Pollicization of the index finger for radial hypoplasia

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The online version of this article (doi:10.1007/s11552-014-9693-z) contains a video, which is available to authorized users

Abstract

Background Associated with anomalies such as VACTERL and Fanconi anemia, congenital hypoplasia of the thumb has a strong association with radial hypoplasia. The majority of patients have bilateral thumb underdevelopment, and those that have a unilateral deformity tend to have the right hand more commonly affected. In order to gain an opposable thumb, patients with a deficient carpometacarpal (CMC) joint, a floating thumb, or complete absence of the thumb can benefit with a thumb amputation and a translocation of the index finger (pollicization) to the thumb position. This video demonstrates the technical steps involved in performing a pollicization procedure in a patient with radial hypoplasia. The video is available electronically.

Methods All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all individual participants included

in the video. The authors declare that they have no conflict of interest.

Results Pollicization allows for improved functional results in patients with radial hypoplasia.

Conclusions This video has reviewed the essential steps in performing a pollicization procedure in patients with radial hypoplasia.

Keywords Pollicization · Radial hypoplasia · Pediatric · Hand · Thumb · Index

Video Narrative

Perhaps one of the greatest challenges to the hand surgeon is reconstruction of a thumb. In this video, doctors MC and SK demonstrate the technical steps involved in performing a pollicization procedure in a patient with radial hypoplasia.

Here, we see a child with radial hypoplasia. Notice how he bypasses his thumb when using his hand.

Gentle exsanguination is performed. A Marybeth Ezaki incision is utilized to develop robust palmar and dorsal flaps that allow for the transposition of the index finger to the thumb position as well as visualization of the critical structures such as the neural-vessel structures to the hypoplastic thumb index and middle fingers.

The neurovascular structures to the hypoplastic thumb and the radial and ulnar digital neurovascular structures can now be identified after the palmar exposure is completed. Additionally, the radial digital artery to the middle finger is also identified for ligation later and lastly, the A1 pulley to the index finger is identified.

The A1 pulley to the index finger is released to prevent bow stringing of the flexor tendons after the index fingers transposed to the thumb position.

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The proper radial digital artery to the index finger must be ligated and transected before the index finger can be mobilized. At this point, if there are any questions regarding the vascularity to the middle finger, a vascular clamp can be applied to this vessel, and the tourniquet can be deflated to assess the perfusion to the middle finger. The proper digital nerve also needs to be dissected proximally from the common digital nerve. This is to prevent tethering of the neural structures when the transfer is performed. The dissection should be proximal enough to allow for placement of the index finger without undue tension.

After the neural vessel structures have been addressed, the intermetacarpal ligament connecting the second and third metacarpals can be transected.

Attention is now paid to the dorsal skin flap. The flap is carefully elevated separating the dorsal veins from the skin. Ideally, 2–3 veins are required for providing adequate egress of blood from the digit.

The pouce is now opened to create a fat neurovascular flap. This is performed by fileting the pouce and removing any bony elements that may be present. The flap can now be replanted in the thenar region of the palm.

At this point, the interossei muscles can be dissected and tagged. The lateral bands on the index finger should also be tagged for easy identification after the transfer is performed.

Release of the juncturae tendinum can now be performed to allow for easy mobilization of the extensor tendons.

At this time, attention is paid to the second metacarpal. The soft tissues are stripped down to the base where an osteotomy is performed to remove the diaphyseal portion of the metacarpal.

Distally on the metacarpal, the physis is ablated with the number 15 blade and the central portion of the metacarpal is then excised as demonstrated.

The MCP joint of the index finger is now placed into hyperextension in an attempt to simulate the CMC joint of the thumb.

After positioning of the MCP joint, a smooth K-wire is inserted in a retrograde fashion along the central axis of the metacarpal.

The index finger is now ready to be transposed into the new thumb position. The thumb is positioned with 45 to 50° of abduction and 100–120° of pronation. The position of the thumb is then checked for appearance and function.

After positioning the thumb, muscle transfers to restore the intrinsic function of the thumb are then performed. The previous tagging of the muscles and sagittal bands facilitate these muscle transfers.

The neurovascular fat flap can now be sutured into its location on the thenar region of the thumb.

At this point, the tourniquet can be deflated to assess the vascularity of the thumb. Final closure of the skin is now performed, making adjustments to provide the best comesis.

This video has reviewed the essential steps in performing a pollicization procedure in patients with radial hypoplasia. Thank you.

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Overview of Main Points Contained in the Video

- Ezaki skin incision
- Isolation of index finger
- Development of dorsal skin flap with preservation of dorsal veins
- Creation of fat neurovascular flap from the dissected pouce flottant
- Release of juncturae tendinum (extensor tendon)
- Shortening of metacarpal and physal ablation
- Repositioning of index into thumb position
- Muscle transfer
- Positioning of fat flap and skin closure

Conflict of interest Christian Eccles declares that he has no conflict of interest.

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Statement of human and animal rights All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008

Statement of informed consent Informed consent was obtained from all individual participants included in the video.