

S CASE REPORT

Artelon[®] tissue reinforcement in the repair of a ruptured, degenerative rotator cuff in an elderly man

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ABSTRACT

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Conflicts of Interest

None declared

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Background Massive degenerative rotator cuff tears are a considerable problem in the elderly. It is known that about one third of surgical repairs of damaged rotator cuffs result in re-tear. The most common reason for this failure is poor quality of the cuff due to degenerative changes. The aim of our study was to see if Artelon Tissue Reinforcement[®] (ATR) in the repair of a degenerative rotator cuff tear could improve the postoperative outcome.

Methods An 81-year old man was treated surgically with repair of a massive degenerative rotator cuff tear, reinforced by an ATR-patch. The patient was followed postoperatively with clinical examinations and MRI at 6- and 15-months postoperatively. Objective outcome measures using Constant Score, WORC and Oxford Shoulder Score were analyzed 2.5 years postoperatively.

Results The MRI showed maintained integrity of the rotator cuff at both 6- and 15-months postoperatively. The results from WORC and Oxford Shoulder Score indicate a return to normal shoulder function.

Discussion The experience from this case and two other similar cases with excellent patient satisfaction and no signs of adverse effects has encouraged us to commence a prospective, randomized study to further analyze the effect of ATR in treating degenerative rotator cuff tears.

INTRODUCTION

In a recent review, Neri et al. [1] describe the available current knowledge about the management of massive and irreparable rotator cuff tears. For patients with chronic symptoms lasting more than 6 months, the results with non-operative methods are unsatisfactory. Pain may be improved with simple debridement and decompression but improvement in function can reasonably be expected only if the overall kinematics about the joint can be restored. This can only be achieved with either complete or partial repair of the rotator cuff tendons. However, the results obtained with tissue substitutes such as freeze-dried cadaveric allograft and porcine small intestinal submucosa to augment repairs or bridge the defects have been disappointing [2–5]. As a result, there is currently no attractive treatment choice for patients with massive rotator cuff ruptures and particularly not for elderly patients with degenerative changes in the tendon.

Artelon[®] Tissue Reinforcement (ATR) (Artimplant AB, Gothenburg, Sweden) is a synthetic patch made from Artelon[®] fibres based on a degradable polyurethaneurea that can be used in surgical procedures for reinforcement of soft tissue where weakness exists (Fig. 1). The implant is biocompatible, degrades slowly and maintains its strength and elasticity over several years, providing long-term support of the soft tissue at the same time as comprising a scaffold for host tissue ingrowths. These patches are easy to cut and handle and are supplied sterile. Before use, they should be soaked with sterile saline at room temperature for at least 5 minutes.

Before initiating a controlled randomized clinical trial comparing rotator cuff repair with and without ATR in elderly patients with a combination of degenerative rotator cuff changes and massive ruptures, we wanted to evaluate the combined treatment option in a few patients. In the present case report, we describe the 2.5 years of follow-up in our first patient.

CASE REPORT

A vital and otherwise healthy 81-year-old male presented at our department in April 2008 with pain, weakness, and limited and painful range of motion (ROM) of his left shoulder. The symptoms started in October 2007 when he lifted some heavy rocks and pulled up his boat from the water. During these activities, he felt that something happened in his left shoulder. Subsequently, he was unable to abduct his left arm more than 80° and suffered from pain and weakness. He had great difficulty in using his left arm for daily activities such as shaving, placing plates on a high shelf, driving his car, and so on.

Pre-operative examination

A magnetic resonance imaging (MRI) examination of his left shoulder performed in February 2008 revealed a full thickness supraspinatus tendon tear retracted to the level of the superior glenoid rim (Fig. 2). The muscle belly had undergone



Fig. 1 The Artelon® Tissue Reinforcement synthetic patch that can be used in surgical procedures for the reinforcement of soft tissue where weakness exists.

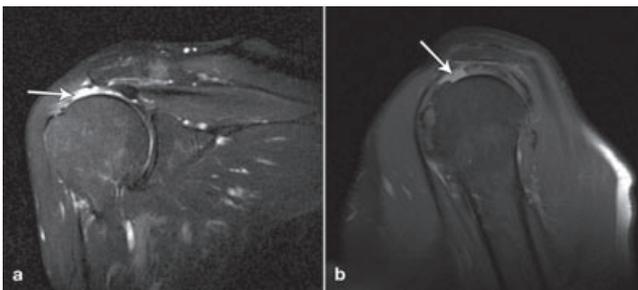


Fig. 2 Pre-operative magnetic resonance imaging (PD-weighted fat saturated) of the left shoulder. (a) Coronal image showing the rotator cuff rupture (arrow) and (b) sagittal image showing the retracted supraspinatus tendon (arrow).

moderate atrophic changes; however, there was no sign of fatty degeneration.

Surgical procedure

In June 2008, the patient underwent open surgery to repair the ruptured rotator cuff. Before surgery, one dose of 1.5 g cefuroxim (Zinacef®; GlaxoSmithKline, Solna, Sweden) was administered intravenously as infection prophylaxis. The procedure included a diagnostic arthroscopy and debridement plus an open acromioplasty. A massive rupture of the rotator cuff was confirmed. The ruptured tendons were of very poor quality even though the infraspinatus tendon was not totally disconnected from the insertion site. An unstable and thickened long head biceps tendon was identified and a tenodesis was performed. The retracted rotator cuff tear was mobilized back to its insertion at the greater tuberosity, although a defect measuring just over 1 cm was left uncovered with tendon (Fig. 3a). The repair was performed with suture anchors (Twifix Ti 5, 0 mm; Smith&Nephews Inc., Memphis,

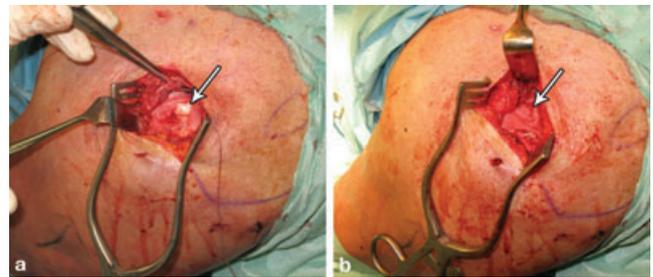


Fig. 3 Open repair of the ruptured and degenerative rotator cuff. (a) The cuff advanced as far as possible and reinserted with suture anchors shows a remaining smaller defect (arrow). (b) Subsequent to covering the defect and the repaired tendon by a 3 cm in diameter patch of Artelon® Tissue Reinforcement.

TN, USA) attached to the greater tuberosity. When the rotator cuff was repaired as far as possible, the whole site, including the repaired cuff and the remaining defect, was covered with an approximately 3 cm in diameter, round ATR patch, which was sutured in place with threads from the suture anchors (Fig. 3b). The patch was soaked with sterile saline at room temperature for approximately 5 minutes before use.

Rehabilitation

The early postoperative course was uncomplicated. The established postoperative regime and rehabilitation for open rotator cuff repair at our department was followed. This entailed 6 weeks of immobilization of the operated shoulder, allowing only passive training of the arm below the horizontal plane during week 3 to week 6. After 6 weeks, the sling was removed and the patient was allowed to start active training under supervision by a physiotherapist.

Follow-up

The patient was followed up clinically at 6 weeks, 3 months, 6 months and 12 months after surgery and with MRI at 6 months (Fig. 4) and 15 months (Fig. 5). No side effects were reported or observed during the follow-up period. The ROM of his operated shoulder improved to almost normal and he was completely relieved of pain, allowing the patient to carry on his daily activities without limitation or pain. He happily told us that he had been able to paint his summer cottage during the first year after the surgery (Fig. 6).

In addition, the patient was evaluated 2.5 years postoperatively with Constant Shoulder Score, Western Ontario Rotator Cuff Index (WORC) and Oxford Shoulder Score to add objective measurements to his long-term outcome. The results were: Constant Shoulder Score 68; WORC 100%; Oxford Shoulder Score 12 points. The results of the WORC and Oxford Shoulder Score indicate a completely normal shoulder status.

DISCUSSION

The repair of massive degenerative rotator cuff tears in the elderly with degenerative rotator cuff changes is a subject of controversy, even though there are studies that recommended repair

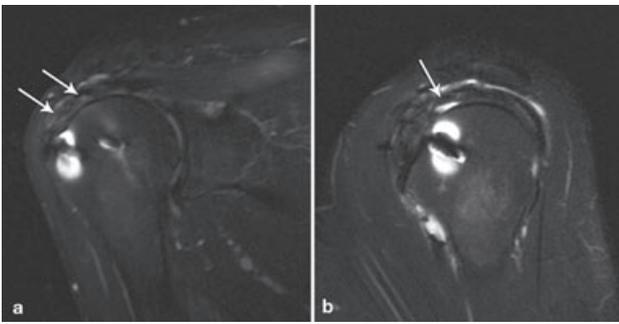


Fig. 4 Magnetic resonance imaging images (T2 fat saturated) of the left shoulder 6 months postoperatively. The repaired and continuous rotator cuff (arrows) is seen in (a) coronal and (b) sagittal projections.

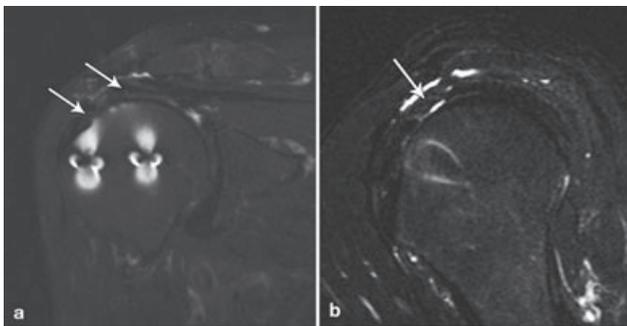


Fig. 5 Magnetic resonance imaging images (T2 fat saturated) of the left shoulder 15 months postoperatively as seen in (a) coronal and (b) sagittal images, with a maintained integrity of the rotator cuff (arrows).



Fig. 6 (a) The patient before surgery of his left rotator cuff rupture, demonstrating painful and limited shoulder abduction of less than 80°. (b) One year postoperatively, the patient painted his summer cottage, demonstrating the range of abduction in his operated shoulder.

of full-thickness rotator cuff tears regardless of tear size and age [6]. As a result of the disappointing results subsequent to surgery in this group of patients, many orthopaedic surgeons prefer non-operative treatment, even if the results are often unsatisfactory. As an alternative, open or arthroscopic surgical debridement and decompression is used in some cases, leaving the ruptured rotator cuff untreated. Short-term results are often good, whereas mixed results have been reported with long-term follow-up [7,8]. Many surgeons are sceptical of rotator cuff repair in this group of

patients as a result of degenerative changes and have linked to this a high re-tear rate [9,10].

With a growing elderly population, the prevalence of patients with a combination of degenerative changes and ruptures of the rotator cuff will increase. Many of these patients suffer from symptoms that have a negative impact on their quality of life [11], such as sleep disturbance as a result of pain and limitations in their ability to perform activities of daily living. Thus, there is a need for a well-documented treatment alternative that offers pain relief in addition to restoring ROM and strength in the affected shoulder.

On the basis of the favourable outcome in this patient, we have proceeded to treat two other elderly patients with massive degenerative rotator cuff tears (one male, one female; both 80 years old) with Artelon® tissue-reinforcement in the same manner as described above. These two patients have been followed with Constant Shoulder Scores both pre-operatively and 6 months postoperatively, with equally favourable clinical outcomes and an improvement in Constant Shoulder Score from 54 to 63 (17% improvement) in the male patient, and 29 to 52 (79% improvement) in the female patient. The results obtained in these three patients have encouraged us to plan a prospective, randomized clinical trial aiming to compare rotator cuff repair with or without ATR in elderly patients with degenerative rotator cuff tears. We recognize that the experience from these three patients is too small to advocate the common use of ATR, and that larger studies are needed before ATR can be recommended as a standardized treatment option.

Conclusions

A growing elderly population will result in an increased prevalence of patients with usually massive and degenerative rotator cuff tears, which will have a negative impact on their quality of life. Despite the existing uncertainty among surgeons for operative treatment, the need for a more active intervention in this patient category is obvious. On the basis on our positive experience using ATR in the repair of degenerative rotator cuff tears, we will proceed with a prospective, randomized clinical trial aiming to further document the results of this method.

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