

Novel orthotic design for lateral band attenuation of finger PIP joint - A case report

Abstract: Patients with lateral band attenuation present with a snapping finger which may be misdiagnosed for a trigger finger. Lateral bands work as a flexor after 30° flexion of the PIP joint assisting with flexion of the PIP joint and works as extensor from 30° onwards extending the PIP and DIP joints. Loss of coordination between the multiple, specialized components of the extensor mechanism results in tendon imbalances leading to altered interphalangeal joint flexion and extension forces.¹

This case report is to introduce the fabrication of an orthotic to tackle this injury for quick and effective conservative treatment. The indications and functions of the orthosis is discussed. The fabrication process is illustrated; including materials needed and steps of molding. Wearing regime and precautions is highlighted to ensure effective patient compliance to orthosis program for the finger injury.

Keywords: Lateral band attenuation, snapping finger, splint

- 1) [Case report](#)
- 2) [Introduction](#)
- 3) [Purpose of the orthosis](#)
 - a. [Materials](#)
 - b. [Fabrication steps](#)
 - c. [Fabrication components](#)
- 4) [Supplementary data](#)
- 5) [References](#)

Highlights

- Allows free proximal interphalangeal flexion during activities of daily life while blocking full extension and preventing snapping of the finger when it moves from extension to flexion and vice versa due to lateral band attenuation.
- Low-cost option that can be customized by therapists to fit the patients functional need

Case report:

Patient presents to the clinic with a diagnosis of trigger finger in the right small finger and a new diagnosis of Parkinson's. Patient complained that the finger would snap when she tried to

bend it in flexion and never locked in flexion. It would just snap back and forth with movement. On assessment no tenderness was noted at A1 and the locking was in extension rather than flexion. When the finger was kept in 30° flexion and patient was asked to move the finger it did not snap but the moment full extension was allowed the finger got stuck and then snapped in flexion. The therapist determined that the lateral bands were attenuated.

[CLICK HERE](#) for video1.

So, we provided the patient with a Novel orthotic design for lateral band attenuation of finger PIP joint. However, we found that if the loops were too close to the PIP joint, it failed to correct the snapping in the finger as it allowed for too much extension. So, in order to keep the loops as far apart as possible to prevent full extension, we used a strip and wrapped around the intersection of the orthosis loop on the volar side. This kept the loops apart and maintained the needed 30° flexion.



Figure 1

We used a nail polish on top for the patient to identify the proximal and distal ends. For results [CLICK HERE for video 2](#)

Introduction – What is Lateral band attenuation:

Lateral bands pass on either side of the proximal phalanx and stretch all the way to the distal phalanx.²

Function is to retain and position common extensor mechanism during PIP and DIP flexion.²

Lateral bands work as a flexor after 30° flexion of the PIP joint assisting with flexion of the PIP joint and works as extensor from 30° onwards extending the PIP and DIP joints.

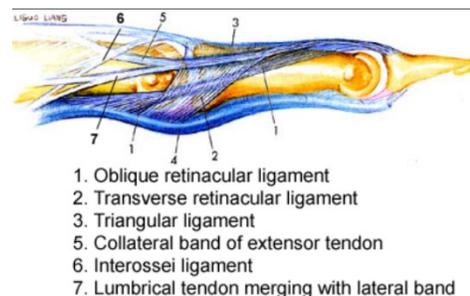


Figure 2

Loss of coordination between the multiple, specialized components of the extensor mechanism results in tendon imbalances leading to altered interphalangeal joint flexion and extension forces.¹ Patients usually present with finger snapping at the PIP joint, after flexion is initiated at DIP. Then the finger snaps into flexion.



Figure 3

A differential diagnosis must always be performed to rule out trigger finger. Assessment for A1 tenderness must be performed, if present then one cannot rule out trigger finger.² If not look for

attenuation of the lateral bands. Case history may indicate trauma or even diagnosis like Parkinson or Ehlers Danlos Syndrome. In a lateral band involvement, the functional limitation of the finger stuck in extension compared to trigger finger where the finger is stuck in flexion.

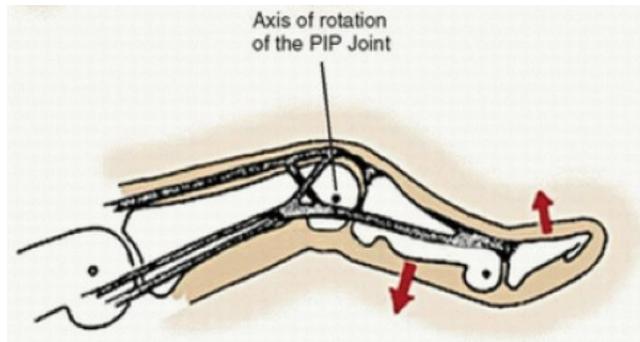


Figure 4

Treatment: When PIP joint is kept in 30° flexion the finger doesn't lock with flexion and extension movement.³

Purpose of the orthosis

Design a ring splint to keep PIP joint in 30° flexion, allowing full flexion and -30° extension. The reasoning behind -30° extension is to advance the lateral bands below the PIP joint axis, to make it work as a

flexor. Full extension can cause it to lock and snap as the finger moves from full extension to flexion.

Materials

- 2 pieces of low-temperature thermoplastic material from 3/32 Tailor Splint material
- Nail polish
- Self-bonding solvent

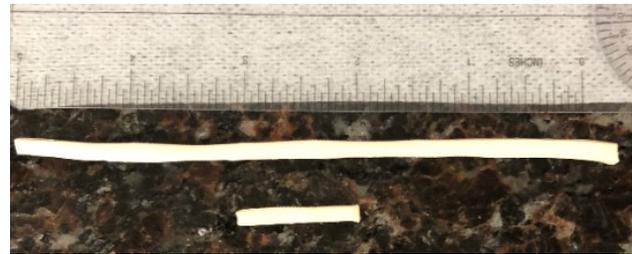


Figure 5

Fabrication Steps

- Cut first piece of strip, 3/32 width of thermoplastic material, approximately 5" in length, to wrap around the PIP joint of the finger
- The second piece of thermoplastic material 3/32 in width and 3/4" in length
- Use the bonding solvent to remove the coat from the ends of the 5" Tailor Thermoplastic strip to allow for adherence of the ends
- The bonding solvent is applied to the entire piece of the 3/4" strip

When designing the novel orthotic design for lateral band attenuation of finger PIP joint, the thermoplastic material must cross in the middle on the volar aspect of the PIP joint. The finger must be kept in slightly more than 30° flexion, to account for stretch. The second piece is then used to wrap around the intersection on the volar aspect to secure it and to set the angle that is needed for the finger, to prevent it from snapping, which typically is -30° extension. This is done by pinching it and flaring the loops further away from the PIP joint to allow for the flexion. The further the loops are away from the joint the more the negative angle at joint.

Nail paint is used at one end to remind the patient which way to wear the splint.

Supplemental data:

Wearing time: All waking hours (functional splint), can remove it at night, if they choose to.

Contraindications: None. The patients didn't develop contractures at the PIP joint partly because they seem to be prone to laxity of the joints. However, further research is indicated to determine the long-term effects of the splint wear and development of contracture on other types of injuries.

References:

1. [Kate Elzinga](#), [Kevin C Chung](#); Managing Swan Neck and Boutonniere Deformities; Clin Plast Surg, 46 (3), 329-337 Jul 2019
2. [R. Lim](#) and [S. Sreedharan](#), **Lateral Band Subluxation: An Unusual Case of Pseudotrigger** *J Hand Microsurg.* 2015 Jun; 7(1): 208–211. Published online 2014 Oct 12. doi: [10.1007/s12593-014-0160-4](https://doi.org/10.1007/s12593-014-0160-4)
3. [Paige M Fox](#), [James Chang](#); Treating the Proximal Interphalangeal Joint in Swan Neck and Boutonniere Deformities; Hand Clin, 34 (2), 167-176 May 2018