

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 And 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.

Introduction

Acromioclavicular joint (ACJ) disruption (Figure 1) is a common military injury, which usually occurs following a fall onto the point of the shoulder [1]. It has been reported that ACJ disruption accounts for 3-5% of all shoulder girdle injuries [1]. Although there is some debate regarding exactly which ACJ disruptions should be treated operatively, it is generally accepted that the majority of ACJ injuries are successfully treated conservatively [1]. Unfortunately some patients fail conservative management, either due to persistence of symptoms or worsening of ACJ separation. These patients require secondary reconstruction to provide definitive stabilisation of the joint [7].

Historically, the injuries requiring operative fixation, underwent a Weaver-Dunn procedure. This was first described in 1972, and involved excision of the lateral end of the clavicle and transfer of the coracoacromio ligament to supplement the deficient acromioclavicular and coracoclavicular ligaments [2]. Copeland described a modified technique in 1995, which included reinforcement of the ligament with a PDS loop, to reduce the failure rate of ligament transfer alone [3]. A number of other augments have been used, including ethibond, vicryl tape or plates



Figure 1. A typical x-ray showing acromioclavicular joint disruption.

and screws. They are all short-term measures offering stability to the joint whilst the main coracoacromial ligament graft heals, and therefore strengthens. Many of these methods still had significant failure rates. (Figure 2), or required a second operation to remove the plate and/or screws used.

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Figure 2. A post-operative x-ray showing a failed acromioclavicular joint reconstruction.

In 2001 a synthetic ligament known as Surgilig™ was developed by the Nottingham shoulder unit [4]. This was initially used in revision ACJ stabilisation operations. More recently this method has gained popularity as the primary operation, where it appears to have a lower failure rate than other augments. This study intends to assess the early results of the use of Surgilig™ at Frimley Park Hospital.

Materials & Methods

Between February and November 2007 we performed 11 procedures using Surgilig™ (manufactured by Surgicraft Ltd and distributed by Plus Orthopaedics UK Ltd). The indication for surgery was a displaced acromioclavicular joint with loss of function. Our cut-off for the degree of displacement was greater than 50% of vertical dislocation (which equates to grade 3 on the Rockwood score). Our patients were followed up to the 6 month point post-operatively when they were discharged from Consultant care. The two senior authors (JC, PR) performed all operations.

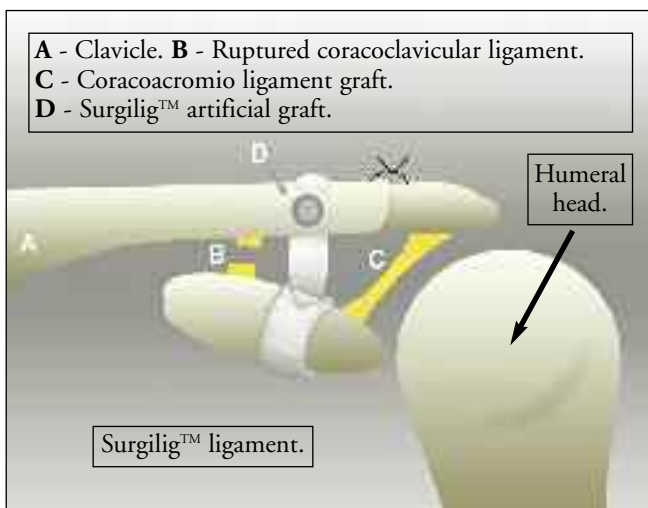


Figure 3. Diagrammatic representation [anterior view] of left shoulder to show position of the coracoacromio ligament [C] and Surgilig™ [D] grafts.

Operative technique

The operation is performed under a general anaesthetic, with the patient in the deck chair position. A sagittal skin incision is made from a point just medial to the ACJ to the coracoid process. The clavicle and acromioclavicular joint are identified. The lateral one centimetre of the clavicle is excised, and a recess created in the distal portion with a burr. The acromial end of the coracoacromial ligament is detached and then re-inserted into the recess at the lateral end of the clavicle. The coracoacromial ligament graft is

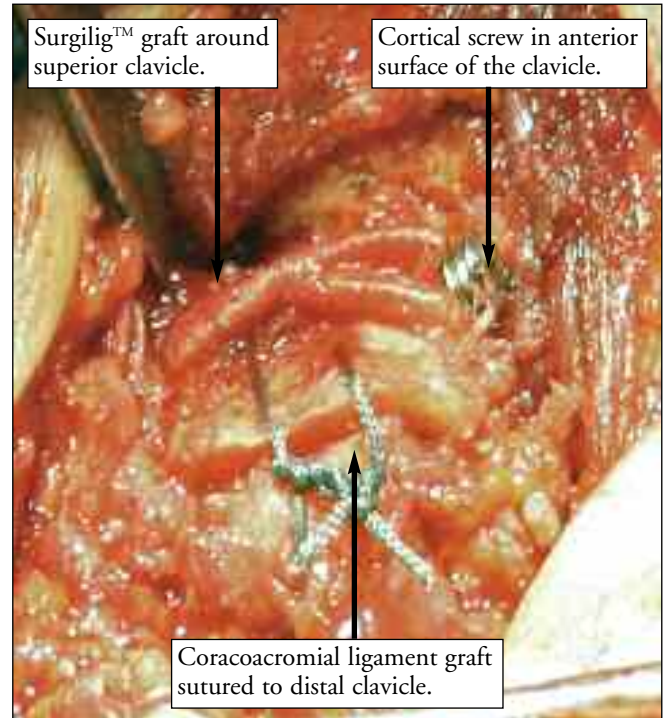


Figure 4. Operative photograph showing Surgilig™ anchored around clavicle with a cortical screw in the anterior surface. [Looking medially along superior border of the clavicle].

held in place with a suture through the clavicle. Surgilig™, a braided polyester prosthetic with a loop at either end of the graft, is passed around the coracoid process using a curved introducer, and then threaded through itself. The free end is then passed around the posterior aspect of the clavicle before being attached to the anterior aspect of the clavicle with a bone screw (Figures 3 and 4). Post-operatively, the limb is immobilised in a sling for 6 weeks, following which time a period of rehabilitation is recommended prior to the return of normal duties.

Posterior-anterior radiographs were taken at the following times post-operatively:

1. Prior to discharge.
2. Six weeks
3. Three months
4. Six months, when follow-up is completed.

Results

Eleven patients underwent acromioclavicular joint stabilisation using Surgilig™ between 8th February 2007 and 7th November 2008. Of these patients, one had Surgilig™ used in addition to a hook plate, and therefore was excluded from analysis in this study. There were no intra, or post-operative complications. Of the 10 patients remaining, none experienced failure of the graft when assessed radiologically as outlined in our methodology, and all returned to their pre-injury level of activities. Figure 5 shows post-operative radiographs of the Surgilig™ used successfully on the right side, with the left side included for comparison. There is no disruption to the ACJ even on weight loading of the joint. We have not experienced any complications to date with the use of Surgilig™, but continue to monitor our use of this implant.

Discussion

From a military perspective, given the age and activity level of military patients, reconstruction of a chronic ACJ dislocation is a relatively common procedure. The functional level that is required post-operatively necessitates a secure augment to the coracoacromio ligament. Military patients benefit from treatment with a single definitive operation. As a group that is so transitory, fixation involving two operations would often require the hand-over of clinical care as the patient is moved to a new

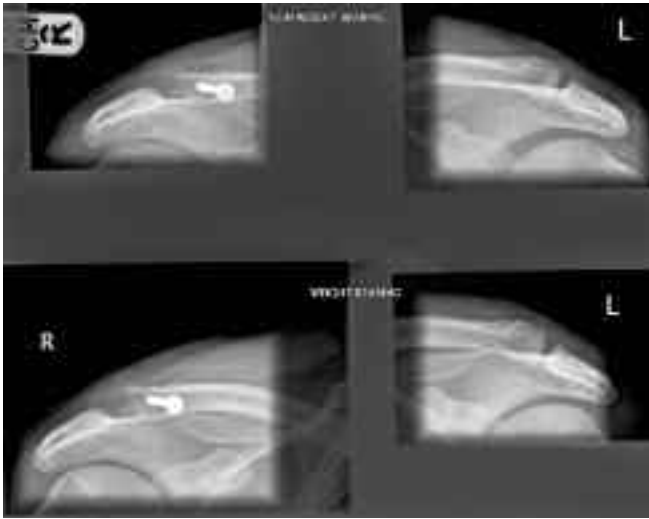


Figure 5. Post-operative x-rays of a Surgilig™ graft used on the right side [note the screw in the clavicle] and the normal left side for comparison. This patient even had inadvertent stress weight-bearing views.

geographical location. It would also require a second period of downgrading and rehabilitation thus prolonging the time of eventual return to active duty.

The use of Surgilig™ in the modified Weaver Dunn procedure has proved beneficial in revision ACJ stabilisation surgery, failed conservative management and even in acute cases [5]. Regardless of the indication for its use, the functional outcome with Surgilig™ has allowed early mobilisation of the affected limb, and early return to full function [6], making it a highly desirable option for use in active people.

A number of methods are available to augment the 'classical' Weaver Dunn, including a hook plate, a plate and screws, or just screws alone [6]. All these methods increase the strength and durability of the fixation. However the real benefit of using Surgilig™ is that it offers secure fixation of the AC joint without the need for a second operation. In contrast, a hook plate can be used to provide a similar secure fixation; however it does require a second operation to remove the plate, necessitating a second in-patient admission.

Although we prospectively followed-up these patients, and therefore had no control group to directly compare our results against, we are confident that more traditional methods of fixation would have displayed a higher failure rate. The authors believe that the complication rate with the previous methods of fixation [ethibond suture, vicryl tape and hook plate] was high [see Figure 2], and this is supported by published evidence [7]. As the results with Surgilig™ have proven it to be so effective, we believe that it would now be unethical to proceed with a randomised control trial.

A potential criticism of our study could be that we relied on radiological evidence and the patients' report of return to all activities as the only outcome measures. Numerous clinical and/or functional shoulder scores exist, such as the Constant-Murley and the Imatani [8,9] scores. However with our particular patient group, a group of motivated and active service personnel, the authors believe they would have scored highly even pre-operatively and therefore would have made conclusions based on functional scores difficult to interpret and potentially misleading. It was felt that to use symptomatic and radiological evidence only would provide more accurate results. Indeed, all of our patient group have returned to full military duties, indicating a very high functional outcome.

In contrast to other units we still use Surgilig™ as an augmentation implant, and continue to rely on the coracoacromial ligament to provide long term mechanical stability. A study from Jeon et al in South Korea advocates the

use of Surgilig™ alone, and reports good results over a period of 55 months [10]. We feel that as the prosthesis is artificial, we would expect it to ultimately fail. If used solely then the strength and functionality of the joint would be reliant on scar tissue exclusively. The authors believe that it is more prudent to use Surgilig™ as an augment to the coracoacromio ligament, so that strength to the acromioclavicular joint is provided by the graft augment in the early stage whilst the coracoacromio ligament achieves full tensile strength. This theory is supported by published biomechanical evidence [11]. Anecdotally the authors have seen failures of the sole use of Surgilig™ without coracoacromial ligament transfer, in service personnel operated on at other centres.

We advise our patients to keep the arm immobilised in a sling for six weeks, after which time mobilisation can begin. We would expect that formal rehabilitation could begin at three months post-op as accepted scientific belief suggests that ligaments heal in three months and therefore the coracoacromial ligament will have achieved full strength. We expect, and have found with our military patients that they can be medically upgraded at five to six months after the operation. Unlike a hook plate or plate and screws, there is no requirement for a planned period of future downgrading/operation/rehabilitation to facilitate removal of the graft.

Conclusion

This study suggests very positive early results for the use of Surgilig™ in primary acromioclavicular joint disruption. The benefit of a single definitive operation would be particularly useful in a military setting, although the reduction in in-patient time and duration of rehabilitation it has clear advantages for the wider NHS setting. Although we have not experienced any complications so far in this initial study, we remain vigilant to any complications that may arise. We are extremely encouraged by the results so far, and feel that after the six-month post-operative time frame we would expect the transplanted coracoacromial ligament to deliver almost all of the mechanical strength stabilising the ACJ. The authors believe that the use of Surgilig™ warrants further study, with particular attention to a longer period of follow-up, and studying a larger patient group.

References

1. Rockwood CA, Young DC. Disorders of the acromioclavicular joint. In: Rockwood CA, Matsen III FA, editors. *The Shoulder*. Philadelphia: WB Saunders; 1990. p. 413-468.
2. Weaver JK, Dunn HK. Treatment of acromioclavicular injuries, especially complete acromioclavicular separation. *J Bone Joint Surg Am* 1972; **54A**: 1187-94
3. S Copeland. *Operative shoulder surgery*. New York: Churchill Livingstone; 1995.
4. Butt HZ, Wallace WA. Nottingham Surgilig™- A Novel Device for the Surgical Treatment of Acromioclavicular Dislocation. *Orth Prod News*, 2005. 44-46
5. Bhattacharya et al. *Journal of Bone and Joint Surgery - British Volume*, Vol 87-B, Issue SUPP_II, 166
6. Guy DK, Wirth MA, Griffin JL, Rockwood Jr CA. Reconstruction of chronic and complete dislocations of the acromioclavicular joint. *Clin Orthop* 1998; **347**: 138-149
7. Goldberg JA, Viglione W, Cumming WJ, et al. Review of coracoacromial ligament reconstruction using Dacron graft material. *Aust N Z J Surg* 1987; **57**: 441-5.
8. Constant CR, Murley AG. A clinical method of functional assessment of the shoulder. *Clin Orthop* 1987; **214**: 160-4.
9. Imatani RJ, Hanlon JJ, Cady GW. Acute, complete acromio-clavicular separation. *J Bone Joint Surg Am* 1975; **57A**: 328-32.
10. Jeon I-H, Dewany G, Hartley R, Neumann L, Wallace WA. Chronic acromioclavicular separation: The medium term results of coracoacromial ligament reconstruction using braided polyester prosthetic ligament. *Injury* 2007 **38**, 1247-1253
11. Wilson DR, Moses ZM, Zilberfarb JL, Hayes WC. Mechanics of coracoacromial ligament transfer augmentation for acromioclavicular joint injuries *J Biomech*. 2005; **38**[3]: 615-9