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Mirror foot: a case report of rare ten toes polydactyly



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ABSTRACT

Introduction: A rare congenital deformity known as “mirror image polydactyly” of the feet is typified by symmetrical duplication of the foot’s digits. According to one study, only 28 cases (seven of which have treatment records) have been described in the English-language literature. Mirror foot can arise as a single congenital defect or a component of a hereditary syndrome involving several congenital defects. In this study, we reported a mirror foot case and emphasized its rarity, unusual presentation, and successful surgical treatment.

Case presentation: A 3-month-old female child was born with unilateral mirror image polydactyly of the foot with congenital talipes equinovarus (CTEV) and congenital genu recurvatum. She was referred to the outpatient clinic of the surgery department of dr. Kariadi General Hospital. In a radiological examination, ten digits and nine metatarsals were found on the left foot. Preaxial duplicates of the first to fourth metatarsals were disarticulated, followed by ablation of five digits. The aim of surgical management for this case was to reconstruct a functional and cosmetically pleasing foot, which will benefit orthopedic surgeons in managing CTEV for serial cast correction. Six months after surgical intervention, the foot showed a satisfactory appearance. However, management of the CTEV was uneventful at the local orthopedic department, and the patient was referred to the pediatric orthopedic center in Jakarta.

Conclusion: Incidence of mirror foot is extremely rare, and treatment must be tailored to each individual. Coordination among different departments should be pursued to ensure optimum care for patients.

Keywords: mirror foot, polydactyly, congenital anomalies.

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INTRODUCTION

The condition known as polydactyly is the existence of extra fingers on the hands or feet. The Dutch physician Theodor Kerkring first used the term polydactyly in 1670.¹ In 40 to 50 percent of cases, polydactyly of the foot occurs bilaterally and accounts for 45% of congenital foot abnormalities.² The location of the extra digit is described by Temtamy and McKusick’s well-known classification of polydactyly: preaxial (medial ray), central, and postaxial (lateral ray).³ Eighty percent of patients have postaxial polydactyly, fifteen percent have preaxial polydactyly, and five percent have central duplication. Postaxial polydactyly is the most common type.⁴

The extreme form of polydactyly, known as mirror image polydactyly of the foot, is an uncommon congenital deformity marked by symmetrical duplication of the foot’s digits. The foot’s

mirror image polydactyly can develop as a single congenital disorder or a component of a genetic syndrome that includes several congenital abnormalities. Mirror hands, tibial hemimelia (varying degrees of tibia hypoplasia), fibular dimelia (absent tibia with duplication of the fibula), and Laurin-Sandrow syndrome are anomalies reported in relation to mirror foot.⁵

In this study, we reported a case of preaxial mirror polydactyly with ten digits and nine metatarsals in the left foot of a 3-month-old female child. We emphasized its rarity, unusual presentation, and successful surgical treatment.

CASE PRESENTATION

A 3-month-old girl was born with congenital genu recurvatum and unilateral mirror image polydactyly of the foot, along with congenital talipes equinovarus (CTEV). She was directed to Dr. Kariadi General Hospital’s outpatient

clinic within the surgery department. She was the third child born to a non-consanguineous couple, and she arrived at full term. Antenatal history was eventful, and no family history of a similar skeletal condition was reported. Clinical examination showed ten digits of the left foot (Figure 1). The radiological examination confirmed that the patient has ten digits and nine metatarsals with fully developed proximal, middle, and distal phalanges of the left foot (Figure 2). Surgery was performed under general anesthesia, and a tourniquet was applied. Preaxial duplicates of the first to fourth metatarsals were disarticulated with an initial medial longitudinal incision followed by ablation of the five digits (Figure 3).

The aim of surgical management for this case was to reconstruct a functional and cosmetically pleasing foot, which will benefit orthopedic surgeons in managing

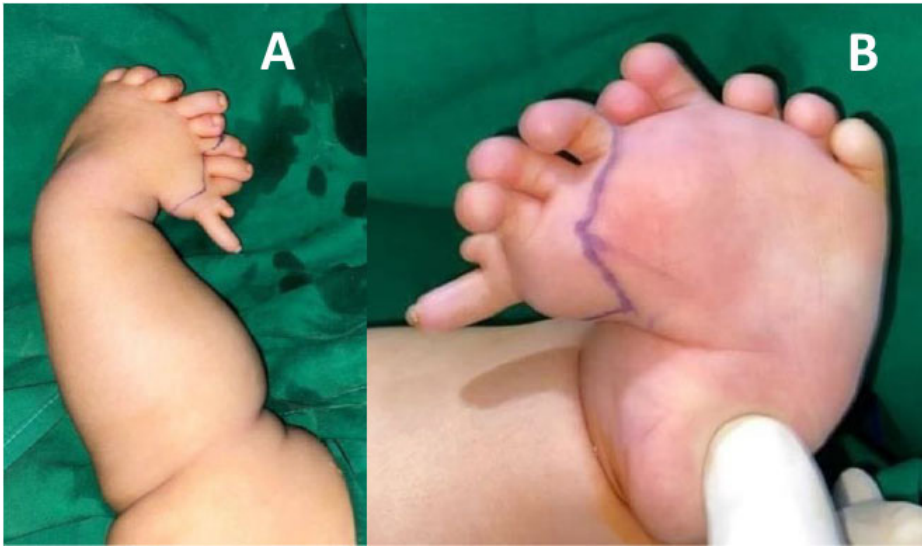


Figure 1. (A) Dorsal view of the left foot showing ten digits and (B) plantar view of the left foot.



Figure 2. Radiological examination revealed ten digits with fully developed metatarsals and proximal, middle, and distal phalanges of the left foot.

CTEV for serial cast correction. Six months after surgical intervention, the foot showed a satisfactory appearance. However, functional capabilities could not be performed as the patient has not been able to walk yet (Figure 4). Management of the CTEV was uneventful at the local orthopedic department, and the patient was referred to the pediatric orthopedic center in Jakarta, Indonesia, due to a lack of facilities in Aceh, Indonesia. Follow-up is required to assess the functional development of this patient later in life.

DISCUSSION

There is still no universally accepted definition of mirror foot in the world.⁶ There is no universal classification for the true definition; it depends on the author.⁷ The existence of an accessory tarsal bone, according to some authors, should be used to distinguish between mirror foot and polydactyly. However, this claim is still up for debate regarding the fulfillment of the criteria, particularly the duplication of all tarsal and metatarsal bones on the medial side of the foot.⁸ While some authors recognize mirror foot as “an extreme form of preaxial polydactyly” and as a distinct type of preaxial polydactyly, others have included foot mirror duplication in the spectrum of preaxial polydactyly.⁹ The phrase “preaxial mirror polydactyly” was coined by Verghese et al. to describe feet that have extra rays medially positioned to the first ray, a feature common to postaxial



Figure 3. Post-operative view of the patient's foot. (A) Medial view of the left foot and (B) dorsal view of the left foot.

toes.⁹ The tarsal duplication was not included due to its variability.¹⁰

Abnormalities of the mirror foot are extremely rare and severe types of congenital duplication of the preaxial polydactyly spectrum. A review of the English literature by Fukazawa et al. found that, as of 2009, only 28 cases of mirror feet were reported, and even fewer of those cases included treatment and outcome details.⁶ Anomalies of the hindfoot, midfoot, and forefoot were discovered, along with variability in tibial and fibular abnormalities.⁷

The reported literature for this rare anomaly with functional and

aesthetic implications offers few surgical management recommendations. McCarthy et al. and Galois et al. detailed the difficulties in treating these abnormalities surgically and reported that the long-term outcome had been unsatisfactory.^{11,12} However, because the hand and foot functions differ, they are less complex than their equivalents in the upper limb.¹³

In this case report, the patient had additional CTEV and congenital genu recurvatum anomalies, which required further referral to the orthopedic department. Clubfoot, also known as CTEV, is one of the most prevalent

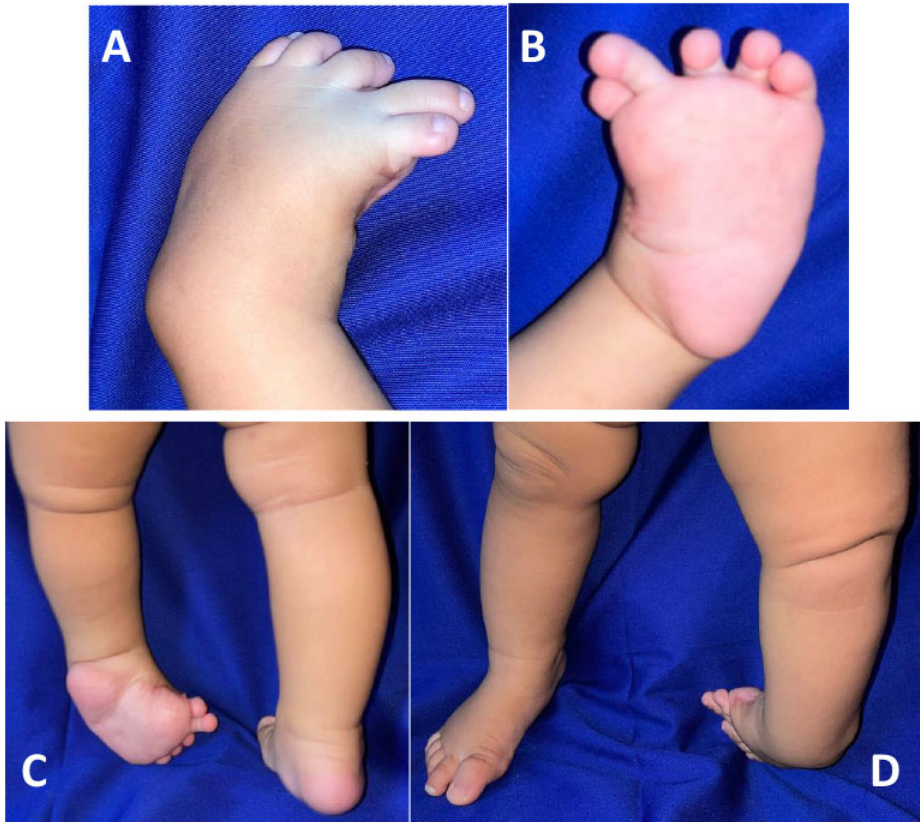


Figure 4. Clinical results after six months of follow-up. (A) Dorsal view, (B) plantar view, (C) posterior view, and (D) anterior view.

congenital musculoskeletal deformities, with a prevalence of 6.8 to 0.6 per 1000 people. The Ponseti technique, which involves sequential manipulation and cast application, is widely recognized as the gold standard for managing clubfoot without surgery.¹⁴

This case report highlights the rarity of mirror foot with additional limb abnormalities. There are no guidelines for the treatment of mirror foot. While the primary purpose of foot reconstruction is cosmetic, it also helps orthopedic surgeons by enabling regular shoe wear and facilitating the use of serial cast correction. When treating patients with mirror feet, it is crucial to consider any associated abnormalities, and working with multiple surgeons will yield the best results. Early and routine gait assessments should also involve occupational therapists and physiotherapists to detect, stop, and treat any abnormalities.

CONCLUSION

Mirror foot is uncommon, and each patient must receive treatment designed explicitly

for them. Mirror foot management is still difficult and calls for a multidisciplinary strategy. In order to provide patients with the best care possible, coordination between various departments should be pursued.

CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient's parents to publish this case report.

CONFLICT OF INTEREST

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria, educational grants, membership, employment, consultancies, or other equity interest in the subject matter or materials discussed in this manuscript).

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Gina Yunita Joice Sitorus (Conceptualization), Teuku Nanda Putra (Conceptualization, Literature Search), Muhammad Ikhsan (Manuscript Preparation and Review), and Siti Miftahul Jannah (Writing and Editing).

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