

SHORT COMMUNICATION

**MIRROR FOOT, POSSIBLE CORRECTION OF DEFORMATION – CASE REPORT**

**STOPA LUSTRZANA, MOŻLIWOŚĆ KOREKCJI DEFORMACJI – OPIS PRZYPADKU**

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**Abstract**

The mirror foot is a rare, congenital defect characterized by a mirror image of polydactyly. Due to a small number of cases and rarity of this condition, the definitions and classifications are incomplete.

This report provides description of the treatment of patient had eight fingers and eight metatarsal bones in his right foot with normal crus bones. A positive result of treatment was achieved with surgical treatment by removing the three middle fingers along with the metatarsal bones and bringing the first and fifth radii of the foot closer. One year after surgery, the appearance and function of the foot are normal, and the child is wearing standard footwear.

There are no clear guidelines for treatment of mirror foot. In the case of proper tibia and fibula, resection of the excess radii of the foot is recommended, starting with the hypoplastic radii.

**Keywords:** mirror foot, resection of foot radius, deformation classification

**STRESZCZENIE**

Stopa lustrzana to rzadka wrodzona wada stopy, charakteryzująca się występowaniem odbicia lustrzanego polidaktylii. Dokładne definicje i klasyfikacje tej anomalii są niekompletne, gdyż opierają się na niewielkiej liczbie obserwacji.

W pracy przedstawiono opis leczenia chorego, który posiadał osiem palców oraz osiem kości śródstopia w prawej stopie przy prawidłowych kościach goleni. Pozytywny wynik leczenia operacyjnego osiągnięto usuwając trzy środkowe palce wraz z kośćmi śródstopia oraz zbliżając pierwszy i piąty promień stopy. Rok po operacji wygląd i czynność stopy są prawidłowe, a dziecko używa standardowe obuwie.

Nie ma jednoznacznych wytycznych w leczeniu stopy lustrzanej. W przypadku zachowanej prawidłowej kości piszczelowej i strzałkowej zaleca się resekcję nadmiarowych promieni stopy, w pierwszej kolejności promieni hypoplastycznych.


**Słowa kluczowe:** stopa lustrzana, resekcja promieni stopy, klasyfikacja deformacji

**Introduction**

Polydactyly is characterized by additional fingers or toes in the hand, foot or both locations simultaneously (Christensen *et al.* 1981; Belthur *et al.* 2011). Extra toes is a relatively

common, isolated congenital defect, although it may also coexist with hand anomalies, such as a mirror hand, polysyndactyly, or a double ulna (Laurin *et al.* 1964; Sandrow *et al.* 1970;

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Authors reported no source of funding  
Authors declared no conflict of interest

Date received: 27th February 2021  
Date accepted: 24th March 2021

Hatchwell *et al.* 1996; Verghese *et al.* 2007). In most cases, polydactyly is in the subaxial form (when extra radii are present on the side of the foot), less often preaxial (when additional rays are present on the medial side of the foot) or the central form of polydactyly (McCarthy *et al.* 1995; Mishra *et al.* 2010; Christensen *et al.* 2011).

The definition of mirror foot is ambiguous, but currently it is defined as presence of a mirror image of polydactyly. This rare congenital deformity may be an isolated defect or may accompany the duplication of the fibula and tibial aplasia along with the underdevelopment of the nasal ala and septum observed in the Laurin – Sandrow or Martin syndrome (Fukazawa *et al.* 2009). To date, 34 cases have been described in the English-language literature, of which only 13 have documented treatment (Shahcheraghi *et al.* 1970).

Due to the significant anatomical variability of the defect, there are no clear guidelines for the treatment of mirror foot. With the proper tibia and fibula, resection of the excess radii of the foot is recommended, taking into account amputation, beginning with the hypoplastic radii. In the case of underdevelopment, especially the absence of the tibia, limb amputation at the knee level should be considered (Narang *et al.* 1982; Kumar *et al.* 1993).

### Subject and methods

A 7-month-old baby was referred to our center. The baby was born in proper gestation, course of pregnancy and childbirth without complications (first pregnancy, first delivery), negative family history of birth defects. The parents were not related to each other. Clinical examination revealed no abnormalities in the upper limbs and trunk. The right foot had 8 toes, including a big toe (a toe with 2 phalanges) which was the first finger from the medial side (Figure 1A).

Radiological examination revealed the presence of a properly developed tibia and fibula as well as eight toes and eight metatarsal bones. The cuneiform bones and the

navicular were not visible on X-ray (Figure 1B). The first medial toe had 2 phalanges, while all other fingers had 3 phalanges. The features of slight hypoplasia of the 4th metatarsal bone were found. X-ray examination carried out immediately before the surgery confirmed the above-described anomalies of the skeletal system and the suspicion of the presence of an additional cuneiform bone.

### Treatment and results

The surgery was performed at 12 months of age; it consisted of resection of the second, third and fourth toe together with the metatarsal bones and partially the cuneiform bone. The first and fifth radii of the foot were approximated by temporarily stabilizing the forefoot with Kirchner wire, which allowed to obtain and consolidate the correct shape and width of the foot (Figure 2A). After the procedure, the foot was immobilized for 6 weeks in a cast splint, after which the immobilization was removed and the Kirchner wire was also removed (Figure 2B). Immediately thereafter, weight loading of the foot was allowed. One year after the operation, the foot's appearance and function were proper and the child was able to wear standard footwear (Figure 3).

### Discussion

Due to the small number of described cases of a defect characterized by significant anatomical variability, there are different and sometimes ambiguous definitions of the mirror foot. Belthur describes the mirror foot as an additional form of preaxial polydactyly (Belthur *et al.* 2011). Other researchers expand this definition by adding further figures – the central and the axial forms, characterized with a possible determination of the axis of symmetry in the computed tomography image (Shahcheraghi *et al.* 1970). Sudesh assumes that the mirror foot differs from polydactyly by the presence of additional tarsal bones (Sudesh *et al.* 2010), and Watanabe distinguished three types of foot deformities depending on the arrangement of these tarsal bones (Watanabe *et al.* 1992). However,



**Figure 1.** A. Photo of the right foot before surgery. Eight fingers, including one toe. B. X-ray image showing eight toes and eight metatarsal bones.



**Figure 2.** A. Postoperative photo after resection of three rays of the foot. B. X-ray image after resection of three rays of the foot (6 weeks after surgery).

**Table 1.** Classification of mirror feet (Al-Qattan *et al.* 1998, modified by Fukazawai *et al.* 2009).

Type	Name	Clinical features
1	Ulnar dimelia	Multiple toes with two fibulae A: each fibula is well formed B: the preaxial fibula is hypoplastic
2	Intermediate type	Multiple toes with two fibulae (one of the fibulae is vestigial) and a tibia
3	Intermediate type	Multiple toes with one fibula and a tibia A: the tibia is well formed B: the tibia is hypoplastic
4	Syndromal mirror feet	Bilateral multiple toes In complex syndactyly Mirror hands and nasal defects are also characteristic A: Sandrow syndrome B: Martin syndrome
5	Multiple foot	Complete duplication of the foot, including the hallux, with normal leg
6	No tibia and fibula	



**Figure 3.** Clinical picture one year after right foot surgery.

according to the Al-Qattan classification in Fukazawa's modification, adopted for the purpose of categorization of the mirror foot deformation, we distinguish 6 types of distortion (Fukazawa *et al.* 2009). Using the above division, our patient's foot was classified as type 3A – intermediate – with normal, single tibia and fibula bones and multiplication of the number of toes (Table 1).

Treatment of a patient with a mirror foot is to restore the foot's proper function and aesthetic qualities. Timely treatment is important for the optimal treatment result. In our opinion, a 3A deformation operation performed after the second or third year of life will allow for the best functional result. At this age, radiographic examination shows the ossification nuclei for the tarsal bones – calcaneus, talus and cuboid bone, and the ossification nuclei for the lateral and medial cuneiform bones; ossification nuclei may also appear for any additional cuneiform bones. This allows for an accurate assessment of bone deformities and proper planning of the treatment. However, parents often are not willing to postpone the procedure until the child's second or third year of life due to the different appearance of the child's foot and the inability to wear standard footwear. It should then be remembered that performing surgery earlier in the child's life may be associated with the need to perform further operations at a later age as a result

of the possible existence and development of additional cuneiform bones, and consequently an increase in the transverse size of the foot.

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