

Surgical treatment of chronic boutonniere deformities by lengthening-dorsalizing the lateral bands and tightening the central slip

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Abstract

Purpose

Boutonniere deformity is caused by damage to the central slip of the extensor tendon hood with secondary palmer migration of the lateral bands. Accordingly, patients complain of disfigurement and impairment of function due to hyperextension of their DIP. The aim of this study is to evaluate the results of surgical treatment of chronic boutonniere deformity by using a technique lengthening-dorsalizing the lateral bands and tightening the central slip.

Patients and methods

Twenty patients with chronic boutonniere deformity were treated by lengthening-dorsalizing the lateral bands and tightening the central slip. The surgery was performed with peripheral nerve block (sensitive), allowing dynamic adjustment of the tendinous sutures. With a dorsal incision, a tenolysis of the extensor was performed. The central slip was tightened and the lateral bands dorsalized by cross-stitches over the PIP joint. The active flexion/extension was tested, and then lengthening of the lateral bands by "mesh graft" tenotomy was performed over the second phalange. The etiology was a closed rupture

of the central slip in 13 cases and a section of the central slip in 8 cases. The mean age was 35.4 years (range: 18-50 years). We included only cases with deformities that were totally correctable passively without joint osteoarthritic changes.

Results

Preoperatively the average PIP joint extension deficit was 64° and postoperatively the average is reduced to 8.2, preoperative the average DIP motion was 9.7° of hyperextension, post-surgery the average DIP active flexion was 77.1°. The final outcomes were 62% excellent, 28.5% good, and 9.5% poor.

Conclusion

This technique gave (90.5%) excellent and good results. The procedure is simple and provides long term good results.

Keywords

Boutonniere Deformity; Lateral Bands; tendon injuries; central slip injury; extension lack.

Introduction

Boutonniere deformity is caused by damage to the central slip of the extensor hood with secondary palmar migration of the lateral band. BD is commonly seen after injury and also as a sequela of progressive inflammatory conditions such as rheumatoid arthritis. The deformity resembles a buttonhole ("Boutonniere" in French) [1].

In boutonniere deformity, the proximal interphalangeal joint (PIP) is flexed and the distal interphalangeal joint (DIP) is hyperextended. Although normal flexion is maintained at the PIP joint, impaired function results from loss of DIP flexion. Patients also complain of the abnormal appearance [2].

If the central slip is disrupted the two lateral bands lose their supporting communication. The apex of the proximal interphalangeal joint prolapses through the hole between the lateral bands. Next, the lateral bands slip volarwards over the convexity of the phalangeal condyles, volar to the axis of rotation [3].

An accurate clinical assessment is essential for selecting the appropriate treatment method. In addition to a physical examination, x-ray may be ordered to ensure there are no fractures associated with the injury [4].

A distinction must be made between an early case and a longstanding boutonniere deformity. An early case can best be treated by splinting. Early diagnosis and treatment of boutonniere deformity is essential to regain and retain full range of motion in the injured finger [5].

Surgery is indicated when splinting is not effective and the patient is not able to hold it up against resistance. Once a reconstructive procedure is considered, preoperative physiotherapy and splinting are required in order to stretch the contracted volar capsule of the proximal interphalangeal joint [6].

Several methods have been designed to overcome chronic boutonnière deformity. We used a technique without interruption of the extensor mechanism. Tightening the central slip and dorsalization of the lateral bands of the extensor mechanism is advisable for flexible boutonnière without osteoarthritis after conservative treatment failure.

Patients and Methods

This is a therapeutic prospective study. This study

was conducted on 20 patients (21 fingers) for whom boutonnière deformity correction was done at ALAZHAR university hospitals between December 2017 and September 2018. There were 12 females and 8 males. The fingers affected were nine ring, eight middle, two index, and two little fingers. The etiology was a closed rupture of the central slip in 13 cases and a section of the central slip in 8 cases. The mean age was 35.4 years (range: 18-50 years). All cases were subjected to clinical and radiological examination. We included only cases with deformities that were totally correctable passively without joint osteoarthritic changes.

Results were assessed on pain and range of motion of the PIP and DIP joint. We used Souter et al score ⁽²⁾ which is classified as follows: excellent (zero score), good (score of one), fair (score of two), and poor (score of three or more).

Table (1): The Score used to assess the Result

PIP Joint Active Flexion		PIP Joint Loss of Active Extension		DIP Joint Active Flexion		Results	
Degrees	Score	Degrees	Score	Degrees	Score	Total Score	Functional Category
≥80	0	≤10	0	≥70	0	0	Excellent
60-79	1	11-20	1	40-69	1	1	Good
<60	2	21-40	2	<40	2	2	Fair
		>40	3			3	Poor

Surgical Technique

The intervention was carried out under pneumatic tourniquet and mild, pure sensory distal nerve block, which allowed dynamic control of the tendon sutures. A dorsal curvilinear incision extending from the metacarpophalangeal joint to the DIP was performed to expose the extensor mechanism. Tenoarthrolysis of the PIP was performed, conserving the scar from elongation of the central slip. Arthrotomy was performed with a lateral approach passing under the lateral band, which allowed the extensor mechanism to be lifted. The central slip was then tightened with 3 to 4 PDS 2-0 cross stitches to the back of the PIP, which also allowed the lateral bands to be dorsalized. The active extension of the PIP was controlled with mild distal nerve block and the central slip was tightened if needed by additional cross-stiches, until the maximal active extension was obtained. An elongation of the lateral bands by mesh-graft, as performed for the expansion of a thin skin graft, was performed with a scalpel by staged punctiform tenotomy to the back of

the intermediate phalanx (Fig. 1), and followed by passive hyperflexion of the DIP (Fig. 2). The PIP joint is temporarily stabilized with a Kirschner wire to facilitate early mobilization of the DIP joint. The K-wire was removed after 4 weeks and gentle active motion is encouraged. Closure of the wound in layer and dressing applied. The PIP joint is immobilized for 4 weeks in full extension. Night splinting then used for an additional 3 weeks. Active motion of the DIP joint is encouraged postoperatively.

Results

In this study, 20 patients with 21 fingers with chronic boutonnière deformity treated surgically without interruption of the extensor mechanism by elongation dorsalization of the lateral bands and tightening of the central slip. Results were assessed on pain and range of motion of the PIP as well as the DIP joints.

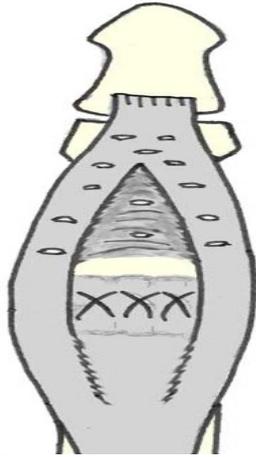


Figure 1: Cross-stitches over the proximal joint and “meshgraft”/punctiform tenotomy over the second phalanx interphalangeal.



Figure 2: Hyperflexion of the distal interphalangeal joint to break up adhesions and to allow distal interphalangeal active flexion.

The average defect in active extension of the PIP was 64 ± 8.03 degrees (range, 80° to 55°), postoperatively the residual active extension defect was 8.2 ± 5.5 degrees (range, 0 to 20°)

Preoperatively, the average PIP Joint Active Flexion was 67.1 ± 10.5 degrees (range, 50° to 80°). Postoperatively, the average active flexion of the PIP was 90.5 ± 14.4 degrees (range, 60° to 105°).

Preoperatively, the average hyperextension of the DIP was 9.7 ± 4.7 degrees (range, 20° to 5°). Postoperatively, the average active flexion of the DIP was 77.1 ± 9.5 degrees (range, 50° to 85°).

The final outcomes were 62% excellent, 28.5% good, and 9.5% poor.

Three fingers had some sort of postsurgical complications. Two (9.5 %) complicated by stiffness of the PIP

and the DIP joints because they did not use the splint postoperatively and did not follow through with physiotherapy. One (4.7%) had a superficial infection early in the post-operative days and was treated by daily dressing and antibiotics.

Discussion

Chronic boutonniere deformity does not develop unless Palmar migration of the lateral bands occurs. Therefore, correction of this palmar migration is an important step for correction of the deformity. Although lifting the lateral band dorsally and suturing them together corrects the boutonniere deformity, subsequent extension contracture of the (DIP) joint is inevitable [7,8]. Many studies have demonstrated many techniques for correction Of Boutonniere Deformity. Additionally, many authors have made recommendations for the correction of this deformity on totonomy, tendon relocation and tendon graft reconstruction.

In this study, 20 patients with 21 fingers with chronic boutonniere deformity treated surgically without interruption of the extensor mechanism by elongation dorsalization of the lateral bands and tightening of the central slip. This technique has the following advantages: The preservation of the continuity of the extensor mechanism (scar of elongation), The perfect dynamic perioperative adjustment of the sutures under mild local distal nerve block that it is quick to perform, The absence of removal or transfer of healthy adjacent tissues, This technique done without suturing the redorsalised lateral bands together dorsally so no limitation of PIP flexion as suturing the lateral bands dorsally restricts the natural dorsal-volar movement of the lateral bands with PIP flexion and extension.

This technique gives excellent and good results in 19 fingers (90.5 %). Results were assessed on pain and range of motion of the PIP as well as the DIP joints. Three fingers had some sort of postsurgical complications. Two (9.5 %) complicated by stiffness of the PIP and the DIP joints because they did not use the splint postoperatively and did not follow through with physiotherapy. One (4.7%) had a superficial infection early in the post-operative days and was treated by daily dressing and antibiotics.

Sameh El-Sallakh et al. (2012) [9] reviewed twelve patients with posttraumatic boutonniere deformity. They were treated by release of the extensor expansion proximal to the distal insertion of the oblique retinacular ligaments with proximal recession of the extensor tendon and lifting the lateral bands dorsally

onto the PIP joint after separation of the transverse retinacular ligaments from their insertion volarly. The final outcomes were 58.3% excellent, 33.3% good, and 8.3% poor which is similar to our result [9].

Towfigh et al. (2005) ⁽¹⁰⁾ described reconstruction of the central slip either with neighboring tendinous tissue or a tendon transplant and temporary immobilization of the joint with a Kirschner wire or a wire suture, at an average follow-up of 40 months, they reported 73% excellent and good results which is less than our results[10].

Le Bellec et al. (2001) [11] reviewed 34 cases of supple posttraumatic boutonnière deformity. one case was treated by an isolated distal tenotomy of the extensor tendon, while the other 33 cases were treated by a procedure of reconstruction of the extensor apparatus including resection suture of the central slip and redorsalisation of the lateral bands when there was a DIP hyperextension with a moderate flexion deformity of the PIP joint, and with 90% of excellent and good results which is similar to our results[11].

Conclusion

The patients presented in this series had results near similar to the results reported by other authors and the

techniques used in our results support the result presented by other authors.

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