

Medical and Clinical Case Reports

Patient Outcomes after Surgical Repair of Acromioclavicular Joint Using Cerclage-Wire Figure of '8' Technique at Kumi Orthopaedic Center; A Retrospective Consecutive Case Series

John Ekure¹, Naomi Amuron², Douglas Kilama¹, Phillip Buluma¹, Andrew Iloket³, Ediomu Joel⁴, Ojelel Peter⁴ and Faith Akello⁵

¹Orthopaedic Surgeon, Kumi Orthopaedic Center, Kumi, Uganda.

²Orthopaedic Surgeon, Soroti University, College of Health Sciences, Soroti, Uganda.

³General doctor, Kumi Orthopaedic Center, Kumi, Uganda.

⁴Imaging Technologist, Kumi Orthopaedic Center, Kumi, Uganda.

⁵Epidemiologist and Biostatistician, Kumi Orthopaedic Center, Kumi, Uganda.

*Correspondence:

Faith Akello, Kumi Orthopaedic Center, Malera Road, P.O Box 376, Kumi, Uganda.

Received: 11 Oct 2024; Accepted: 24 Nov 2024; Published: 05 Dec 2024

Citation: John Ekure, Naomi Amuron, Douglas Kilama, et al. Patient Outcomes After Surgical Repair of Acromioclavicular Joint Using Cerclage-Wire Figure of '8' Technique at Kumi Orthopaedic Center; A Retrospective Consecutive Case Series. Med Clin Case Rep. 2024; 4(4): 1-4.

ABSTRACT

Introduction: Proposed surgical methods for the repair of Acromio-clavicular Joint (ACJ) vary widely. However, the currently available treatment modalities require high technology e.g. specialised sutures that impose a high financial burden to patients especially in low and middle income countries. A modified technique using cerclage wire figure of '8' technique was innovated by the lead surgeon at Kumi-orthopaedic Center for the management of ACJ disruptions that would be suitable for use in low resource settings. However, there was no study done to assess the patient outcomes and quality of life hence this study.

Methods: This study was a retrospective consecutive case series of 7 patients that had been managed for ACJ disruptions at KOC using the cerclage wire figure of '8' technique. The outcomes were assessed using the participants' shoulder constant score, radiological findings and the quality of life measured using the DASH and EQ-5D-5L scores following the surgical repair.

Results: Of the 8 participants, the mean age was 37.8 years (SD±4.9). Majority of the participants were male 5 (62.5%) and the commonest mechanism of injury was Road Traffic Accidents (RTA) 6 (75.0%). The right hand was the dominant hand amongst all the participants with the right and left shoulders being affected equally. The median time to surgery following injury was 7 days. The mean number of years of follow up were 5.8 years. Only 1 participant reported history of having repeated injury to the affected shoulder after surgery.

The mean shoulder score was 89.3 (SD ± 10.7) with a range of 68.5 to 100, the mean DASH score was 11.7 (SD ± 13.9) with a range of 0 to 41.67 and the mean EQ-5D score was 0.756 (SD ± 0.314) with a range of -0.152 to 1.0. On radiographic evaluation, 6 participants (75.0%) had normal AC joint with 2 (25.0%) still having a widened AC joint. 2 participants had osteoarthritis in the affected shoulder, 2 participants had re-displacement according to the study definition and all had wire breakage with 1 participant having a history of repeated surgery to remove the broken wire.

Conclusion: Cerclage wire figure of 8 technique produces comparable results to other high technology surgical techniques used in the management of ACJ disruptions, especially in terms of the shoulder score. This technique could be recommended for use in low resource settings.

Keywords

Re-displacement, ACJ.

Introduction

The acromioclavicular joint is a diarthrodial link established by several ligaments. The acromioclavicular capsular ligaments provide most of the joint stability in the anteroposterior direction while the coracoclavicular ligaments provide vertical stability [1].

Acromioclavicular injuries are common but with unknown real evidence of their prevalence because a relevant percentage of affected persons do not seek medical treatment [2]. The management of AC injuries is based on minimal intervention, either surgical or non-surgical aiming to restore both horizontal and vertical stability. AC joint repair has a long history and dates back to 1917, when Cadenet first introduced his technique for AC joint instabilities [3]. Since then over 150 different techniques have been described, covering open and closed techniques including metallic wires, pins, hook plates, auto-or allografts, suspension devices, synthetic ligaments, ligament or tendon transfers, clavicle osteotomy or excision [4].

Currently proposed surgical methods vary widely. These include anatomic coracoclavicular ligament reconstruction, coracoacromial ligament transfer, reconstruction with internal fixation and reconstruction with implantable suture fixation devices. However, the currently available treatment modalities require high technology e.g. specialised sutures that impose a high financial burden to patients especially in low and middle income countries. A modified technique using cerclage wire figure of '8' technique was innovated by the lead surgeon at Kumi-orthopaedic Center for the management of ACJ disruptions that would be suitable for use in low resource settings.

This study therefore aims to assess the patient outcomes and quality of life of patients following ACJ repair using the innovated technique.

Technique Description

During the surgery, under aseptic conditions, the coracoid process and distal clavicle are exposed through layers, and using a wire passer, the 1.8mm cerclage wire is passed under the coracoid process and around the clavicle forming a figure of 8 or circular manner and then tightened to reduce the acromioclavicular joint. The twisted wire ends are cut and buried in muscle. The wound is closed in layers with vicryl number 1 and skin is closed with nylon 2/0. The wire is kept in place for the duration of healing and may only be removed if it causes symptoms or if it breaks. During the procedure, the tightening of the wire is done manually. Then the patient is given appropriate post-surgery management to restore full functionality.

Methods and Materials

This study will be a retrospective consecutive case series of all the 23 patients that have been managed for ACJ disruptions at KOC over the last 10 years using the cerclage wire figure of '8' technique.

A questionnaire was used to obtain the patients' demographic characteristics. Primary outcome was evaluated using constant score. The secondary outcomes were evaluated using Quick DASH (Disabilities of the Arm, shoulder and Hand) score and EQ-5D (European Quality of life 5 dimensions) score. AP radiographs of both shoulders and a Zanca view of the involved shoulder were used to evaluate the position of the AC joint, changes of the post-traumatic osteoarthritis, coracoclavicular ossification and assess for wire breakage. Re-displacement was defined as elevation of the distal clavicle of more than 25% in relation to the coracoid process. AC osteoarthritis was considered to be absent, mild; when there is narrowing of the joint space, moderate when there is evidence of subchondral sclerosis or osteophytes and severe if the joint is badly deformed.

Results

Table 1: Sociodemographic and clinical characteristics of the 8 patients that had repair of the AC joint.

Variable	Number	Percentage
Age		
Mean (SD)	37.8(±4.9)	
Sex		
Male	5	62.5
Female	3	37.5
Dominant Hand		
Right	8	100
Left	0	0
Affected shoulder		
Right	4	50
Left	4	50
Mechanism of injury		
Fall	2	25
RTA	6	75
Time to surgery		
Median (IQR)	7 (2-17.5)	
Years of follow up		
Mean (SD)	5.75(±3.62)	
H/O Repeated trauma		
Yes	1	12.5
No	7	87.5
H/O Repeated surgery		
Yes	1	12.5
No	7	87.5

Table 2: Results of the post-surgical outcomes of the 8 patients after repair of the AC joint.

Variable	Number	Percentage
Shoulder score		
Mean (±SD)	89.3(±10.7)	
DASH score		
Mean (±SD)	11.7(±13.9)	
EQ-5D score		
Mean (±SD)	0.76(±0.314)	
AC joint		
Normal	6	75
Wide	2	25

Osteoarthritis		
No	6	75
Yes	2	25
Redisplacement		
No	6	75
Yes	2	25
Wire breakage		
Yes	8	100
No	0	0

Discussion

Many procedures, both non-operative and operative have been described for treatment of complete acromioclavicular dislocations. The best primary treatment however, still remains unclear.

The surgical technique used on patients at KOC found a shoulder score of 89.3 points. This is similar to 87.2 points found among 89 patients that underwent non-biological fixation between the coracoid and clavicle e.g. using suture loops and synthetic ligaments and 87.4 points gotten among 49 patients that had ligament and/ or tendon transfer [5].

The shoulder score in this study is also similar to 89.2 that was got by 18 patients who underwent coracoclavicular ligament reconstruction and also similar to 90.2 got among 24 patients that underwent hook plate fixation for management of acute unstable Acromioclavicular joint dislocation [6]. However, its lower than 97 points found among 21 patients that underwent a new surgical technique in which the clavicle is reduced to an anatomic position, the coracoacromial ligament is transferred to the clavicle and acromioclavicular joint fixation accomplished with the use of absorbable braided suture cord [7]. It was also lower than a score of 94.5 that was found among patients that underwent coracoclavicular ligament reconstruction using LARS artificial ligaments [8] and a score of 95 among patients that had arthroscopic acromioclavicular joint reconstruction using suture anchors and small titanium plate [9].

The mean DASH score among patients in this study was 11.7. This is mildly higher than the DASH score of 9 that was found among 52 patients that underwent Arthroscopy assisted tightrope repair of Acromioclavicular dislocations (Rookwood grad III and V) [10]. It is also higher than the score of 4.79 got among 24 cases of patients that underwent hook plate fixation of the Acromioclavicular joint and 2.98 got among 18 patients that had arthroscopy [11]. The difference in DASH scores could be alluded to the subjectivity of the test and therefore patients may have introduced information bias by reporting what they think and not the facts. There was re-displacement noted in only 2 patients (25%) which could have occurred due to wire breakage before joint reduction was achieved. Despite the fact that wire breakage occurred in all the participants, majority of the participants did not experience symptomatic complications to warrant re-operation to remove the broken wire. While our study had limitations of small sample size and the fact that data on the severity of injury

was lacking, the study still provides useful information about the technique's outcome [12,13].

Conclusion

This study has shown that the “cerclage wire figure of 8” technique for surgical management of Acromio-clavicular joint disruption produces comparable results especially in the shoulder score measure when compared to other high technology techniques. Therefore, it could be recommended for use in low resource settings.

References

1. Beitzel K, Cote MP, Apostolakos J, et al. Current concepts in the treatment of acromioclavicular joint dislocations. *Arthroscopy*. 2013; 29: 387-397.
2. Fraser-Moodie JA, Shortt NL, Robinson CM. Injuries to the acromioclavicular joint. *J Bone Joint Surg Br*. 2008; 90: 697-707.
3. Cadenet FM. The treatment of dislocations and fractures of the outer end of the clavicle. *Clin Orthop*. 1917; 1: 145-169.
4. Dyrna F, Berthold DP, Feucht MJ, et al. The importance of biomechanical properties in revision acromioclavicular joint stabilization: a scoping review. *Knee surgery, sports traumatology, arthroscopy*. 2019; 27: 3844-3855.
5. Borbas P, Churchill J, Ek ET. Surgical management of chronic high-grade acromioclavicular joint dislocations: a systematic review. *J Shoulder Elb Surg*. 2019; 28: 2031-2038.
6. Yoon JP, Lee BJ, Nam SJ, et al. Comparison of results between hook plate fixation and ligament reconstruction for acute unstable acromioclavicular joint dislocation. *Clinics in orthopedic surgery*. 2015; 7: 97-103.
7. Tienen TG, Oyen JF, Eggen PJ. A modified technique of reconstruction for complete acromioclavicular dislocation: a prospective study. *Am J Sports Med*. 2003; 31: 655-659.
8. Lu N, Zhu L, Ye T, et al. Evaluation of the coracoclavicular reconstruction using LARS artificial ligament in acute acromioclavicular joint dislocation. *Knee surgery, sports traumatology, arthroscopy: official journal of the ESSKA*. 2014; 22: 2223-2227.
9. Chernchujit B, Tischer T, Imhoff AB. Arthroscopic reconstruction of the acromioclavicular joint disruption: surgical technique and preliminary results. *Arch Orthop Trauma Surg*. 2006; 126: 575-581.
10. Flinkkilä TE, Ihanainen E. Results of Arthroscopy-Assisted Tight-Rope Repair of Acromioclavicular Dislocations. *Shoulder & Elbow*. 2014; 6: 18-22.
11. Natera-Cisneros L, Sarasquete-Reiriz J, Escolà-Benet A, et al. Acute high-grade acromioclavicular joint injuries treatment: Arthroscopic non-rigid coracoclavicular fixation provides better quality of life outcomes than hook plate ORIF. *Orthopaedics & Traumatology: Surgery & Research*. 2016; 102: 31-39.

-
12. Natera Cisneros LG, Sarasquete Reiriz J. Acute high-grade acromioclavicular joint injuries: quality of life comparison between patients managed operatively with a hook plate versus patients managed non-operatively. *Eur J Orthop Surg Traumatol.* 2017; 27: 341-350.
 13. Theopold J, Henkelmann R, Zhang C, et al. Clinical outcomes of arthroscopic and navigation-assisted two tunnel technique for coracoclavicular ligament augmentation of acute acromioclavicular joint dislocations. *BMC Musculoskelet Disord.* 2021; 22: 528.