

SURGICAL MANAGEMENT OF MACRODACTYLY

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Macroductyly involving the foot is a rare congenital deformity. Associated conditions include neurofibromatosis, congenital lipofibromatosis, and heman-giomatosis. Macroductyly involving the digits can occur with or without enlargement of the respective metatarsal. There is also an associated soft tissue enlargement, as well as bony elongation that also occurs.

Surgical options include various bony procedures to reduce the length of the digit, including arthroplasty, arthrodesis, epiphysiodesis, and in this report removal of a diaphyseal segment of the phalanx with reduction and pinning. In severe cases, some authors have recommended ray resection. Soft tissue debulking can also be performed to address that component of the deformity.

Case Report

A six-year-old boy was brought to the office by his parents. The primary concern was that the second toe of the right foot was excessively long. Secondary concerns involved discomfort from most of his shoes, and occasional blister formation on the end of the toe. The parents had noted the child's deformity at birth, and it seemed to progressively worsen. The only treatment that had been attempted was the use of larger shoes. The child's pediatrician evaluated the deformity and subsequently referred him for podiatric consultation.

The child's medical history was unremarkable and he was taking no medications. He had an uncomplicated

birth, no other congenital abnormalities had been noted. His past surgical history was significant for myringotomy with tubes. His parents were healthy, and neither had a history of macroductyly.

Physical examination showed normal neurovascular status. Orthopedic examination revealed that the right second digit was excessively large in both length and circumference as compared to the contralateral digit (Figure 1). Clinically, the right second toe extended 14 mm past the end of the hallux, whereas the left second digit only extended 2 mm past the left hallux, yielding a total length discrepancy of 12 mm. Plain film radiographs were taken (Figures 2 and 3) and the following measurements were taken:

	<u>Left foot</u>	<u>Right foot</u>
Distal phalanx	5 mm	10 mm
Middle phalanx	10 mm	12 mm
<u>Proximal phalanx</u>	<u>20 mm</u>	<u>24 mm</u>
Total Bone Length	35 mm	46 mm

Other pertinent physical examination findings showed significant hyperextension of the right second distal interphalangeal joint. This was in part due to the soft tissue enlargement causing a very bulbous distal portion of the toe (Figure 4).

Surgical considerations involved decreasing the length of the toe, and debulking the soft tissue enlargement. The decision had to be made whether to perform

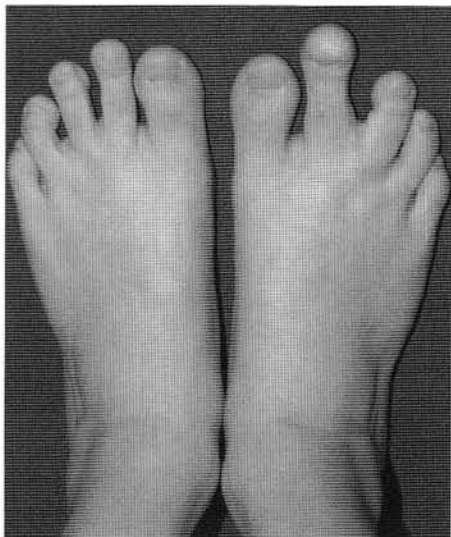


Figure 1. Macroductyly of the right second digit.



Figure 2. DP radiograph of the left foot.



Figure 3. DP radiograph of the right foot.

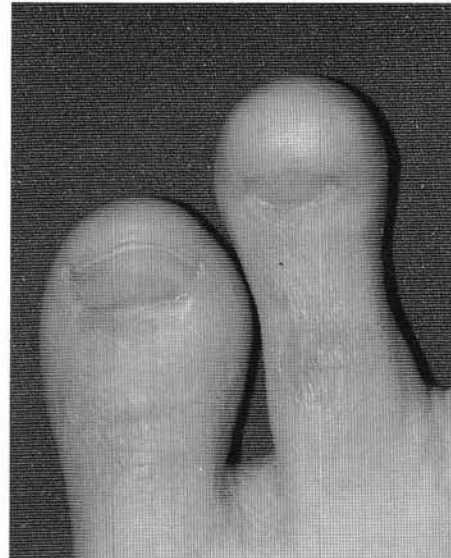


Figure 4. Macrodactyly of the right second digit.

both procedures at the first surgical setting or to stage the procedures. There have been instances where toes have been lost due to the vascular compromise that occurred by performing bone and soft tissue work at the same time. Because the patient's main concern was the excessive length of the toe, it was decided to address the length discrepancy first, and then debulk the soft tissues if necessary at a later date.

Each bony segment was excessively long, and was proportionally worse from proximal to distal. The right distal phalanx was twice as long as the contralateral distal phalanx, whereas the right middle and distal phalanges were 40% longer than the contralateral digit. To preserve the integrity of the proximal interphalangeal joint it was decided to remove a cylindrical section from the mid-portion of the proximal phalanx, followed by reduction and pinning to allow fusion of the head/neck to the base. Removal of the head of the middle phalanx and the base/growth plate of the distal phalanx were also planned (Figure 5). Removal of the growth plate of the distal phalanx was performed to aid in shortening the bone as well as ceasing future longitudinal growth.

The procedure was performed under local anesthesia with sedation. Initially a linear incision was placed centrally over the second digit beginning at the base of the proximal phalanx and extending distally to the head of the middle phalanx. At this level a transverse incision was made just distal to the distal interphalangeal joint forming a "T" type approach. After the bone resection was performed, the proximal phalangeal head/neck was reduced and pinned to the base with a Kirshner wire. The pin was initially drilled from a proximal to distal direction beginning at the base of the middle phalanx. After exiting

the distal end of the digit, the proximal end of the pin was driven in a retrograde manner across the two reduced pieces of the proximal phalanx and finally into the head of the second metatarsal (Figure 6). A rotary burr was then used to smooth the distal edge of the dorsal cortex of the base of the proximal phalanx so as to avoid a step-off. The long extensor tendon and capsular tissues were then repaired. The subcutaneous tissue and skin were repaired together using non-absorbable sutures. After completion of the procedure vascular status was intact to the digit.

Postoperative management consisted of 8 weeks non-weightbearing in a posterior splint that extended distally past the end of the second digit. At this time solid fusion had occurred and the pin was removed. At twelve weeks postoperative the patient was ambulating well in normal shoes, very pleased with the reduction in the length of the digit (Figures 7A-7C).

Macrodactyly is a condition that can involve the digits of the hands or feet. The phalangeal bones are more often affected than the corresponding metatarsals. Males are affected more commonly than females. Some authors believe that lymphatic and adipose hyperplasia is responsible for the aberrant growth.

At the time of this writing the patient was 8 months postoperative and was pleased enough with the reduction in length of the toe that it was decided to delay the soft tissue debulking. The patient was able to wear the same size shoe on each foot, which prior to surgery was impossible. He is currently in an observational status with evaluation twice a year. If further deformity occurs as his growth continues, a proximal phalangeal epiphysiodesis would be a reasonable consideration.



Figure 5. Preoperative DP radiograph.



Figure 6. Postoperative DP radiograph.

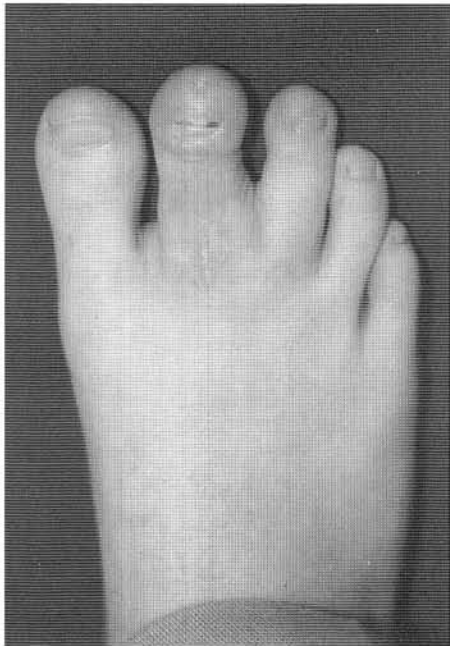


Figure 7A. Postoperative view, week 12.

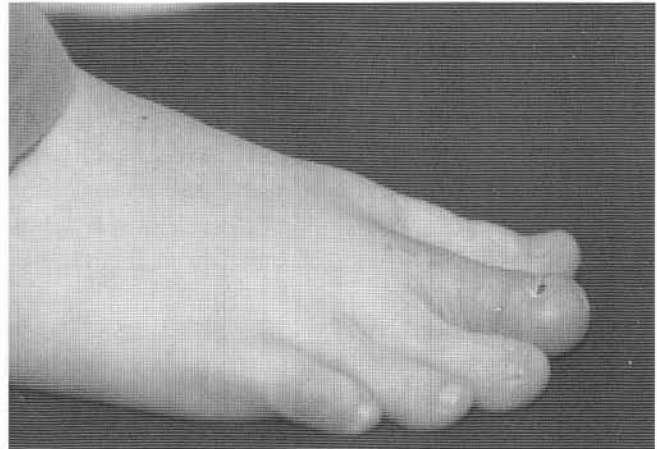


Figure 7B. Postoperative view, week 12.

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Figure 7C. Postoperative radiograph, week 12.