

Are we over-treating biceps tendon disorders?

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Abstract

The aim was to analyse biceps tendon disorders histopathologically in order to get a better understanding of the pathogenesis. A histopathological examination was made of tissue samples taken from 41 patients in subpectoral biceps tenodesis operations applied for a diagnosis of biceps tendinopathy. The mean age of the patients was 53,4 (range: 27- 64). The mean Constant shoulder score was determined as 32 preoperatively and 84 postoperatively. The VAS (visual analog score) values were determined as mean 8.75 preoperatively and 2.18 postoperatively. As a result of the histopathological examinations, no findings suggestive of an acute or chronic inflammatory event were determined in any case. The histological findings determined were not sufficient to explain the pathophysiology of biceps tendinopathy diseases. The findings strengthened the view that extrinsic factors apart from the tendon could play a significant role in the pathogenesis of the disease. Therefore, we ask whether or not tendon decompression may be considered as a treatment option for biceps tendinopathies as in chronic compression tendinopathies.

Keywords: Biceps tendinitis, biceps tendinopathy, tenosynovium, long head biceps tendon

Introduction

The biceps brachii muscle is located in the anterior compartment of the arm. It aids in elbow flexion and supination of the forearm. The long head of the biceps tendon (LHBT) is surrounded by synovial membrane [1]. The transverse humeral ligament, which is located over the bicipital groove and the pectoralis major muscle which passes diagonally in front of the groove, helps in the stabilisation of the LHBT [2].

Pathologies of the LHBT are widely seen [3, 4]. These may cause persistent pain and loss of function of the shoulder. Even though tendon pathologies are seen in isolation, there is a greater incidence together with other intra-articular diseases such as rotator cuff diseases, SLAP lesions and instability [5-7]. In recent years, the opinion has emerged that LHBT disorders are an important source of shoulder pain [8,9].

Biceps tendon pathologies may vary from inflammatory tendinitis to degenerative tendinosis. The term of tendinitis refers to inflammation around the tendon. This is generally seen in young patients related to sporting activities. Tendinosis is thought to be related to overuse and degeneration [9,10].

Conservative treatment is often applied to biceps tendon pathologies. In cases of persistent pain, surgical treatment is preferred. Tenotomy or tenodesis are the most often applied surgical treatments. Some researchers recommend only tenotomy [11,12] while others offer only tenodesis [13,14]. There are also researchers who have reported no significant difference between the two techniques when the clinical results are taken into consideration.

Since the biceps pathology is a significant source of shoulder pain, and the pleasing results of surgical procedures applied to biceps pathologies, a remarkable increase was seen in studies directed at the pathogenesis of biceps tendinopathies. In our clinical practice, subpectoral biceps tenodesis is applied to patients when the decision was surgical treatment for the biceps tendinopathy. In this study, histological examination was made of the proximal part of the biceps tendon that was resected.

Several studies related to biceps pathology have yielded positive results. Positive results from various surgical techniques (arthroscopic tenotomy, arthroscopic suprapectoral tenodesis, open subpectoral tenodesis, etc) and from various materials used in tenodesis (anchor, tenodesis screw, etc) necessitated to examine the role of factors outside the tendon to clarify the pathogenesis of biceps tendinopathy. It was therefore aimed to primarily examine the tendon structure histopathologically to make a contribution to the understanding of the disease pathogenesis.

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Materials and Methods

The study included 41 patients who underwent arthroscopically-assisted subpectoral biceps tenodesis for a diagnosis of isolated biceps tendinopathy in our clinic between April 2014 and January 2016. Conservative treatment was applied to all the patients for 3 months before the operation. The decision for surgical treatment was taken for resistant cases who did not respond to conservative treatment. Direct radiographs and MRI were taken of all patients preoperatively. A thorough, detailed physical examination was made for all patients. Exclusion criteria were the finding on MRI of pathologies other than biceps, patients who had received biceps tendon sheath steroid injection during conservative treatment, those to whom rotator cuff repair was applied apart from the biceps tenodesis procedure during surgery, and those to whom other procedures were applied, such as subacromial decompression.

The operation was done with the patient in the beach-chair position. Standard anterior and posterior portals were opened and the biceps was tenotomised from the area closest to the superior labrum with arthroscopic radiofrequency. Then a subpectoral approach was made. A 3-4cm longitudinal incision was made starting from 1cm proximal to the inferior edge of the pectoralis major tendon on the medial edge adjacent to the axilla. When advancing towards the bicipital groove with blunt dissection, the tendon of the long head of the biceps muscle was located immediately below the pectoralis major muscle. The tendon was pulled with an instrument from the joint and freed (Figure 1). The biceps tendon was cut approximately 1-2cm proximal from the musculotendinous attachment. Tenodesis was applied with the aid of an anchor just inferior to the bicipital groove. The excised tissue samples were fixed in formaldehyde and after routine procedures and embedding in paraffin, slices of 5 microns were cut and stained with haetoxilyn and eosin. Examination with a light microscope was made by a single pathologist. The tissue samples were evaluated in respect of inflammation, mixoid degeneration, vascular increase, collagen irregularity and tenocyte hypertrophy. Statistical analysis was performed by SPSS software (version 19.0, packet program for windows systems). Normal distribution for continuous variables was checked with histogram plot. A P -value <0.05 was considered statistically significant.



Figure 1. Biceps tendon was pulled and freed after the biceps was tenotomised with arthroscopic radiofrequency

Results

The mean age of the patients was 53,4 (range: 27- 64). The mean Constant shoulder score was determined as 32 preoperatively and 84 postoperatively. The VAS (visual analog score) values were determined as mean 8.75 preoperatively and 2.18 postoperatively. While the speed test was positive in 93.75% of the patients, there was sensitivity with palpation over the bicipital groove in all the patients.

As a result of the histopathological examinations, no findings suggestive of an acute or chronic inflammatory event were determined in any case (Figure 2). Collagen degeneration was determined in the tissue samples of 26 cases (Figure 3), tenocyte hypertrophy in 5 cases, increased vascularisation in 7 cases and the presence of mixoid material in 3 cases(Figure 4).

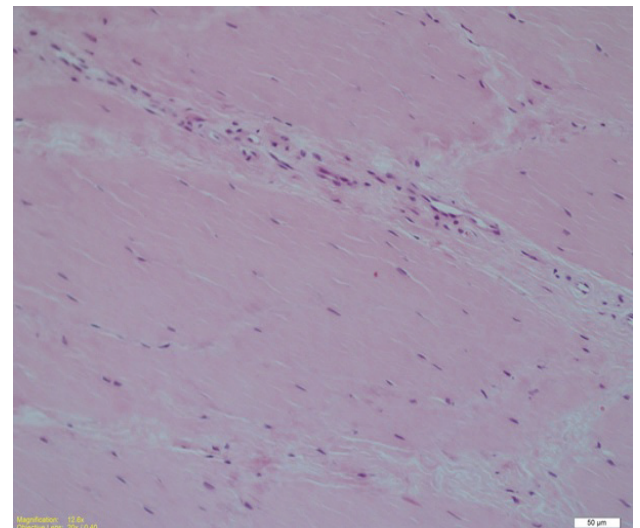


Figure 2. Usual biceps tendon tissue. H&E stain, 20X

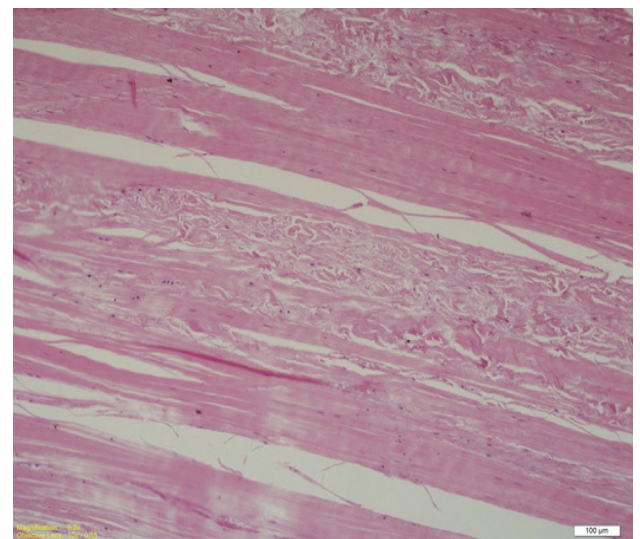


Figure 3. Collagen dejeneneration in biceps tendon tissue. H&E stain, 10X

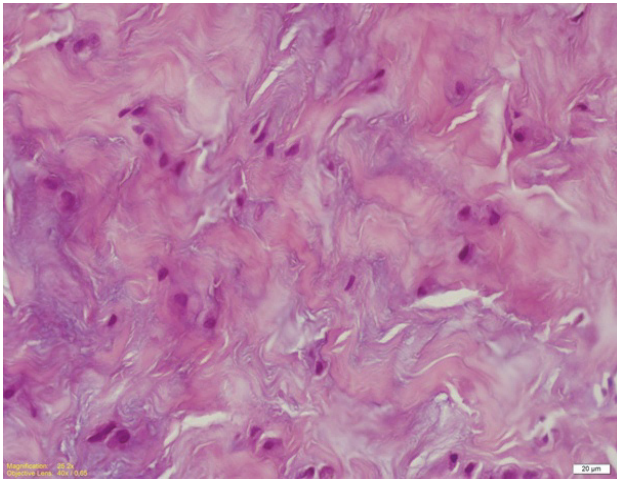


Figure 4. The presence of mixoid material among collagen bundles. H&E stain, 40X.

Discussion

Biceps tendon disorders may be seen either in isolation or together with other shoulder joint diseases. Recently, it was clarified that the biceps tendon could be a source of shoulder pain [15-17]. Tenodesis or tenotomy of the biceps are frequently applied operations [11,12,18]. It has been reported that after tenotomy, early rehabilitation is possible and complication rates are low. Tenotomy has been recommended by some authors for patients of an advanced age with a low level of physical activity [19,20]. However, some authors advocate tenodesis due to the potential complications of tenotomy. It has been reported that in tenodesis, cosmetic deformity (Popeye sign) is seen less often and there are biomechanical advantages [13,14]. There is also a previous study which compared the forearm supination and elbow flexion strength of patients after tenotomy and tenodesis and no significant difference was reported between the two groups [21].

Boileau et al. applied biceps tenotomy or tenodesis in massive irreparable rotator cuff repairs and clinically positive results were obtained related to the complaints of shoulder pain and dysfunction in the patients with both techniques [22].

Some authors compared the results of arthroscopic biceps tenodesis and open subpectoral biceps tenodesis and have reported similar clinical results with both techniques [23,24]. Millet et al. researched the effect of the material used in open subpectoral biceps tenodesis on results. The results of operations made with an interference screw or a suture anchor were compared and no statistically significant difference was determined in the clinical results between the groups [25].

Streitt J J et al made a histopathological analysis of the extra-articular section of the biceps tendon and reported that the disorder in most cases was related not to an

inflammatory event but to a chronic degenerative process such as in De Quervain tenosynovitis and other tendinopathies [26].

Alizadeh K et al examined histological findings in idiopathic carpal tunnel syndrome, compared them to normal histological tissue and similarly concluded that inflammatory events had no place in the pathogenesis of the disease [27]. In another study, Jaferi D et al made a histopathological examination of cases of idiopathic carpal tunnel syndrome. It was reported that although not widespread, there were findings of inflammation and fibrosis in some patients [28]. Similarly, Nakamichi et al reported that the ligament and tenosynovium histology was normal in most cases of idiopathic carpal tunnel syndrome and typical histological changes were not encountered related to idiopathic carpal tunnel syndrome [29]. In another histopathological study related to De Quervain disease, it was suggested that intrinsic degenerative mechanisms played a role in the disease pathogenesis rather than inflammatory events [30]. The histopathological results of the current study show a similarity to these examples given of histopathological studies of carpal tunnel syndrome and De Quervain disease.

The aim of the current study was to make a contribution to the clarification of the pathogenesis of biceps tendon disorders. No specific pathological findings were determined in the histopathological examination of the biceps tendon. As tendon sections which were thought to be healthy were not observed in the histological examination, there might be other factors which have not yet been revealed for satisfactory explanation of the pathogenesis of the disease. For example, just as in carpal tunnel syndrome and De Quervain disease, biceps disorders could be partially related to the entrapment of the biceps under the humeral transverse ligament rather than tendon disease itself. Further research is required on this subject and cadaver studies would be useful. Similarly, findings such as fibrosis and mixoid degeneration could be investigated with histological examination of the transverse humeral ligament in biceps disorders.

In a cadaver study, Kwon YW et al investigated the anatomic structures which contribute to the stability of the proximal biceps tendon. The subscapularis tendon was reported to be the most important structure in stability and when there was isolated sectioning of the transverse humeral ligament, excursion of the tendon in the groove was seen to increase significantly [31].

The histopathological results reached in the current study support the view that factors outside the tendon play a significant role in the pathogenesis of the disease. In a previous study, the chance of success in arthroscopic tenodesis operations made without decompression of the extra-articular biceps tendon was reported to be lower

compared to cases where the transverse humeral ligament was sectioned or cases of tenodesis made distal to the bicipital groove [32]. According to the results obtained in the current study together with those of the previous cited studies, primary decompression of the transverse humeral ligament may be sufficient in the treatment of selected patients with biceps tendinopathy. The current study supports the need for investigation of extrinsic factors other than the tendon. Further studies are required to investigate whether or not primary decompressing of the tendon is sufficient, as in the treatment of chronic compression tendinopathies.

In conclusion, biceps tendon disorders are a significant cause of shoulder pain. It is accepted that various surgical techniques applied to the biceps provide positive clinical results. The histopathological results obtained in this study preserving the structure of the biceps tendon indicated that no major histopathological findings were determined which would clarify the process. This suggests that as in De Quervain tenosynovitis, structures outside the tendon could have an impact for biceps tendon diseases. According to the results of this study, there is a pathophysiological similarity between biceps tendon disorders and chronic compression tendinopathy diseases. Therefore, we suggest that tendon decompression may be considered as a treatment option for biceps tendinopathies same as in chronic compression tendinopathies if further studies confirm our hypothesis.

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