



A Comparative Analysis of K Wire Fixation and Dogbutton for Grade III and Higher Acromioclavicular Joint Dislocations

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Abstract

Background: Acromioclavicular joint injuries are frequent in active adults; management of Rockwood grade III and higher remains debated. This study compares arthroscopic double-endobutton reconstruction with open reduction plus K-wire fixation and direct ligament repair.

Methods: Single-centre prospective and retrospective review from July 2015 to January 2017. Twenty-six adults with acute Rockwood grade III+ separations were treated: Group A (arthroscopic double-endobutton, n=8) and Group B (open K-wire fixation with ligament repair, n=18). Radiographs and stress views were recorded. A staged rehabilitation programme was applied. Ethical approval and informed consent were obtained. Primary outcomes were forward flexion, abduction and UCLA score.

Results: Both groups showed substantial improvement. At 12 months mean forward flexion reached about 175.65° and mean abduction about 177.83°. The arthroscopic group regained motion earlier, with many patients reaching near-normal range by six months. UCLA scores and patient satisfaction were high in both groups. Complications were uncommon and no major revisions were recorded.

Conclusion: Arthroscopic double-endobutton and open K-wire fixation with ligament repair both provide good one-year functional outcomes. The arthroscopic method enabled faster early recovery. Technique choice should be tailored to patient needs, implant availability and surgeon experience.

Keywords: Acromioclavicular joint, Rockwood, Double-endobutton, K-wire fixation, Ligament repair, Shoulder function.

Introduction

The acromioclavicular (AC) joint is a common site of shoulder injury, especially in young active adults who sustain direct blows to the shoulder. Clinical decision-making relies on the Rockwood classification: low-grade injuries are usually

managed nonoperatively, whereas high-grade separations, particularly types IV–VI and selected symptomatic type III injuries, often require surgical treatment to restore anatomy and function [1]. Operative aims are straightforward — restore coracoclavicular spacing, re-establish AC joint congruity and



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provide a stable environment for ligament healing so that painless shoulder mechanics return during activity [2]. Historically, a variety of fixation methods have been employed, including K-wires, screws, hook plates and tension-band constructs, each with advantages and notable complications leading to evolving preference for anatomic reconstructions [3]. Contemporary techniques emphasize restoration of both conoid and trapezoid components of the coracoclavicular complex to recreate native kinematics and resist superior, anterior and posterior translation [4]. Minimally invasive methods such as double-button systems and arthroscopic reconstructions seek to minimize soft-tissue trauma while providing stable fixation, facilitating earlier rehabilitation and improved cosmesis [5]. However, implant-related issues such as prominence, migration or late failure remain concerns with some rigid constructs, and residual radiographic displacement can occur despite clinical improvement, underscoring the need to balance radiographic goals with patient-centred outcomes [6]. This study examines outcomes after two commonly used surgical approaches—arthroscopic double-endobutton reconstruction and open reduction with K-wire fixation plus direct ligament repair—to compare early recovery of motion, functional scores and complication profiles, using prospectively recorded data from a single tertiary centre. Postoperatively a staged rehabilitation protocol that protects repaired tissues while progressively restoring active motion is essential to achieve durable functional gains. By presenting comparative clinical and radiographic outcomes with standardized follow-up, this work aims to inform surgeon choice and patient counselling in settings where implant selection, cost and surgeon familiarity influence practice.

Review of Literature

The literature on acromioclavicular (AC) joint injuries shows a long evolution from rigid fixation toward techniques that try to restore anatomy while minimizing hardware problems. Early open reductions and fixation methods often achieved good initial alignment, but complications from prominent implants and the need for secondary procedures spurred surgeons to look for better options [7]. Classic reviews and summaries emphasized the variety of presentations and the limitations of older methods, noting that device-related irritation and implant migration were not uncommon and sometimes affected outcomes [8,9]. Textbook descriptions reinforced the complex anatomy around the clavicle and coracoid, underscoring why reconstructions that respect the native ligamentous anatomy may perform better [10,11]. More recent work described a shift toward anatomic reconstructions and less invasive approaches. Arthroscopic techniques and button-based fixation were introduced to reduce soft-tissue damage and permit earlier motion, with several series reporting encouraging clinical recovery and cosmetic benefits compared with bulky hardware [12].

Biomechanical and cadaveric investigations compared various reconstructive strategies and generally found that anatomic reconstructions—those that recreate both conoid and trapezoid components—restore stability more closely than non-anatomic transfers, although some residual laxity can persist in experimental setups [13]. Detailed anatomical studies clarified the landmarks and safe corridors for drilling and graft passage, information that helped refine surgical techniques and reduce iatrogenic complications [14]. Taken together, the literature supports a move toward reconstructive solutions that balance durable mechanical restoration with lower implant morbidity. However, study designs are heterogeneous and long-term comparative data remain limited; thus, treatment is often tailored to injury chronicity, patient needs and surgeon experience rather than driven by a single definitive technique.

Materials and Methods

This single-centre study combined prospective and retrospective case review at a tertiary orthopaedic institute from July 2015 to January 2017. Adult patients with acute acromioclavicular dislocation Rockwood grade III and above were enrolled after informed consent. Patients with ipsilateral clavicle or scapular fractures and chronic dislocations were excluded. Preoperative assessment included anteroposterior and Zanca radiographs, stress views with standardized weights and routine investigations to document coracoclavicular distance. Treatment choice followed clinical indication and surgeon judgement, forming two groups: arthroscopic double-endobutton fixation (Group A) and open reduction with K-wire fixation plus direct AC and CC ligament repair (Group B). The arthroscopic method involved clearance of the coracoid, guided drilling through clavicle and coracoid, passage of a continuous loop endobutton and securing a clavicular locking button to reconstruct coracoclavicular function. The open technique used a lateral clavicular incision, manual reduction, two parallel non-threaded K-wires from acromion into clavicle with bent lateral ends to prevent migration, direct repair of AC and CC ligaments with non-absorbable sutures and reattachment of the deltoid-trapezial aponeurosis. A uniform rehabilitation protocol was applied: two weeks of sling and elbow motion; weeks three and four with limited uniplanar shoulder motion; weeks five and six progressing to biplanar motion to 90°; thereafter graded strengthening toward full activity over three months. Follow-up was at one, three, six, nine and twelve months with clinical and radiographic assessment. Outcome measures included forward flexion, abduction and the UCLA shoulder score; complications and return to function were recorded and compared between groups using standard statistics. All intraoperative details and immediate postoperative radiographs were recorded on a proforma. Ethical approval and informed consent were secured. Radiographic measures included coracoclavicular distance;

clinical data recorded pain, range of motion and UCLA scores at each visit. Data were entered prospectively and analyzed to compare recovery between techniques and complications.

Results

During the study 26 patients with acute AC dislocation grade III and above were followed for twelve months. Group allocation yielded eight patients in the arthroscopic double-endobutton group and eighteen in the open K-wire with ligament repair group. There were twenty right-side injuries and six left-side injuries. The cohort included thirteen patients aged forty years or younger and thirteen older than forty; twenty-one were male and five were female. Range of motion improved steadily in both groups. By twelve months mean forward flexion in the affected limb reached approximately 175.65 degrees and mean abduction averaged around 177.83 degrees. The arthroscopic group achieved full or near-full forward flexion and abduction earlier than the open group, with several endobutton patients reaching maximal motion by six months. Functional recovery measured by the UCLA shoulder score showed progressive improvement at each follow-up with high median satisfaction scores recorded at one year. Complications were infrequent and minor; no patient required major revision surgery during the follow-up period. Most patients returned to routine activities by three to six months without major functional limitations affecting final outcomes overall.

Discussion

The coracoclavicular ligaments and the surrounding soft tissues play a central role in shoulder girdle stability, and their disruption leads to functional compromise that may not be fully compensated by surrounding muscles. Restoring anatomy and joint congruity seeks to re-establish normal load transfer and reduce pain and fatigue during overhead or heavy activities. Rigid implants such as hook plates or screws often maintain radiographic reduction but can cause prominence, sub acromial irritation and often require removal, which adds morbidity to recovery [15]. Soft-tissue reconstructions and button devices reduce hardware prominence and permit earlier rehabilitation, yet have been associated in some series with loss of radiographic reduction or rare hardware failure [16]. Biomechanical evidence supports anatomic reconstruction of conoid and trapezoid components; tendon grafts and double-button constructs better replicate native restraint to superior and horizontal translation compared with older techniques, although some residual superior displacement may persist in experimental settings [17]. The management of Rockwood type III injuries remains debated; pooled analyses show that nonoperative care can yield comparable long-term objective function in many patients, while surgery may offer superior cosmetic alignment and faster return to high-demand tasks for selected individuals [18]. In our series the arthroscopic double-

endobutton group showed earlier return of forward flexion and abduction with high patient satisfaction, which likely reflects reduced soft-tissue disruption and stable anatomic fixation that facilitates graded physiotherapy [19]. Surgeon experience, implant costs and availability are important determinants in real-world technique selection; these pragmatic factors may guide decisions as much as biomechanical data. Ultimately, randomized prospective trials with standardized outcome measures are needed to define which patients benefit most from operative reconstruction and which techniques provide durable, complication-free restoration of shoulder function [20]. Until such evidence emerges, individualized care that balances patient goals, surgical risk and resource considerations remains the most practical approach to management.

Conclusion

Both arthroscopic double-endobutton reconstruction and open K-wire fixation with direct ligament repair provide reliable restoration of shoulder function for acute Rockwood grade III and higher acromioclavicular injuries in this series. The arthroscopic approach permitted earlier gains in forward flexion and abduction and facilitated quicker rehabilitation while maintaining high patient satisfaction. Open fixation with ligament repair also produced good to excellent outcomes by one year, demonstrating that both techniques can achieve durable function when combined with a structured rehabilitation programme. Surgeons should individualize technique selection based on patient activity level, implant availability, cost considerations and their own experience to optimise outcomes. Further prospective, Randomised studies with longer follow-up are warranted to refine indications and compare long-term stability and complication profiles across techniques. Most patients returned to routine activities within months and serious complications were rare, supporting both methods as effective options when used with tailored rehabilitation and close follow-up, essential again.

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