

Correction of Triphalangeal Thumb with Small Delta Phalanx by Closed Wedge Osteotomy of the Proximal Phalanx: A Case Report

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Abstract

Background: Triphalangeal thumb (TPT) is a rare congenital anomaly, especially in the Asian population. Traditional treatments depend on the type of deformity and the presence of concomitant anomalies and include either excision in addition to the ligament reconstruction or fusion and shortening osteotomy. Instability and stiffness are the major concerns following the traditional techniques.

Case Report: In this study, we report a case of right TPT with a small delta phalanx in a nine-year-old boy who was treated by proximal phalanx radial closed wedge osteotomy without delta phalanx resection or intracapsular dissection. The angular deformity and the appearance of the thumb were corrected by this simple procedure without resulting in instability and stiffness in the interphalangeal joint.

Conclusion: Proximal phalanx closed wedge osteotomy is a rapid, simple, and effective technique with a low risk of unexpected complications for correcting the appearance in the cases of TPT with a small delta phalanx.

Keywords: Hand Deformities; Congenital Abnormalities; Osteotomy; Finger Phalanges

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Background

Congenital hand anomalies occur in almost 2.3 per 1000 live births (1-3). Thumb deformities are the most common form of hand anomalies in Asian and Caucasian individuals (4, 5). Triphalangeal thumb (TPT) is an uncommon anomaly in which the thumb has an additional phalanx (6). TPT has a prevalence of about 1 per 25000 births, which can be isolated or associated with other abnormalities (7).

Treatment options depend on the anatomy of the deformity and generally involve addressing the extra phalanx in addition to the intraarticular reconstruction (7). However, conventional procedures often lead to instability, loss of motion, and stiffness due to capsular dissection and articular incongruence resulting from removing the extra phalanx (8).

In this study, we report the surgical outcomes of a case of TPT with a small delta phalanx and angular deformity. Our approach involved radial closed wedge osteotomy at the proximal phalanx, avoiding delta phalanx resection and intraarticular invasion. The aim is to explore a novel technique that addresses this deformity while minimizing the risk of postoperative complications associated with traditional procedures.

Case Report

A 9-year-old boy with a known congenital right thumb malformation was referred to the orthopedic clinic for deformity correction. He was in good medical condition with no history of underlying diseases, chromosomal syndromes, genetic diseases, anemia, trauma, or previous surgeries. In addition, there was no family history of hand deformities such as syndactyly and polydactyly.

Furthermore, the patient was the only child of a non-consanguineous marriage. The thumb deformity was not painful, and its range of motion (ROM), in addition to its function, was reported as normal.

Physical examination revealed 30 degrees of ulnar deviation in the right thumb. Force, pinch, and grip tests were normal and symmetrical in both hands. Peripheral vascular examination was normal, and no tenderness, deformity, or malformation was observed in the upper and lower extremities. Other examinations, including neurological, cardiological, and endocrinological assessments, yielded normal results.

Paraclinical Assessment: Blood count and hemostasis were within normal limits. Radiographs revealed a unilateral, sporadic, delta-shaped extra phalanx on the radial side of the right thumb interphalangeal joint (Figure 1). Thus, the patient was deemed a candidate for elective TPT correction surgery.

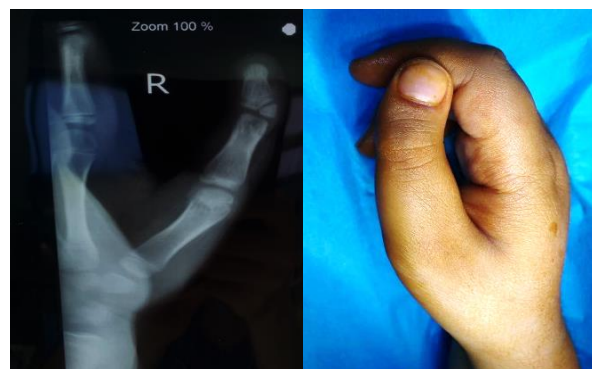


Figure 1. A. Preoperative image of triphalangeal thumb (TPT) with a small delta phalanx; B. Preoperative radiographic image of deviation in the right hand thumb

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Surgical Technique: Under general anesthesia, a mid-axial incision was made on the radial side of the proximal phalanx of the affected thumb. After bone exposure, a radial closed wedge osteotomy was performed in the extracapsular area of the distal shaft of the proximal phalanx. The amount of bone resection was determined preoperatively based on the degree of deviation (30 degrees). Two 0.8 mm Kirschner wires (K-wires) were used for the fixation of the osteotomy. After skin closure, a thumb spica splint was applied for postoperative immobilization.

Follow-Up: The patient was evaluated two weeks post-surgery through physical examination and radiography (Figure 2). In the fourth week, the K-wires were removed from the surgical site under digital block anesthesia, and the protection continued with a removable part-time splint for an additional two weeks. During subsequent follow-up, the patient was assessed through physical examination and radiographic imaging three months after the surgery.



Figure 2. A. Corrected appearance in the right thumb; B. Early postoperative radiographic image of corrected right thumb deviation

Discussion

In this study, radial closed wedge osteotomy was used to correct the TPT. To the best of our knowledge, this is the first report employing proximal phalanx closed wedge osteotomy as an isolated procedure for TPT correction.

TPT is usually classified into three subgroups, including full, delta, and rectangular, based on the extra phalanx shape (8). The extra phalanx in the current study was delta-shaped. While surgical intervention is usually unnecessary for the TPT, it becomes essential in the presence of severe dysfunction, unacceptable appearance, or concomitant abnormalities such as polydactyly, first web narrowing, and thenar atrophy (9).

There are several techniques for TPT correction. Common procedures for deformity correction include removal of the extra phalanx with collateral ligament reconstruction, shortening osteotomy, or arthrodesis (7). However, these procedures might be complicated by instability and stiffness (10). Extra-articular proximal phalanx closed wedge osteotomy without arthrodesis or delta phalanx removal is a novel technique used in this study.

Our patient sought surgery at the age of nine. Notably, since our osteotomy was extra-epiphyseal, it could be performed at a younger age. Some reports have recommended performing the operation on these patients between 24 and 30 months of age when the phalangeal epiphysis is explicit. Moreover, operating at an

earlier age aids the patient in adaptation to the reconstructed thumb (11-13).

In the present study, we did not observe any adverse effects, including avascular necrosis (AVN). Our method effectively preserved the condylar vascularity of the proximal phalanx. In addition, we preserved the interphalangeal joint motion and stability by avoiding the opening of the joint capsule. Although over-lengthening is not significant in the presence of a small extra phalanx, correction was achieved to some extent by removing the bone at the basis of the wedge osteotomy. However, this necessitates long-term follow-up as the growth rate of the delta phalanx is unpredictable. Still, recurrence of the deformity is not expected due to the preservation of the physis in this technique. At the end of the follow-up period, the appearance of the right thumb was reformed, and the physical examination, including thumb function and ROM, was normal.

Conclusion

Proximal phalanx closed wedge osteotomy proves to be a rapid, simple, and effective technique with a low risk of unexpected complications for correcting the appearance in cases of TPT with a small delta phalanx.

Conflict of Interest

The authors declare no conflict of interest in this study.

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