

# Chronic Boutonniere Deformity: Cross-Lateral Band Technique Using Palmaris Longus Autograft

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**Purpose** The purpose of this study was to evaluate the outcomes of treatment of chronic boutonniere deformity with a reconstruction technique using palmaris longus autograft.

**Materials and methods** Seven patients with chronic, posttraumatic, flexible boutonniere deformities referred to our clinic between January 2010 and September 2014 were included in the study. In all 7 patients, the lateral bands were deficient or damaged beyond repair. A novel reconstruction technique for chronic boutonniere deformity utilizing palmaris longus autograft was used. The 2 lateral bands were reconstructed by attaching the palmaris longus tendon grafts from the lateral part of the central slip proximally to the volar aspect of the distal phalanx distally using pull-out sutures. The grafts were positioned so that they crossed over one another at the level of the middle phalanx. The patients were followed for a mean of 14 months (range, 12–16 months). The principal outcome measure was the range of motion of the proximal (PIP) and distal (DIP) interphalangeal joints.

**Results** Before surgery, the average PIP joint active flexion was 69° (range, 60°–85°). After surgery, the average PIP joint active flexion increased to 92° (range, 90°–100°). Before surgery, the average PIP joint extension deficit was 54° (range, 40°–60°); after surgery, the average deficit was reduced to 7° (range, 5°–15°). Before surgery, the average DIP posture was 9° of hyperextension (range, 5°–12°); after surgery, DIP hyperextension was reduced to 2° (range, 0°–5°). Before surgery, the average DIP active flexion was 40° (range, 35°–55°); after surgery, this increased to 55° (range, 43°–72°). No patients developed a DIP flexion contracture.

**Conclusions** In the chronic boutonniere deformity, when the lateral bands are deficient or damaged, our cross-lateral band reconstruction technique using palmaris longus autograft is a treatment option with satisfactory results. (*J Hand Surg Am.* 2017; ■(■):1.e1-e5. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

**Type of study/level of evidence** Therapeutic V.

**Key words** Boutonniere deformity, lateral band, tendon graft, palmaris longus, central slip.



**B**OUTONNIERE DEFORMITY DEVELOPS because of damage to either the central slip or the lateral bands of the extensor mechanism, resulting in displacement of the lateral bands volar to the axis of

rotation of the proximal interphalangeal (PIP) joint or shortening of the extensor mechanism proximally.<sup>1,2</sup> Management options vary depending on the time elapsed since injury and the degree and flexibility of

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the resulting PIP joint flexion contracture. Acute injuries can be treated with an orthosis for 6 weeks. Active flexion exercises of the distal interphalangeal (DIP) joint during this time results in realignment of the lateral bands.<sup>1</sup>

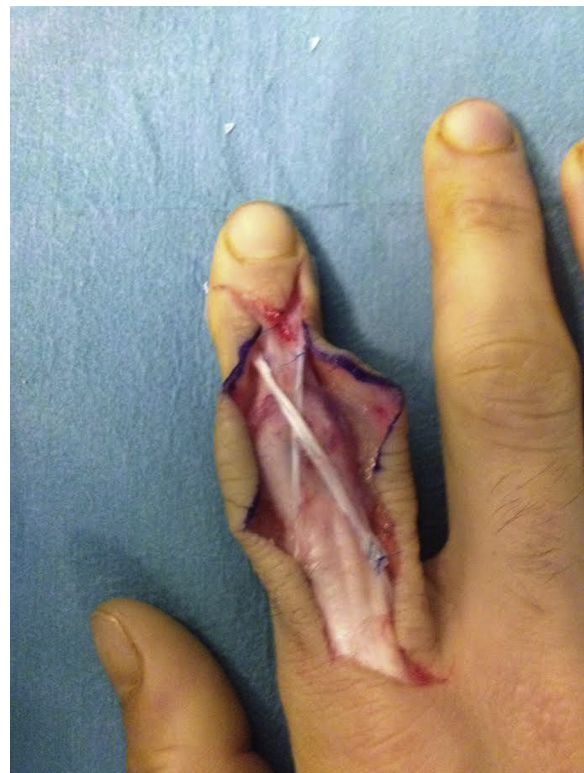
Surgery is indicated when an orthosis is not effective and the patient cannot tolerate the resulting deformity. Among the procedures described for chronic boutonniere deformity are lateral band reconstruction, central slip reattachment, central slip reconstruction, transverse retinacular ligament release, and extensor tenotomy.<sup>2–18</sup> The aim of this study was to describe the results of a technique of cross-lateral band reconstruction using palmaris longus autograft in the repair of chronic boutonniere deformity.

### MATERIALS AND METHODS

This study was performed after institutional board approval. Patients with chronic boutonniere deformity who were referred to our clinic between January 2010 and September 2014 were evaluated according to Burton et al's classification.<sup>12</sup> Only patients with stage I boutonniere deformities with no fixed deformity of either the PIP or the DIP joints were included. Nontraumatic boutonniere deformities caused by conditions like rheumatoid arthritis were excluded.

Seven patients meeting these criteria, all of whom had previously undergone surgical treatment for traumatic central slip ruptures, were treated using a cross-lateral band reconstruction. None of the patients had associated fractures but the lateral bands were deemed to be damaged beyond what could be addressed with a primary repair. The mean time between injury and surgical reconstruction with the cross-lateral band technique was 14 months (range, 6–18 months). All patients worked on maximizing active PIP joint extension and active DIP joint flexion while the PIP joint was held extended to 0° for a 2-week period prior to the surgical procedure.

The surgery was performed under axillary block and with tourniquet control. A curvilinear incision was made over the dorsal surface of the PIP and DIP joints. A palmaris longus tendon graft was used in all 7 cases. Crossed lateral bands were reconstructed by attaching the grafts to the lateral part of the central slip dorsally and to the volar aspect of the distal phalanx distally. Pull-out sutures were used and the reconstructed lateral bands positioned to cross each other over the middle phalanx (Figs. 1–4). By



**FIGURE 1:** Perioperative view of the tendon grafts: Proximal parts of the grafts were fixed to the lateral part of the central slip and the distal parts were fixed to the volar side of the distal phalanx through the pull-out suture technique.

crossing the grafts over the middle phalanx, passing them through bone tunnels in the distal phalanx, and fixing them on the volar side of distal phalanx by pull out sutures, 2 pathomechanical mechanisms were addressed. The first goal was to transform the flexion in the PIP joint to an extension force by forming tension between dorsal and volar sides and by distributing the force between the flexor and the extensor mechanisms. The second goal was to balance the forces on the PIP joint in the normal axis by attaching the graft on the flexor side at the distal of the distal phalanx.

Following surgery, the PIP and DIP joints were treated with an orthosis in full extension for a period of 3 weeks, making sure that the DIP joint was not hyperextended. Passive flexion and extension exercises of the DIP joint were initiated 3 weeks after the surgery, with the PIP joint held in full extension for 6 weeks in total. Passive exercises of the DIP joint were continued for an additional 3 weeks before the pull-out sutures were removed at the end of 6 weeks and active exercises were started for both joints.

The results were based on the active range of motion of the PIP and DIP joints. Both measurements

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