosening or peri-prosthetic fracture.

Virtually all of the failures that occurred in the fixation group, occurred at an early stage, suggesting that most patients in this group need only be followed up for 2 years post-operatively.

## Study Strengths

- RCT / Multi-centred
- Good patient numbers
- Blinded patient allocation
- Surgeons experienced at both procedures
- Intention to treat basis
- Adequate follow-up
- Clear and full presentation of outcomes

## Study Weaknesses

- Large volume of patients lost to follow-up
- Assessment of outcome not blinded, leading to potential study bias
- Number of different types of prosthesis used
- Configuration of fixation pins not stated – was this standardised
- Surgical approach for replacement not stated – was this standardised

**Open reduction and endobutton fixation of displaced fractures of the lateral end of the clavicle in younger patients**

C. M. Robinson CM, Akhtar MA, Jenkins PJ, Sharpe T, Ray A, Olabi B
J Bone Joint Surg [Br] 2010;92-B:811-16.

Reviewer: David Roberts

## Introduction

Undisplaced distal clavicle fractures usually heal well with minimal morbidity. Displaced distal clavicle fractures have a higher risk of non-union resulting in pain and functional loss. Elderly patients with lower functional demands usually have a satisfactory outcome with non-operative treatment but younger patients with greater functional demands may find the outcome unsatisfactory. Open reduction and rigid internal fixation may result in shoulder stiffness and after bony union implants need to be removed. Flexible implants which do not require removal are used for stabilisation of coracoclavicular injuries. The aim of this work was to assess the use of such an implant for the acute stabilisation of displaced distal clavicle fractures in young patients. Such a technique if found to be effective would prevent the need for a second operation and may improve shoulder stiffness.

## Methods

A prospective, consecutive case series.

## Patient selection

Patients included were those presenting less than three weeks after injury, medically well, under 60, had a completely displaced fracture with no cortical contact lateral to base of corocoid.

## Surgical technique

Bra-strap incision was used for open reduction and holes drilled in the clavicle and corocoid under direct vision. The implant, consisting of two Endobuttons joined with Orthocord, was tensioned once both buttons passed through holes appropriately and position checked with fluoroscopy.

## Outcomes

### Clinical

It is described Short Form-36 (SF-36), Disabilities of the Arm Shoulder and Hand questionnaire and Constant score were recorded at 3, 6 weeks and 6, 12 months. Return to work or normal activity was also recorded. Individuals were examined clinically for signs of rotator cuff lesions, labral pathology, impingement or acromioclavicular dysfunction. Reference to literature describing clinical examination techniques for such pathologies are made although the specific tests are not named in the text.

### Radiological

Displacement measured on anteroposterior radiograph, ie, distance between most superior part of lateral and medial fragments. Bony union was considered successful if certain clinical and radiological criteria were met: No pain/mild activity related discomfort; no loss of reduction; no implant loosening/breakage; no resorption at fracture site.

## Results

No short term complications were observed. Clinical outcomes were good (mean Constant score 87.1, median DASH 3.3) with 15 patients pain free at one year and one with mild pain. Thirteen with sedentary jobs had returned to work by six months and the three individuals with manual jobs by 12 months. There were no clinical signs of impingement, cuff pathology or acromioclavicular joint problems. One patient had an asymptomatic, normally functioning fibrous union, confirmed with CT.

Radiological outcomes demonstrated good reduction was maintained with a maximum of 4mm displacement. When describing results and the good radiological outcome there is a comment which might benefit from a little more explanation by the authors regarding one patient, it is stated, with a clearly demonstrable residual gap. This case does not appear to be the one fibrous union as earlier description in the results section stated that reduction was well maintained. If this patient was that which had some residual mild pain then more information would be informative.

No results are included for the SF-36 despite the use of it described. Well validated shoulder specific (Constant) and upper limb specific (DASH) outcome measures demonstrate good results which may be sufficient measures of clinical outcome for this work.

## Discussion

The authors discuss that a major impetus for this work is to prevent a second operation to remove implants. At one year the technique appears favourable with no further surgery required and good outcomes. It is discussed that most ligamentous injuries associated with this type of fracture are partial and reconstruction unnecessary but were there to be major ligamentous injury the authors indicate that this technique should not be employed. It is also mentioned that as a single surgeon series the ease of transfer of this technique has not been assessed.

It is discussed that there is no comparison group in this study, useful to compare clinical outcomes with screw or plating techniques. Also, the fact that no further surgery was required, the authors do comment that later complications may not be apparent by one year such as corocoid stress fracture, refracture of clavicle or late acromioclavicular osteoarthrosis. Long term follow up will be informative.

## Study strengths

- A consecutive single surgeon series
- Well defined group of patients
- Full follow-up at one year
- Validated clinical outcome measures used

## Study weaknesses

- No comparison group
- Relatively short term follow-up

**Concomitant Arthroscopic SLAP and Rotator Cuff Repair**
Forsythe B, Guss D, Anthony SG, Martin SD.
J Bone Joint Surg [Am] 2010;92-A:1362-9.

Reviewer: Staton Phillips

## Introduction

The treatment of concomitant SLAP lesion and rotator cuff tear is controversial in particular it is thought to lead to stiffness especially in middle aged patients. The author also raises the question of whether this is due to differing post-operative rehabilitation regimens.

## Methods

The authors performed a retrospective review of all cases of combined repair undertaken between 2003 and 2005. These were performed by a single surgeon using a standard technique that was detailed in the paper. Patient assessment was also performed by a single surgeon. Numerous exclusion criteria were considered e.g. Previous shoulder surgery, severe osteoarthritis and advanced fatty infiltration of the cuff, identified on ultrasound scan.

## Patients

Two groups of patients were compared, a group consisting of 34 patients with both rotator cuff repair (RCR) and SLAP lesion repair (32 type II, 1 type IV and 1 type V) and another consisting of 28 patients with rotator cuff tears alone (5 of whom had type I SLAP lesions). All 62 patients were contacted albeit 7 by telephone only, and evaluated using the American shoulder and elbow surgeon score (ASES), the Constant score and normalised Constant score.

## Results

ASES scores showed a significant improvement from significantly different pre-operative scores (RCR only group better) to post-operative scores, which showed no significant difference between groups. Constant scores and normalised Constant scores showed significant improvement from similar pre-operative scores to post-operative scores, which show significant difference between groups (RCR + SLAP group better).

Forward flexion, abduction and external rotation all improved significantly for both groups, but no significant difference either pre or post-operatively.

## Discussion

It was felt that the paper was comparing patient groups with differing initial pathologies and as such any conclusions drawn were not relevant to the aims of the study. In order to answer the question proposed by the paper a prospective trial would have been required, comparing two groups of patients each with both rotator cuff tears and SLAP lesions. This would have allowed a more direct comparison between repairs conducted separately and those conducted as a combined procedure. Perhaps also a control group to measure the effect of the post-operative rehab, which was essentially an aggressive mobilisation regimen for all the patients in the study. We concluded therefore that the design of the study was its major weakness.