RESULTS OF THE SUPERANKLE PROCEDURE IN PALEY TYPE FIBULAR HEMIMELIA 3C

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INTRODUCTION: Fibular hemimelia is a congenital condition that presents with underdevelopment or total absence of the fibula. It has a wide range of clinical presentations, with Paley type 3C associated with rigid equinus and valgus deformities of the ankle. For the treatment of these severe types, Paley described a reconstruction technique called SUPERankle in 1996. There are few reports in the literature on its results. Objective: To describe the results of patients with Paley type 3C fibular hemimelia reconstructed using the SUPERankle technique.

METHODS: We analyzed 15 limbs from 13 patients with Paley type 3C fibular hemimelia reconstructed using the SUPERankle technique from 2004 to 2023. Cases were evaluated clinically, through analysis of deformity, pre- and post-operative characteristics; radiographically, by measuring pre-and post-operative angles (talocalcaneal, plantigrade, and tibiotalar). Gait videos and calcaneal height at the last evaluation were also analyzed. The ASAMI score was used to measure post-operative bone and functional results. Complications were studied and compared with the literature.

RESULTS: The average age at surgery was 26 months, 73% were male, with an average of 5 cm lengthened and a healing index of 42 d/cm. The time spent with the fixator was 9 months. The most common complication was pin infection (73.3%). Recurrence was observed in 4 cases requiring new surgical intervention. According to the ASAMI score, 100% of the functional results were excellent/good and 86.7% of the bone results were excellent/good. There was a correction of 31.1% of the measured angles. Gait was considered excellent or good in 66.7% of cases. There was a correlation between recurrence and initial tibial valgus deformity (p = 0.011), recurrence and lower post-operative plantigrade angle (p = 0.048), and recurrence and rotation correction at the end of lengthening (p = 0.033). Pseudoarthrosis correlated with greater valgus deformity (p = 0.033), and a trend between knee flexion contracture and procurvatum (p = 0.076).

DISCUSSION AND CONCLUSION: Despite being technically challenging and with complications, the SUPERankle procedure can be a reliable tool in the treatment of severe cases of fibular hemimelia with good results. There is a significant correlation between recurrence and initial tibial valgus deformity, recurrence and low post-operative plantigrade angle, and recurrence and correction of rotational deformity.

Figure 1 - Exemple of reconstruction using the SUPERankle technique.

Figure 1 - Pre, intra and post-operative images of a patient from the study. a - pre-operative panoramic radiography; b - pre-operative clinical image; c - intra-operative image of image intensifier showing fixation of tibia and subtalar osteotomies; d - final assembly of the external fixator; e - clinical aspect of the foot and leg in the immediate post-operative period.

Figure 2 - Radiographic result of foot and ankle reconstruction.

Figure 2 - Preoperative radiographic images of a patient's foot with Paley type 3C fibular hemimelia (a,b) and images 10 years after the SUPERankle procedure (c,d).

Figure 3 - Examples of mechanical axis alignment after reconstruction.

Figure 3 - Radiographic images of two different patients at the end of the follow-up. The image on the left corresponds to a 6-year-old patient with a final image after 5 years of reconstruction surgery. The image on the right is of a patient operated on at 6 years old, with a follow-up of 16 years.

Figure 4 - Patient with bilateral fibular hemimelia type Paley 3C.

Figure 4 - Pre-clinical images (a,b), immediate post-operative (c) and late (d,e,f,g) with a follow-up of 9 years and 6 months.