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Non-vascularized phalangeal grafting as an alternative treatment in symbrachydactyly: A case series of three pediatric patients

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Abstract

Background: Symbrachydactyly is a rare congenital hand malformation characterized by hypoplastic or absent digits often associated with syndactyly [1].

Case presentation: We report three pediatric cases of type III symbrachydactyly treated by non-vascularized phalangeal grafting.

Conclusion: This technique represents a valuable alternative when microsurgical toe transfer is not feasible, despite the risk of graft resorption [6].

Keywords: Symbrachydactyly; Phalangeal graft; Congenital hand anomaly; Pediatric surgery.

Introduction

Symbrachydactyly is a rare congenital anomaly of the hand characterized by shortened or absent digits associated with cutaneous syndactyly [1]. It is usually unilateral, sporadic, and non-hereditary.

This condition was first described by Poland in 1841 in association with pectoral muscle deficiency [2]. The incidence ranges between 1/10,000 and 1/40,000 live births.

The most widely accepted etiology is vascular disruption during limb development, particularly involving the subclavian artery [3,4].

Differential diagnosis includes amniotic band syndrome, Apert syndrome, ulnar longitudinal deficiency, and hypodactyly [5].

Classification

The Blauth and Gekeler classification distinguish four types [6,7]:

- Type I: Short fingers
- Type II: Cleft hand
- Type III: Monodactyly
- Type IV: Peromelic

Case Presentations

Case 1

An 11-month-old infant presented with type III symbrachydactyly. A phalangeal graft was performed on the second ray.

Preoperative and postoperative radiological findings are shown in (Figure 1).

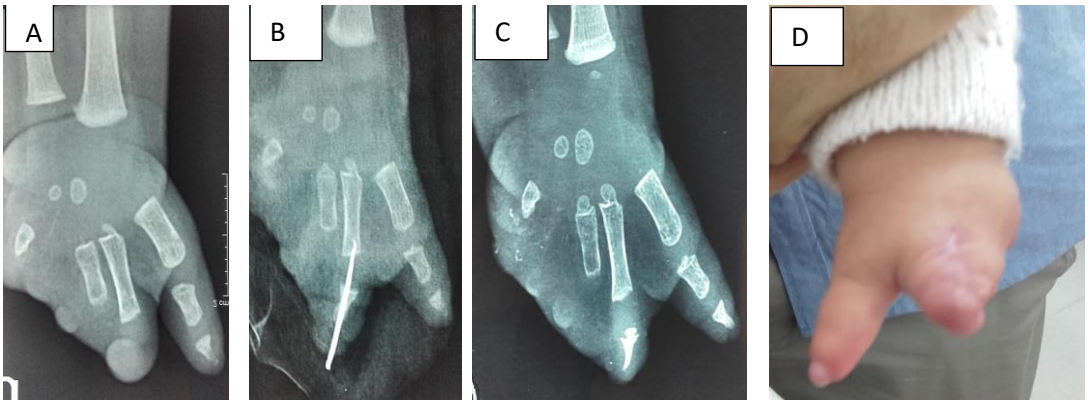

Figure 1: Type III symbrachydactyly before and after phalangeal grafting (Case 1). **(A)** Preoperative radiological appearance; **(B)** Immediate postoperative radiological appearance. **(C,D)** Postoperative clinical and radiological outcomes.

Case 2

A 16-month-old infant underwent phalangeal grafting using phalanges harvested from the 3rd and 4th toes.

Preoperative clinical and radiological findings are shown in (Figure 2A–B), while postoperative results are shown in (Figure 2C–D).

At 2-year follow-up, good integration and functional improvement were observed (Figure 2E–F), with acceptable donor site outcome (Figure 2G).

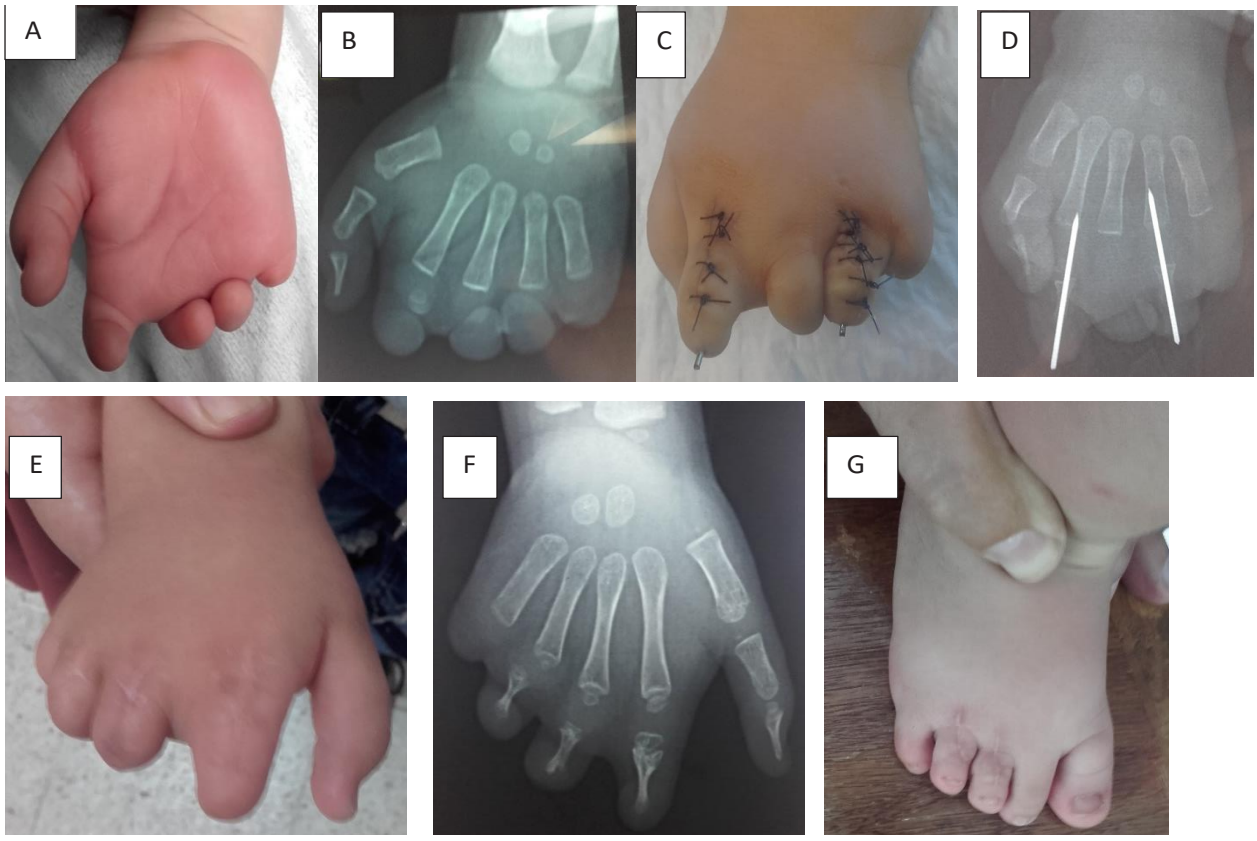

Figure 2: Case 2 – **(A–B)** Preoperative; **(C–D)** Postoperative results. **(E–F)** 2-year follow-up; **(G)** Donor site.

Case 3

A 4-year-old child underwent phalangeal grafting using a middle phalanx harvested from the 4th toe.

The surgical steps including harvesting, closure, and graft placement are illustrated in (Figure 3).

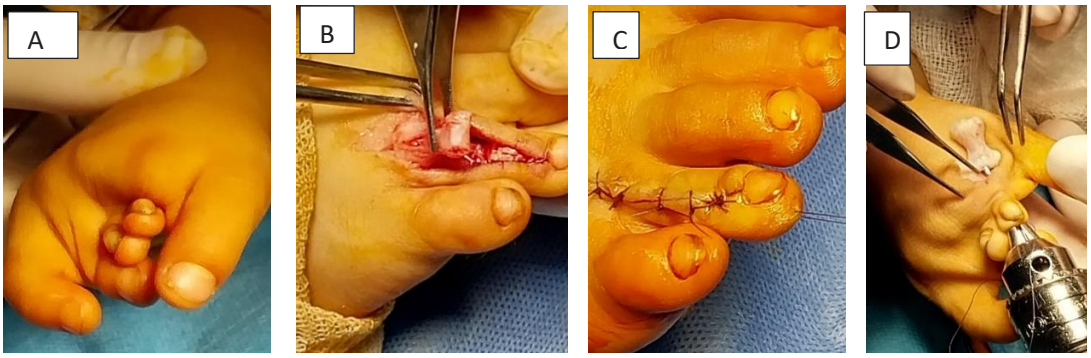

Figure 3: Case 3 – Surgical steps: **(A)** Deformity, **(B)** Phalanx harvesting, **(C)** Closure, **(D)** Graft placement.

Surgical technique

The technique consists of :

Harvesting a phalanx from the 3rd or 4th toe
Creating a recipient pocket
Fixation using a Kirschner wire for 4 weeks.

Discussion

Microsurgical toe transfer remains the gold standard in severe symbrachydactyly [6]. However, it is technically demanding and not always feasible.

Non-vascularized phalangeal grafting represents an alternative, particularly in type III cases [6,9]. It improves grasp function and digital stability.

However, graft resorption remains a major limitation. Literature reports variable outcomes, with better results observed in early surgery (before 18 months) [10].

Other techniques include distraction osteogenesis, which allows progressive bone lengthening [11].

Conclusion

Symbrachydactyly requires individualized management based on functional and anatomical assessment.

Non-vascularized phalangeal grafting is a reliable alternative when microsurgical reconstruction is not possible. Early intervention improves outcomes, although long-term evaluation remains necessary.

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