

The Transverse Bone in Cleft Hand: A Case Cohort Analysis of Outcome After Surgical Reconstruction

Alexander W. Aleem, MD, Lindley B. Wall, MD, M. Claire Manske, MD, Valerie Calhoun, MS, Charles A. Goldfarb, MD

Purpose To evaluate the implications of the transverse bone in cleft hand by assessing outcomes after reconstruction in comparison with a control group.

Methods This study is a retrospective review of 23 hands in 18 patients following surgical reconstruction of the cleft hand. Eleven hands had a transverse bone component, and 12 hands (control group) did not. Patients and their families were contacted to assess overall satisfaction following reconstruction. Clinical and radiographic records were reviewed to assess aesthetic and functional outcomes, the need for additional surgery, and radiographic divergence angles.

Results There was no difference in aesthetic or functional subjective outcomes. There was no statistically significant difference in any objective outcome measure between the two groups. The use of the cleft for pinch was more dependent on the status of the index finger and the preoperative thumb-index webspace rather than the presence of a transverse bone. Eleven (4 transverse and 7 control) hands required additional surgery to address abnormal function or posture of the index and ring fingers. Preoperative radiographic divergence angles were larger in the transverse bone group than in the control group, whereas postoperative divergence angles were nearly equivalent.

Conclusions Similar outcomes between the two groups demonstrate that the presence of a transverse bone in cleft hand was not associated with worse outcomes following cleft reconstruction. Preoperative narrowing of the thumb webspace and postoperative index finger metacarpophalangeal joint abnormality are associated with worse functional outcomes. (*J Hand Surg Am.* 2014;39(2):226–236. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic Level III.

Key words Cleft hand, central deficiency, transverse bone, reconstruction, transposition.

From the Department of Orthopaedic Surgery, Shriners Hospital for Children and St. Louis Children's Hospital, Washington University School of Medicine, St. Louis, MO.

Received for publication June 10, 2013; accepted in revised form November 4, 2013.

The authors would like to thank Jennifer Steffen for her helpful contribution to this manuscript.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

Corresponding author: Charles A. Goldfarb, MD, Department of Orthopaedic Surgery, Washington University School of Medicine, 660 Euclid Ave., Campus Box 8233, St. Louis, MO 63110; e-mail: goldfarbc@wudosis.wustl.edu.

0363-5023/14/3902-0005\$36.00/0
<http://dx.doi.org/10.1016/j.jhsa.2013.11.002>

CLEFT HAND IS THE VARIABLE absence or abnormal formation of the central ray(s) of the hand.^{1–3} Classic cleft hand presents with a V-shaped central cleft, most commonly with an absent middle finger ray. More severe forms progress radially and can include syndactyly of bordering fingers and deficiency of the first webspace.² Cleft hand is limited to abnormalities of the hand without forearm involvement, although it may be present bilaterally and may have associated foot anomalies.¹ This entity is differentiated from the broad U-shaped cleft that is present in symbrachydactyly, which is classically an isolated limb deficiency with finger nubbins.^{3,4}

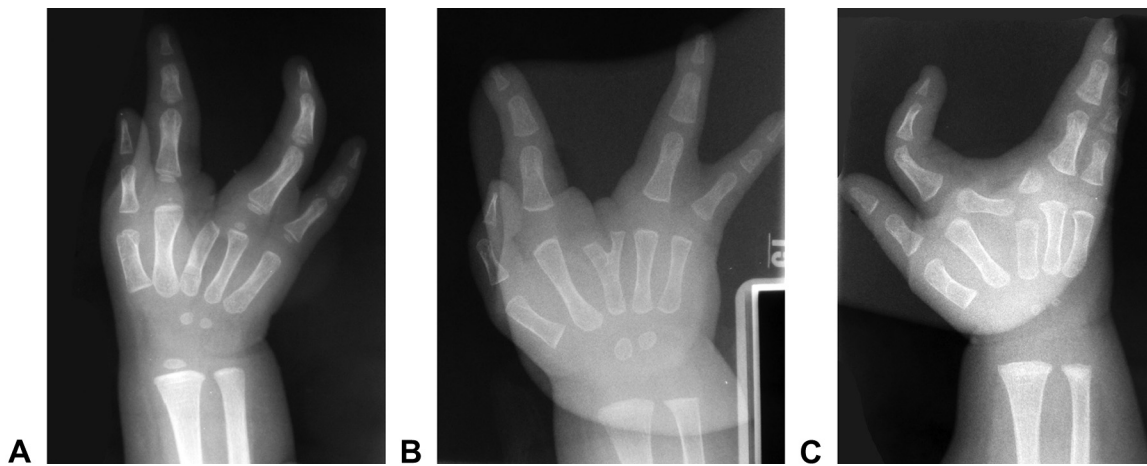


FIGURE 1: Radiographs of different phenotypic presentations of cleft hand. **A** Cleft hand without transverse component. **B** Bifid metacarpal. **C** Transverse phalanx.

Flatt⁵ described the cleft hand as “a functional triumph and a social disaster” because the absence of the central digits may not impact function. Manske and Halikis² focused attention on the first webspace with their classification, as functional limitations are greatest with webspace narrowing. Surgical reconstruction for cleft hand is recommended for both function and appearance.⁶

One notable, but uncommon, feature of cleft hand is the presence of a transverse bone in the center of the hand, a “crossbone.”^{7–9} This is represented by either a transversely oriented phalanx or a bifid metacarpal and is thought to contribute to widening of the cleft deformity with growth (Fig. 1).^{1,9} The transverse bone may join adjacent metacarpophalangeal (MCP) joints.⁹ Early intervention in patients with a transverse bone component is recommended as part of the standard cleft closure to prevent progression of deformity. The transverse component is addressed by either excision or osteotomy and reshaping of the bifid metacarpal and includes reconstruction of the involved MCP joints.^{6,8–10}

There are little published outcome data on cleft hand in general and the impact of the transverse bone in particular. One case report investigating the outcomes of crossbones in cleft hand and central polydactyly reported overall satisfactory functional outcomes.⁸ The purpose of this study was to investigate the outcome implications of a transverse bone by assessing 2 groups of patients, 1 with and 1 without the transverse bone. We hypothesized that patients with a transverse bone would have worse aesthetic and functional outcomes despite reconstruction and would require a greater number of surgeries including procedures to address the index and ring fingers.

TABLE 1. Classification

Types*	
Manske	Ogino
I: Normal webspace	I: Cleft hand without missing digit
IIA: Mildly narrowed first webspace	II: Defect of single finger ray
IIB: Moderately narrowed first webspace	III: Defect of 2 finger rays
III: Syndactylized first webspace	IV: Defect of 3 finger rays
IV: Merged with cleft	V: Defect of 4 finger rays

*Manske classification² is based on quality of the first webspace. Ogino classification¹¹ is based on bony central deficiency.

MATERIALS AND METHODS

Institutional review board approval was obtained for this retrospective investigation. All patients were treated at a single pediatric, orthopedic hospital with a diagnosis of cleft hand. We identified 18 patients with 23 affected hands with an absence of only the middle finger, Ogino type II (Table 1),¹¹ who were treated surgically with cleft closure between 1984 and 2011. We included consecutive patients with a transverse bone identified during this time frame. We attempted to create a control group of similar patients with an Ogino type II cleft and no transverse bone. Specific age and gender matching was not possible owing to the rarity of this condition. We excluded patients with an absence of more than the middle finger in order to keep the patient populations as homogeneous as possible. Thus, there were 12 hands

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