

Clinical Data Summary

BESS 2014 Poster Prize

Optimal Clavicular Anchorage Point Of An Artificial Ligament Used For The Treatment Of Chronic Acromioclavicular Joint Dislocation (A Cadaveric Study)

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Purpose: The aim of this study is to find the optimal clavicular anchorage point of an artificial ligament used for the reconstruction of chronically dislocated ACJ (acromioclavicular joint) and to demonstrate the necessity of augmenting this technique with the reconstruction of the anterior ACJ ligament.

Materials and Method: The study was conducted on 7 cadaveric shoulders. Superior translation of the ACJ was corrected with an artificial ligament which was anchored into the clavicle in 4 different points: CT (Conoid tubercle), 1cm and 2cm lateral to the CT and 1cm medial to the CT. Reconstruction of the anterior ACJ ligament using the coracoacromial ligament was attempted to reduce the anterior displacement of the ACJ in 5 cadavers.

Results: We found that if the ligament was secured at the level of the CT the ACJ could be reduced anatomically. If the ligament was placed to medial to it, the ACJ was found irreducible; if placed 2cm lateral to the ligament, the ACJ remained displaced with the end of the clavicle lying inferior, anterior and significantly medial to the acromial articulation. If the ligament was placed 1cm lateral to the CT, the ACJ could almost be reduced in 3 cases and in one case anatomical reduction could be achieved. Even when the artificial ligament was inserted over the CT, anterior displacement of the clavicle persisted. The coracoid end of the coracoacromial ligament was transferred to the end of the clavicle in 5 shoulders, which in turn abolished this instability.

Discussion and Conclusion: Our results show that the optimal insertion for the artificial ligament used for ACJ reconstruction should be the conoid tubercle. An anatomical reduction of the ACJ was achieved after reconstructing the anterior acromioclavicular ligament.

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MODIFIED WEAVER-DUNN PROCEDURE VERSUS THE USE OF A SYNTHETIC LIGAMENT FOR ACROMIOCLAVICULAR JOINT RECONSTRUCTION

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Abstract

Purpose. To compare the subjective outcome of acromioclavicular joint (ACJ) reconstruction using the modified Weaver-Dunn procedure versus the Surgilig synthetic ligament.

Methods. 55 patients aged 19 to 72 (mean, 42) years underwent ACJ reconstruction of Rockwood grade 3 (n=38), grade 4 (n=8), and grade 5 (n=9) using the modified Weaver-Dunn procedure (n=31) or the Surgilig synthetic ligament (n=24), based on the surgeon's preference. The mean period from injury to surgical treatment was 39 months. Subjective outcomes were assessed before and after surgery using the Oxford Shoulder score and Nottingham Clavicle score. The time required to return to work and sports was also recorded.



Results. After a mean follow-up period of 40 months, the mean Oxford Shoulder scores improved from 28 to 42 in the Weaver-Dunn group ($p=0.009$), and from 26 to 45 in the Surgilig group ($p=0.007$), whereas the respective mean Nottingham Clavicle scores improved from 53 to 81 ($p=0.047$) and from 51 to 93 ($p=0.023$). The Surgilig group achieved significantly better postoperative Oxford Shoulder score ($p=0.008$) and Nottingham Clavicle score ($p=0.007$), and could also return to work (14 vs. 6 weeks, $p<0.001$) and sports (25 vs. 12 weeks, $p<0.001$) sooner than the Weaver-Dunn group. Three patients in the Weaver-Dunn group and one patient in the Surgilig group had persistent pain and/or functional deficit with evidence of ACJ dislocation.

Conclusion. Chronic ACJ reconstruction using the Surgilig synthetic ligament achieved better Oxford Shoulder score and Nottingham Clavicle score and earlier return to work and sports, compared with the modified Weaver-Dunn procedure.

THE HISTOLOGICAL CHARACTERISTICS OF THE TISSUE RESPONSE TO THE LOCKDOWN AUGMENTATION DEVICE – A BRAIDED POLYESTER MESH

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The LockDown device (previously called the Nottingham Surgilig) is a braided polyester augmentation device used to treat Acromio-Clavicular Joint (ACJ) dislocations. Designed in 1995, it has now become a standard treatment for ACJ dislocations (over 5,000 patients treated in Europe). In theory a non-biological device should not be successful if subjected to repetitive stress. Methods: 3 patients who have been treated for ACJ dislocation using the LockDown device which have failed as a result of a further traumatic incident (2 cases) and low grade infection (1 case) are reported. In all three cases the LockDown device was revised and the original LockDown device subjected to histological evaluation. Results: In Case 1 there was connective tissue ingrowth present amongst the outer fibres of the “artificial ligament”. There was also a thick “pseudo-ligament” capsule present around the “artificial ligament”. No active inflammatory component was identified. In Case 2, connective tissue was identified amongst polyester fibres. In Case 3 there was tissue ingrowth amongst the superficial bundles of the LockDown. There was also the development of a pseudo-ligament around the LockDown implant. There were no granulomata or a significant giant cell inflammatory reaction. Conclusion: LockDown stabilisation of the ACJ is recognised as being a successful surgical procedure in Europe for unstable AC Joints. Our results indicate that the LockDown device retains its strength by ingrowth into and around the device. Tissue ingrowth into the superficial bundles of the LockDown also occurs with no granulomata and minimal giant cell inflammatory reaction.

The Journal of Arthroscopic and Related Surgery, Vol 29, No 10 (October), 2013: pp 1604-1607 IMPACT OF TUNNELS AND TENODESIS SCREWS ON CLAVICLE FRACTURE: A BIOMECHANICAL STUDY OF VARYING CORACOCLAVICULAR LIGAMENT RECONSTRUCTION TECHNIQUES

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Purpose: The purpose of this study was to compare the load to fracture of distal clavicles with no tunnels, one tunnel, or 2 tunnels and to evaluate the effect of inserting tenodesis screws in the tunnels on load to fracture of the distal clavicle.

Methods: Fifty right sawbone clavicles were obtained and divided into 5 groups ($n = 10$): group 1, normal clavicle; group 2, one tunnel, no tenodesis screw; group 3, 2 tunnels, no tenodesis screws; group 4, one tunnel with tenodesis screw; and group 5, 2 tunnels with 2 tenodesis screws. Tunnels were created using



a 5-mm-diameter reamer, and 5.5 _ 10 mm polyethyl ethyl ketone tenodesis screws were used. A 4-point bending load was applied to the distal clavicles. Load to failure was noted for each specimen.

Results: Load to failure in clavicles without tunnels was significantly higher (1,157.18 _ 147.10 N) than in all other groups (P < .0005). No statistical differences were noted between groups 2, 3, 4, and 5. Load to failure was not statistically different in clavicles with one versus 2 tunnels. In addition, the use of tenodesis screws in the tunnels did not affect the load required to fracture. Conclusions: The use of tunnels in the clavicle for coracoclavicular (CC) ligament reconstruction significantly reduces the load required to fracture the distal clavicle. The addition of tenodesis screws does not appear to significantly increase the strength of the clavicle in this construct. Clinical Relevance: CC ligament reconstruction techniques commonly use tunnels in the distal clavicle, which may render the clavicle more susceptible to fracture. This study helps quantify the effect of these tunnels on the strength of the distal clavicle.

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An Analysis of the Strength of Fixation of the LockDown and TightRope Methods of Stabilization for Grade 3 & 5 ACJ Injuries in the Cadaver

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THE MANAGEMENT OF STERNO-CLAVICULAR DISRUPTIONS

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Introduction: Injuries in the region of the Sterno-Clavicular Joint (SCJ) are either epiphyseal injuries –the epiphysis does not close till age 25 to 26, or a shearing injury through the fused physis, or a fracture of the medial end of the clavicle in older patients. SCJ subluxation is uncommon but can limit sporting activities but true dislocation of the SCJ is rare.

Methods: The senior author’s 10 year experience of 25 Sterno-Clavicular disruptions is reported. These include ORIF for medial clavicular fractures (x2); closed manipulation of posterior dislocation (x2); open reduction of epiphyseal injuries (x1) and stabilisation of Sterno-Clavicular disruptions with either a soft tissue repair (x4), a sterno-mastoid sling (x3), a GraftJacket sling (x2) or by reconstructing the Costo-Clavicular Ligament (CCL) with a polyester LockDown device (x11).

Results: Sterno-clavicular disruptions are caused by either a complete disruption of the costo-clavicular ligament or by the clavicle separating from its periosteal sleeve. Reconstruction focuses on either returning the clavicle into its periosteal sleeve (in younger patients) or recreating the costo-clavicular ligament (in older patients). The CCL is best recreated by using the LockDown device to encircle the first rib anteriorly and then anchoring it onto the clavicle supero-medially using one 3.5 mm screw. The results of these surgical interventions will be reported.

Conclusions: Sterno-Clavicular disruptions have been poorly understood in the past. CT and MR imaging is now allowing us to better understand the pathology and new surgical techniques are allowing us to

return patients, who previously had a significant permanent disability, to normal function.

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ACROMIOCLAVICULAR JOINT DISLOCATION : DIAGNOSIS AND MANAGEMENT

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Abstract

We present a review of the literature with respect to the anatomy, biomechanics, classification, diagnosis and rationale for contemporary management of both acute and chronic acromioclavicular joint dislocations.

Both conservative and surgical management are discussed.

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STABILIZATION OF ACROMIOCLAVICULAR JOINT DISLOCATION USING THE ‘SURGILIG’ TECHNIQUE

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Abstract

Background Disruption of the coracoclavicular ligaments may be associated with dislocation of the acromioclavicular joint, resulting in pain and functional disability. The Surgilig (Surgicraft Ltd, Redditch, UK) is a synthetic ligament used to reconstruct the ligaments, thereby stabilizing the joint.

Methods Between 2004 and 2009, 50 patients with acromioclavicular joint dislocation were reconstructed using the Surgilig system. Five patients were lost to follow-up; hence, 45 patients underwent review. Patients were evaluated clinically and radiologically at an average of 26.9 months (range 6 months to 60 months) postoperatively using the Oxford, University of California, Los Angeles (UCLA) and Simple Shoulder scoring systems.

Results The mean Oxford score was 45.31 (SD 4.52, range 35 to 48), the mean UCLA score was 31.38 (SD 5.07, range 11 to 35) and the mean Simple Shoulder score was 10.92 (SD 1.7, range 6 to 12). Ninety-one percent of patients were completely satisfied with the procedure and outcome. Few complications were encountered, with no recorded infections. However, one patient underwent early revision for persistent

instability. Six patients had the screw removed at a later stage as a result of local skin irritation. Removal of the screw did not result in recurrent instability.

Discussion The present study is the largest reported mid-term results using the Surgilig technique, and appears to be successful for treating both acute and chronic injuries, with high patient satisfaction and excellent functional results.

J R Army Med Corps. 2009 Sep; 155(3):191-3

PRELIMINARY RESULTS OF THE ‘SURGILIG’ SYNTHETIC LIGAMENT IN THE MANAGEMENT OF CHRONIC ACROMIOCLAVICULAR JOINT DISRUPTION.

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Abstract

Background : Chronic instability of the acromioclavicular joint is relatively common and normally occurs following a fall onto the point of the shoulder. Reconstruction of the joint [Weaver-Dunn procedure] using the coracoacromial ligament is often required in service personnel, and a number of methods to augment this repair have been used. Many of these operative methods require a second operation to remove the metalwork, and in addition can be associated with a failure rate of up to 30%. The 'Surgilig™' was originally designed for use in the revision of failed Weaver-Dunn procedures. However this study evaluates its use in the primary operation, reinforcing the autologous graft, in an attempt to reduce the failure rate.

Data Collection & Analysis : We prospectively followed up the Modified Weaver Dunn procedures using Surgilig™. The post-operative x-rays were reviewed at six weeks, three months and then six months to assess the radiological success of the procedure. Our patients were discharged at six months.

Results : We have performed this procedure in 11 patients. One of the 11 patients was excluded from the study as the Surgilig™ graft was used in addition to a hook plate. The remaining ten patients have all reached the six-month post-operative time with no incidence of radiological failure of the graft. After six months they were discharged from clinic follow-up as the coracoacromial graft had sufficient strength to no longer rely on the augment for mechanical stability of the joint. All 10 patients had a good clinical and radiological result. One patient even had inadvertent stress! weight-bearing x-rays taken at six weeks, with no discernable detrimental effect to outcome.

Conclusion : Although a small study, these initial results for primary fixation of acromioclavicular joint disruption with Surgilig™ are extremely encouraging. The results suggest that Surgilig™ should continue to be used in its current role. As patient numbers increase, a follow-up study to evaluate these preliminary findings should be conducted.

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Chronic acromioclavicular separation: The medium term results of coracoclavicular ligament reconstruction using braided polyester prosthetic ligament

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Abstract

Summary In this series, we treated chronic acromioclavicular disruption with an artificial coraco-clavicular ligament made from braided polyester (The Nottingham Surgilig). The ligament has a loop at each end and is passed around the coracoid

process, threaded through itself, then passed around the posterior aspect of the clavicle and finally anchored to it with a bone screw. Eleven men with an average age of 39 underwent this procedure. Three patients had previously been operated on using the Weaver—Dunn procedure which had failed.

All eleven patients have been reassessed clinically and radiographically at an average of 55 months. Using the Imatani evaluation score, 10 patients achieved a good/excellent result with the mean Constant score being 92. One patient had fracture of the base of the coracoid after heavy lifting in the early postoperative period which resulted in a poor outcome. Two patients needed an additional operation. In one the lateral end of the clavicle was excised together with removal of the fixation screw, and in the other a subacromial



decompression was carried out. The Nottingham Surgilig is a useful alternative for the treatment of chronic acromioclavicular separation, especially in revision reconstruction when the coracoacromial ligament is no longer available.