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Surgical Treatment of Hand Syndactyly: Experience of the Plastic and Reconstructive Surgery Department in Marrakech

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Abstract: Original Research

Introduction: Syndactyly is a congenital or acquired malformation characterized by partial or complete fusion of the fingers, affecting hand function and aesthetics. Its treatment is based on surgical management aimed at restoring digital anatomy and preventing functional and aesthetic complications. The objective of this study is to evaluate the outcomes of our surgical approach combining zigzag release, omega flaps, and full-thickness skin grafts (FTSG), by analyzing functional and aesthetic results as well as observed complications. ***Methods:*** This is a retrospective study conducted on 21 patients operated on for syndactyly at the Mohammed VI University Hospital of Marrakech over a one-year period. Data collected included epidemiological characteristics, surgical techniques used, postoperative complications, and patient satisfaction. ***Results***: The mean age of patients was 30 months (range: 8 months–43 years), with a sex ratio of 1.71. Syndactyly was bilateral in 6 cases (28.6%) and unilateral in 15 cases (71.4%). The third web space was the most commonly affected (52%). Most cases were simple forms (15 cases, 71.4%) versus 6 complex cases (28.6%). Full-thickness skin grafts were used in 57% of the cases. Postoperative complications included one infection (4.8%) and two recurrences (10%). Overall satisfaction score was 8.2/10. ***Conclusion***: Zigzag release combined with omega flaps provides effective correction of syndactyly with satisfactory functional and aesthetic outcomes. Appropriate surgical planning and rigorous postoperative management are essential to minimize the risk of recurrence.

Keywords: Syndactyly, Plastic surgery, Omega flaps, Full-thickness skin graft.

1. INTRODUCTION

Syndactyly is one of the most common congenital anomalies of the hand, with a prevalence of 1 in 2000 to 2500 births. It results from the failure of embryological separation of the fingers between the 6th and 8th weeks of gestation. It can be simple (cutaneous fusion) or complex (involving bone, tendon, or vascular structures).

The goal of surgical treatment is to achieve optimal functional and aesthetic finger separation while preventing secondary complications such as scar contractures and recurrence.

This study aims to assess the effectiveness of the zigzag release technique combined with omega flaps and full-thickness skin grafts by analyzing functional outcomes, complications, and patient satisfaction.

2. Materials and Methods

2.1 Study Design

Descriptive retrospective study conducted at Mohammed VI University Hospital in Marrakech over a one-year period.

2.2 Inclusion Criteria

- Patients with congenital or post-burn (cicatricial) syndactyly.

- Patients operated on exclusively in our department.

2.3 Data Collection

Clinical and surgical data were collected from medical records:

- Patient age and sex
- Clinical form of syndactyly (simple or complex)
- Number of affected web spaces
- Surgical technique used
- Postoperative complications and recurrences
- Evaluation of functional and aesthetic results

2.4 Surgical Techniques

- Dorsal zigzag incisions and palmar anchor-shaped flaps
- Omega flaps to reconstruct the commissures
- Full-thickness skin grafts (donor site: inguinal region), if needed

3. RESULTS

3.1 Patient Characteristics

Characteristics	Number (n = 21)	Percentage (%)
Male	13	61.9%
Female	8	38.1%
Mean age (months)	30	-
Bilateral syndactyly	6	28.6%
Unilateral right syndactyly	9	42.9%
Unilateral left syndactyly	6	28.6%
Simple form	15	71.4%
Complex form	6	28.6%

3.2 Surgical Techniques Applied

- 35 web spaces treated
- 10 patients underwent a single-stage procedure
- 8 patients required multiple procedures
- Skin grafts used in 57% of cases

3.3 Postoperative Complications

Complications	Number of Cases	%
Infection	1	4.8
Recurrence	2	10
Partial graft necrosis	1	4.8

3.4 Evaluation of Outcomes

- 69% of patients achieved good functional and aesthetic outcomes
- Mean satisfaction score: 8.2/10

4. DISCUSSION

The goal of syndactyly surgery is to restore hand function while ensuring optimal aesthetic results. The main challenges include web space reconstruction, prevention of scar contractures, and recurrence control. Our series evaluated patient characteristics, surgical techniques, postoperative complications, and patient satisfaction levels.

4.1 Patient Characteristics

The mean patient age was 30 months, aligning with the recommended age for surgery. Egloff and Germain (2020) advocate intervention before 2 years for syndactyly involving the thumb or index finger to prevent functional impairment, while surgery for other digits can be performed between 18 months and 3 years.

The male predominance (sex ratio 1.71) is consistent with the literature, though the underlying reasons remain unclear. Genetic factors have been suggested, but no specific mutations have been identified.

Bilateral involvement was found in 28.6% of cases, in line with published data indicating 30–50%.

The third web space was most commonly affected (52%), which agrees with Clark and Gehrmann (2019), who report a 45–60% prevalence, due to the complex embryological separation of the third and fourth rays.

Simple forms predominated (71.4%) over complex forms (28.6%), consistent with global data. Complex syndactyly poses greater surgical challenges and often requires multiple procedures.

4.2 Surgical Techniques

A total of 35 web spaces were treated. The choice between single and multi-stage procedures depended on the extent of the fusion and the need to minimize complications.

FTSGs were performed in 57% of cases, mainly when large coverage areas were required. Patel and Kay (2018) suggest avoiding grafts when possible, favoring local flaps to reduce the risk of contracture. However, in complex or post-burn syndactyly, FTSG remains indispensable.

The inguinal region was the primary donor site, chosen for its fine, flexible texture and good graft take. Some authors suggest the forearm or antecubital fossa for better aesthetic match.

4.3 Postoperative Complications

Three major complications were noted:

1. Infection (4.8%) – Managed with systemic and local antibiotics, with no sequelae. This low rate reflects good surgical field management and appropriate prophylaxis.
2. Partial graft necrosis (4.8%) – Possibly due to poor revascularization or minor local infection. Reported rates range from 3–10%, placing our rate within normal limits.
3. Recurrence (10%) – Mainly in complex forms or hypertrophic scarring. Our rate is slightly higher than international reports (5–8%). Long-term follow-up and postoperative scar management (orthoses, massage, silicone therapy) may help reduce recurrence.

4.4 Outcome Evaluation and Patient Satisfaction

Patient satisfaction averaged 8.2/10, with 69% achieving good functional and aesthetic outcomes—comparable to recent literature reporting 65–80%.

Positive satisfaction factors included:

- Effective finger separation and functional recovery
- Minimal scarring or contractures
- Satisfactory appearance, especially in non-grafted cases

Negative factors included:

- Need for surgical revision in recurrences
- Presence of hypertrophic scars in some cases, later treated

Our findings support the use of zigzag release with omega flaps as reference techniques to optimize results.

4.5 RECOMMENDATIONS

Based on our experience and current literature, we recommend:

- Favoring local flaps over grafts when feasible
- Planning multi-stage procedures for complex syndactyly
- Implementing rigorous postoperative follow-up with scar therapy and rehabilitation

5. CONCLUSION

Surgical management of syndactyly using zigzag release, omega flaps, and full-thickness skin grafts offers excellent functional and aesthetic outcomes. Long-term follow-up and optimized graft and flap techniques are essential to reduce recurrence and improve patient satisfaction.

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