



FOOT SYNDACTYLY MANAGEMENT USING DORSAL RECTANGULAR FLAP-A CASE SERIES

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ABSTRACT

Syndactyly is a common congenital condition involving the hands and foot. Surgery to reconstruct the toes may be indicated for cosmetic, psychological and functional reasons. A dorsal rectangular flap and a plantar reverse U shaped flap with defatting and primary closure /full thickness graft technique was done in Twelve feet of 8 patients with foot syndactyly between January 2021 to October 2024. There were 2 boys and 6 girls . Four cases were bilateral. Age at operation ranged from 6 years to 14 years. The mean follow-up period was 2.5 years. In the 12 cases operated, 3 had complete syndactyly and the remaining 9 had incomplete syndactyly. 10 cases had primary closure, in 2 cases full thickness graft was applied. Two toes had mild torsional deformity, which is present preoperatively, and two toes had mild deformities of the nail. Creeping of the web of about 3–4mm is noticed which ceased after one year postoperatively. At final follow-up, all patients had acceptable web depth and pulp contour. Web reconstruction using dorsal rectangular flap ,plantar flap with straight midlateral incisions and defatting with primary closure/full thickness graft is safe, with good cosmetic and functional outcome in our follow-up.

KEYWORDS : Syndactyly, dorsal rectangular flap, web creep.

INTRODUCTION

Syndactyly, a condition characterised by the fusion of adjacent digits, commonly affects the hand and foot. While often considered a cosmetic concern, syndactyly can warrant surgical intervention for cosmetic, psychological, and functional reasons, particularly in cultures where footwear choices may expose the toes^{1,6}. Surgical correction aims to separate the fused digits and reconstruct the web space, ultimately creating a functional and aesthetically acceptable foot^{2,3}.

This research article focuses on the management of foot syndactyly using dorsal rectangular flap and a plantar reverse U shaped flap with defatting and primary closure /full thickness graft. The study presents a case series of patients who underwent this procedure, analysing the surgical outcomes and any associated complications.

MATERIALS AND METHODS

Twelve feet in 8 patients with simple cutaneous syndactyly were treated by this technique between January 2021 to October 2024. There were 2 boys and 6 girls and four cases were bilateral. Age at operation ranged from 6 years to 14 years. The mean follow-up period was 2.5 years. Five feet had syndactyly of the 1st and 2nd toes, four feet had syndactyly of 4th and 5th toes, two feet had syndactyly of 3rd and 4th toes, and one had 1st, 2nd, and 3rd toe syndactyly. 12 webs were operated in this series. 3 had complete syndactyly and the remaining 9 had incomplete syndactyly.

Operative Technique

Under regional anaesthesia and after the application of a pneumatic tourniquet, a dorsal proximally-based, rectangular skin flap was created between the webbed toes. The base of the flap was placed 5mm proximal to the normal level to compensate for postoperative creeping of the web⁷. The width of flap spans from one metatarsal head to the other, while the length is approximately two-thirds the length of the proximal phalanx. The blood supply to the flap is primarily from small perforating vessels, and care should be

taken to avoid damaging these during dissection. The distal border is designed to accommodate the plantar inverted U incision. When raising the dorsal flap, some fat over the underlying tissue is left. Next, a plantar reverse U incision was made, which delineated the plantar margin of the commissure. Plantar flap was placed 5mm proximal to the normal level. Ligation of one branch of the common digital artery was not necessary. Separation of the syndactyly was completed by mid lateral incisions. Defatting done taking care of the neurovascular bundle. At this stage, the tourniquet was released and complete haemostasis was achieved to prevent the development of a haematoma. The dorsal flap was pulled down and sutured into the plantar flap to facilitate tension less closure. Absorbable suture materials were used. The remaining incisions are closed primarily in 10 cases after defatting. Only 2 cases needed full thickness skin graft. Non-adhesive dressing applied. The web space was filled with sterile cotton gauze and the entire foot was dressed. Below knee slab was applied which was removed at 2 weeks. Post operative antibiotics were continued for three days. The dressing was changed once a week. In evaluation Changes in the depth of the webs were evaluated half yearly. At final follow-up, formation of scars, deformity of the toe and nail, and web depth are assessed.

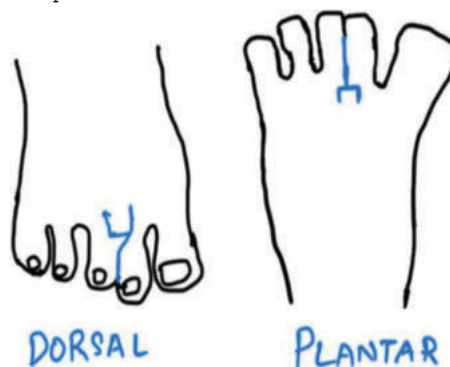


Figure 1 : Markings of Operative Incisions

RESULTS

No infection was recorded and all webs healed uneventfully. No flap necrosis. Two toes had mild torsional deformity, which had been present preoperatively, and two toes had deformities of the nail. Creeping of the web of about 3–4mm noticed which ceased after one year postoperatively.



Figure 2: A, B Preop Images Showing Fourth And Fifth Toes Syndactyly C. Postop Follow Up Image Showing Good Web Depth.

DISCUSSION

The primary goal of syndactyly release is to produce a functional and aesthetically pleasing hand or foot, with adequate web space that allows full range of motion for the digits.¹

The dorsal rectangular flap is a well-established technique for syndactyly repair, frequently used for both hand and foot cases. The rationale for this approach stems from the abundance of dorsal skin on the hand and foot, which can be mobilised to plantar flap to reconstruct the web space without creating excessive tension. A dorsal rectangular flap and a plantar reverse U shaped flap with defatting and primary closure /full thickness graft from inguinal region reduces tension and has minimal scar related complications.

Advantages and Rationale for Choosing a Dorsal Flap

Minimising Skin Grafts: The dorsal rectangular flap technique aims to avoid or minimise the need for full-thickness skin grafts. This reduces the risk of complications associated with skin grafting, such as donor site morbidity, pigmentation mismatch, and contracture.⁸

Web Creep Prevention: By situating the webspace proximally and creating a deep commissure, the dorsal rectangular flap technique aims to minimise post-operative web creep. This is crucial for long-term stability and aesthetic outcomes.⁵

Variations and Modifications of the Dorsal Flap Technique

While the dorsal rectangular flap is a fundamental technique, variations exist:

Pentagonal Island Flap: One modification involves a dorsal pentagonal island flap, which allows for primary skin closure without skin grafting. This technique has shown good results in achieving acceptable web depth and pulp contour.² However, potential complications like keloid formation exists.

Double-Wing Flap: Another variation is the dorsal double-wing flap, which eliminates the need for skin grafts.¹⁰

Post-Operative Management and Potential Complications

Post-operative care includes pain management, elevation of the foot, and antibiotics as prescribed. Early mobilisation and physiotherapy are essential to prevent contractures and regain range of motion.

Despite the advantages of the dorsal rectangular flap technique, several complications can arise:

Flap Necrosis: This is a rare but serious complication that can occur if the blood supply to the flap is compromised.

Infection: Any surgical procedure carries a risk of infection, which can delay healing and lead to further complications.

Web Creep: Web creep, the recurrence of webbing due to scar contracture, is a common long-term complication. It can affect both hand and foot cases, and factors like post-operative

infection and inadequate flap design can contribute to its occurrence.^{8,12}

Scarring: Scars are inevitable after surgery, but their appearance and impact can vary. Hypertrophic scars, keloids can be aesthetically unappealing.³

Joint Stiffness and Contractures: Immobilisation after surgery can lead to joint stiffness and contractures, potentially affecting foot function.¹¹

Comparison with Other Techniques

The sources highlight alternative techniques for syndactyly repair, each with advantages and drawbacks

Open Technique: An open technique, where the web space is left to epithelialize spontaneously, has been described for foot syndactyly.⁴ This method avoids skin grafting and its associated complications but requires a longer healing time (around 3–4 weeks).

Split-Thickness Plantar Skin Grafting: A recent study investigated the use of split-thickness plantar skin grafts for foot syndactyly, reporting good aesthetic outcomes and minimal donor site morbidity⁵ but this causes secondary graft contracture.

CONCLUSION

Web reconstruction using dorsal rectangular flap, plantar flap with straight midlateral incisions and defatting with primary closure/full thickness graft is safe, with good cosmetic and functional outcome in our follow-up.

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