A Case of Bilateral Foot Polydactyly; Metatarsal Remodeling and Lateral Closing Wedge Osteotomy Following Amputation of Post-axial Supernumerary Digit

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STATEMENT OF PURPOSE
Polydactyly is a congenital anomaly that occurs in the hand or foot. Reconstruction of abnormally shaped metatarsal bones has been infrequently discussed in cases of surgical management of polydactyly.

LITERATURE REVIEW
Polydactyly is a common congenital anomaly that involves presence of one or more extra or supernumerary digits or metatarsals of the feet. The frequency of occurrence is in about 2 per 1000 live births.1 Approximately 10-30% of all polydactyly cases have a positive familial history with no sex predilection, occur bilaterally 25-50% of the time and have a higher incidence rate in black and Asian populations. There are known syndromes associated with polydactyly including Down’s syndrome, Ellis-van Creveld Syndrome.2

A recognized classification for post-axial polydactyly is by Tentamy and McKusick which first divides polydactyly based on syndromic, non-syndromic, and multiple polydactyly.3 It further breaks non-syndromic polydactyly into preaxial, mixed, and postaxial. Postaxial polydactyly is then divided into Type A and Type B where Type A is the presence of a fully developed digit with articulation to a metatarsal bone and Type B is simple vestigial digit with no metatarsal connection.3 Treatment for polydactyly is noted to be primarily for reduction of pain, discomfort in shoe gear, cosmesis, and prevention of pressure ulcers.4,5

CASE STUDY
A 14 month baby was referred to the clinic for bilateral congenital post-axial polydactyly. There was noted to be crowding of the digits with under-lapping of the 5th digit and widened forefoot. Figure 1a, 1b The patient’s parents were concerned about difficulty wearing normal shoe gear and possible future psychological implications due to this malformation.

The patient’s past medical history was insignificant, vascular status was intact, neurological sensation was intact, and range of motion to the digits was slightly limited. There was no noted tenderness or pain associated with palpation, range of motion, or gait. Pre-operative bilateral foot x-rays were taken for further analysis of the bony involvement which showed duplicated digits with an enlarged left fifth metatarsal head and a t-shaped right fifth metatarsal head. Figures 2a, 2b

Given the radiographic findings and clinical presentation, it was decided by surgeon and family to undergo surgical intervention. Surgical procedure included amputation of left supernumerary sixth digit with reshaping of the fifth metatarsal head and amputation of right supernumerary sixth digit with lateral closing wedge osteotomy of the fifth metatarsal with pinning. Figure 2a, 2b

Surgical Technique: A 2 cm racquet-type incision was made over each supernumerary digit and the digit was dissected from the fifth metatarsal head. The lateral incision was extended proximally to allow for reconstruction of the metatarsals. On the left using an oscillating sagittal saw and rotary burr, the lateral eminence of the bifid fifth metatarsal was then resected. This provided a flat lateral shelf. Figure 3b Again, on the right foot, using an oscillating sagittal saw and rotary burr, the lateral eminence of the bifid fifth metatarsal was then resected, and a CBWO was performed at the CORA of the metatarsal, which had an angular deformity. After osteotomy, a 0.045 Kirschner wire was placed through the proximal phalanx and into the metatarsal shaft, holding the osteotomy in a more corrected position. This was confirmed under fluoroscopy. Figure 4b Subsequently, the MTP joint was reconstructed with 2.0 Ethibond suture. Deep structures were then closed using 3.0 Vicryl sutures and the overlying skin was then re-approximated and coapted utilizing 4-0 Monocryl sutures in simple interrupted suture technique. Figure 3a, 4a

Successful removal of the supernumerary digits with reshaping of metatarsals bilaterally was achieved. Post-operatively, bilateral posterior splints were placed for two weeks and the patient was to remain non-weight bearing. At the two week follow up, patient was then placed in a Jones compression to the LLE and allowed to be partially weight-bearing. On the RLE, a short leg cast was applied, and patient was to remain non-weight bearing. Follow-up visits recorded no complaints of pain and adequate healing was noted at the surgical sites. At the fourth week follow up, the 0.045 Kirschner wire was successfully removed. Figure 4c

RESULTS
Polydactyly is a common congenital deformity and its incidence rate is as high as 2 per 1000 live births according to Mann’s. There has not been much discussion on the surgical technique for metatarsal reshaping following removal of the supernumerary digit. Surgical planning must take into account functionality and cosmesis.

It is concluded that the most efficient way to remove the digit was through a racquet type incision allowing adequate exposure to the metatarsal for reshaping. The most challenging decision made was to remove the most lateral supernumerary digit, pre-operatively. In addition, due to the severe angulation of the T-shaped right fifth metatarsal, a CBWO was necessary to maintain the articulation of the fifth metatarsophalangeal joint space. The surgical technique presented in this study, allows for the most aesthetically satisfying foot, while keeping the full function of the fifth ray intact.

There was full satisfactory success after the procedure which resulted in the patient having full movement of the toes and foot, ability to fit comfortably into a normal width shoe, and normal appearing foot.

REFERENCES