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Case Report

Reconstruction for Congenital Absence of the Fifth Metacarpal

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We report a case of an isolated congenital absence of the right fifth metacarpal with ring and little finger syndactyly in a 6-year-old girl without other ipsilateral limb anomalies or phenotypic disorders. The patient underwent amputation of the hypoplastic right little finger with reconstruction of the ulnar collateral ligament of the ring finger metacarpophalangeal joint as well as hypothenar muscle transfer. She has returned to normal childhood activities without limitation at 3 months after surgery. Absence of the fifth metacarpal is a rare congenital anomaly without clear recommendations regarding reconstructive options. This case discussion supplements the current literature by describing an unusual presentation of this hand anomaly while supporting individualized management to maximize functional and cosmetic results.

Although a variety of metacarpal abnormalities have been described, congenital absence of the fifth metacarpal is rare and has not been well defined.[1,2] Morphologies described include a complete absence of the fifth metacarpal or failure of segmentation of the fourth and fifth metacarpals. A review of literature reveals only seven cases of fifth metacarpal agenesis (one patient with bilateral hand involvement).[3–5]

The aesthetic appearance of the hand as well as functionality of the little finger must be considered when reviewing treatment options. Ipsilateral upper limb anomalies may also be present, adding to functional complaints and increasing case complexity.[6] Like many congenital hand anomalies, management is individualized to provide the most functional and cosmetic result for the patient.

We present a case of unilateral absent fifth metacarpal in a 6-year-old girl without other systemic or phenotypic disorders. Surgical management involved amputation of the little finger with ring finger ulnar collateral ligament (UCL) and hypothenar musculature reconstruction. This case report received institutional review board approval. Both the patient and legal guardian provided informed consent prior to conducting the case report. All authors declare that they have no conflicts of interest. No external funding was received for any aspect of this work.

Case Report

A 6-year-old left-handed girl was referred to the pediatric orthopedic clinic for evaluation of a right-hand abnormality. Per the parents, the deformity had been present since birth. There was no family history of congenital hand malformations. The patient was functional with the hand, able to make a fist, and perform age-appropriate tasks. On physical examination, the right hand was slightly smaller than the unaffected hand. Simple, incomplete syndactyly was noted between the ring and little finger without a defined web space. The little finger was hypoplastic and malrotated. The digit was unable to flex independently, yet the patient was able to make a full fist and grasp objects. The hypothenar musculature was hypoplastic with an oblique crease at the fourth web space (Fig. 1). Further examination of the extremity revealed no other phenotypic abnormalities or functional limitations. Neurologic testing was benign with normal sensorimotor responses throughout the extremity, symmetric reflexes, no upper motor neuron or radicular signs, and no signs of fine motor impairment.

Initial radiographic evaluation of the hand demonstrated complete absence of the fifth metacarpal (Fig. 2). There was a conjoined metacarpophalangeal (MCP) joint between the ring and little finger with resultant ulnar deviation of the little finger. Soft tissue

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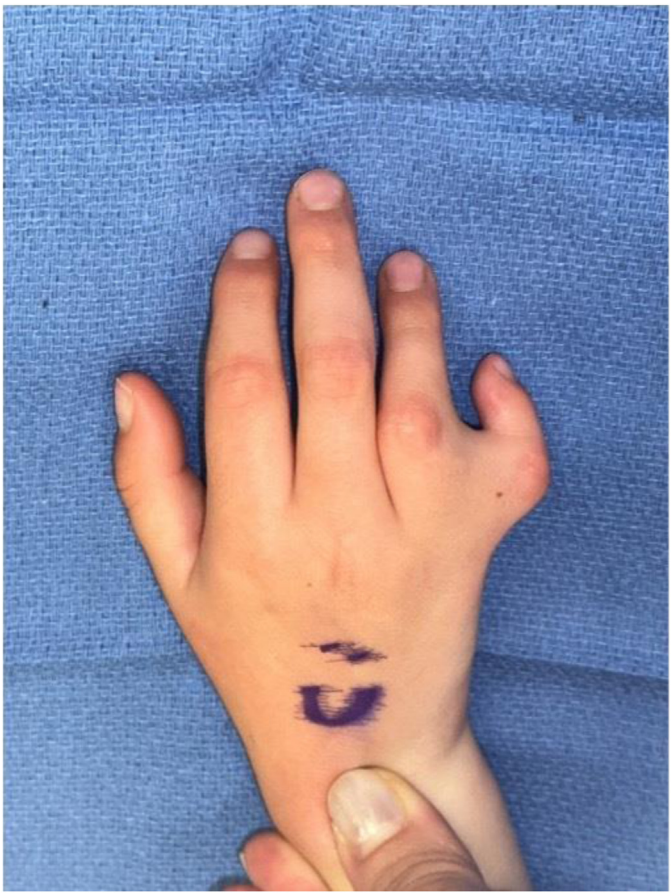

Figure 1. The patient's right hand with absence of the fifth metacarpal with simple, incomplete syndactyly between the ring and little finger.

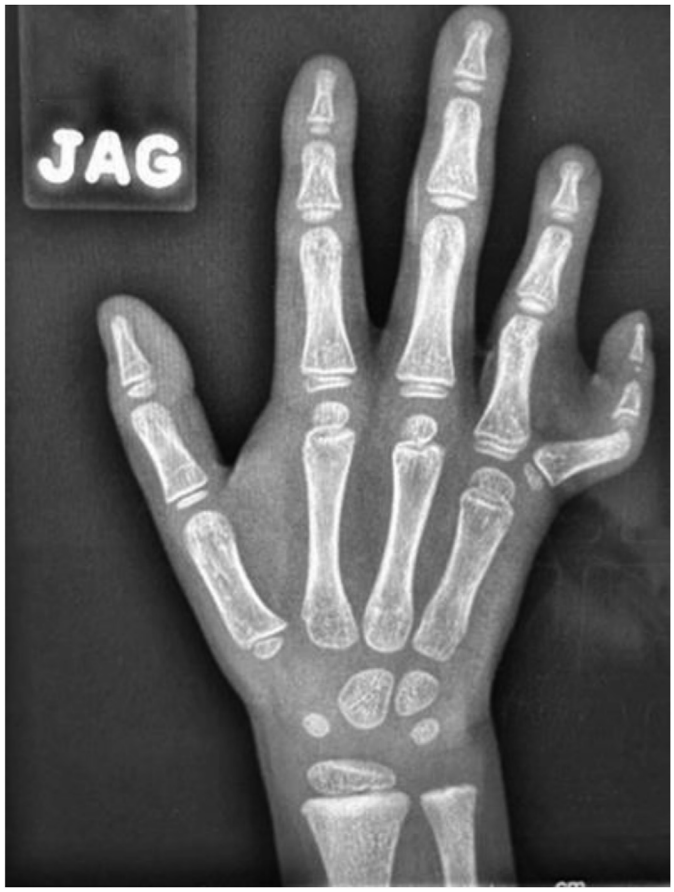

Figure 2. Anteroposterior preoperative radiograph demonstrating absence of the fifth metacarpal with a shared MCP joint between the ring and little finger.

shadows of the image suggest the degree of soft tissue webbing between the two digits.

Given the minimal functionality of the little finger, the patient was offered surgical treatment in the form of little finger amputation with both ring finger UCL and hypothenar musculature reconstruction.

During surgery, the little finger was amputated in standard fashion. During this portion of the case, it was noted that the flexor tendons to the little finger shared the A1 pulley with the flexor tendons to the ring finger. The A1 pulley was released and the flexor tendons to the little finger were separated from the ring finger flexor tendons. Examination of passive tenodesis demonstrated minimal functionality of the little finger flexor tendons; therefore, these tendons were sharply excised. The abductor digiti minimi and flexor digiti minimi brevis muscles were isolated and removed sharply from the little finger proximal phalanx with a periosteal sleeve for subsequent reattachment. No true collateral ligament of the little finger MCP joint was identified; therefore, a capsular tissue flap was elevated for subsequent reconstruction of the little finger UCL. A shared physis of the ring and little finger proximal phalanx was identified and sharply divided with a 15-blade knife. The skeletonized little finger amputation was then completed. The proximal phalanx of the ring finger was positioned centrally over the fourth metacarpal head and pinned reduced with a 0.9 mm (0.035 in) K-wire (Fig. 3). The capsular tissue from the amputated little finger MCP joint was used to reconstruct the UCL of the ring finger with 4-0 Ethibond (ETHICON) sutured directly into the periosteum at the base of the ring finger proximal phalanx. The hypothenar musculature was transferred to the base of the ring finger proximal phalanx in similar fashion.

After surgery, the patient was placed in a short arm cast and discharged home the same day. The ring finger MCP K-wire was removed at 4 weeks with maintenance of a concentric joint. A thermoplastic short arm splint was used from this time point until 10 weeks after surgery. The patient maintained excellent function of the hand with full return of motion by 12 weeks after surgery without pain or limitation (Fig. 4).

Discussion

As a rare condition, complete or partial absence of the fifth metacarpal presents challenges in surgical management based on the spectrum of the abnormality and overall functionality of the patient. As summarized by Eren et al,[4] management should be individualized for each patient. Case reports on the topic provide a framework for both patient counseling, treatment options, and surgical considerations for varying phenotypes of this deformity. Our case report adds to the current literature for management of congenital absence of the fifth metacarpal and provides surgical guidance specifically with UCL and hypothenar muscle reconstruction of the ring finger to maximize postoperative functionality.

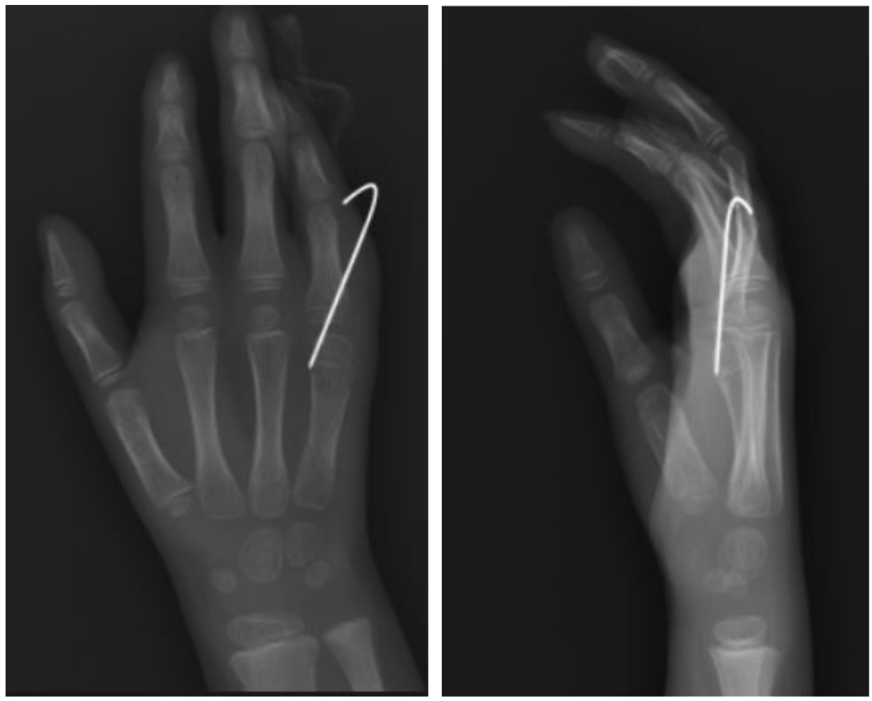

Figure 3. Postoperative anteroposterior and lateral radiographs demonstrating interval amputation of the right little finger and provisional fixation of aligned ring finger MCP joint.

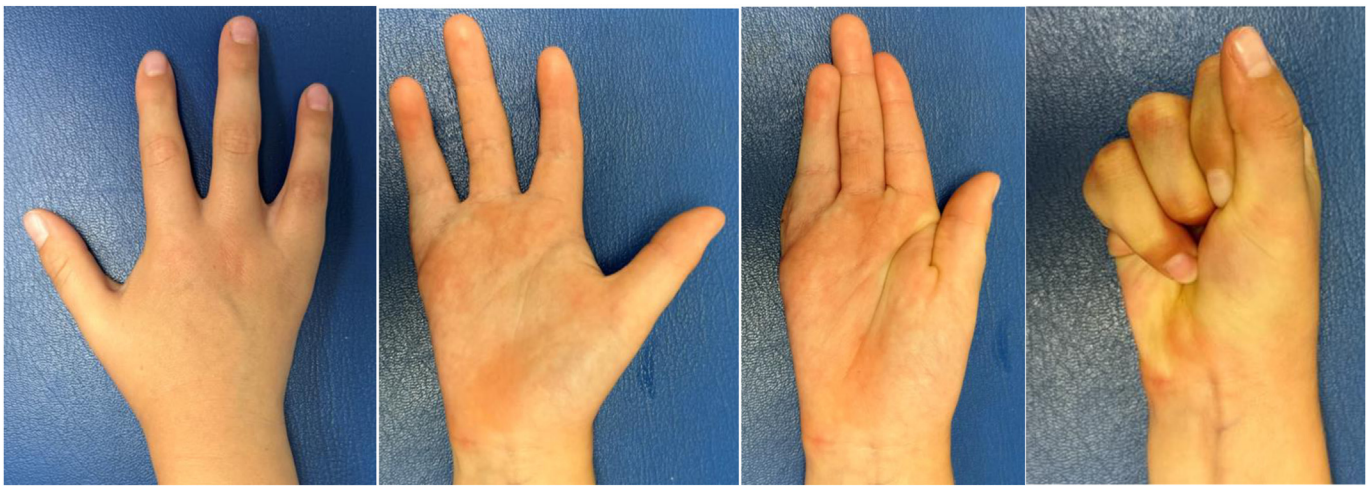

Figure 4. The patient's cosmetic and functional results at 12 weeks after surgery.

Conflicts of Interest

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

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