

MODIFIED BUCK GRAMCKO DORSAL ROTATION ADVANCEMENT FLAP FOR RELEASE OF THE THUMB INDEX SYNDACTYLY

Dr. Jhansi S	Assistant Professor, Department of Plastic Surgery, BIRRD (T) Hospital, TTD
Dr. Chaitanya Gadi*	Assistant Professor, Department of Orthopaedics, BIRRD (T) Hospital, TTD *Corresponding Author
Dr. Tejaswi Dussa	Assistant Professor, Department of Orthopaedics, BIRRD (T) Hospital, TTD
Dr. Venugopal SM	Associate Professor, Department of Orthopaedics, BIRRD (T) Hospital, TTD
Dr. Varaprasad KG	Assistant professor, BIRRD (T) Hospital, TTD

ABSTRACT

The aim of this study is to present our experience with and to evaluate the versatility and reliability of the modified Buck Gramcko dorsal rotational advancement flap for release of the thumb index finger syndactyly. 6 patients (4 males and 2 females) in the age group of 18 months–16 yrs were operated. The follow up period ranged 8–16 months postoperatively. This modification of Buck Gramcko flap provides a long wide flap which releases the thumb index web space with suture lines far beyond the web. It maintains the width of the thumb web postoperatively. Syndactyly is the most common congenital hand difference with both aesthetic and functional importance. It can be seen as isolated deformity as well as a part of syndromes or in combination with other malformations. In Thumb-index finger syndactyly the problem of the first web is not only to deepen the web but, also, to widen it, in order to restore normal position, appearance and function of the thumb. The dorsal rotational advancement flap described by Buck- Gramcko (1998)¹ achieves good widening of the first web without the need for skin grafting of the donor area. This paper describes a modification of the Buck Gramcko flap, with the advantage of being longer and wider. This achieves better release of the first web, without grafting of the donor site.

KEYWORDS :

PATIENTS AND METHODS

Six hands in six patients with thumb and index finger syndactyly (4 boys and 2 girls) were operated an average age of 36 months (range 18 months–16 years). The cases were collected over 1 year with an average follow-up of 12 (range 8–16) months.

Surgical technique

The flap is marked on the dorsum of the hand with a straight incision over the first metacarpal bone. The second ulnar incision is a curved one with a long curve from the second to the fifth metacarpal bones, extending to the wrist level (Fig 1a). Instead of marking the apex of the flap at the point of meeting of these two lines at the level of the metacarpophalangeal joint, as described by Buck-Gramcko (1998), the two lines are extended in rectangular shape to the level of the junction of the distal and middle thirds of the proximal phalanges of index and thumb (Fig 1a). On the palmar aspect, the inverted T-shaped incision is extended 1 to 2cm proximal to the level of the thumb metacarpophalangeal joint (Fig 1c). The distal release is carried out with multiple Z-plasties² to prevent contractures^{3,4,5}

The distal, rectangular part of the flap is fully released from its bed but the more proximal dissection is carried out at the epifascial level, with careful preservation of the perforating vessels and the branches of the dorsal carpal arch and the radial artery (the first and second dorsal metacarpal arteries)⁶. Some of the terminal branches of these vessels may be ligated at the edge of the flap to allow greater arc of rotation. The tourniquet was released intra-operatively to check good perfusion of the apex of the flap in all cases. The released web is maintained by two K-wires crossing between the first and second metacarpal bones. The flap is then advanced along the radial incision and rotated along the ulnar incision to occupy the first web space. It is sutured to the horizontal limb of the palmar inverted T incision well beyond the edge of the first web (Fig 1c). The donor site is closed with direct sutures. The sides of the index finger and thumb need full thickness skin grafting. The abducted thumb is temporarily fixed by Kirschner-wire between the first and

second metacarpal. After k wire removal, the thumb is kept in full abduction at night with a thermoplastic splint for 3 months after surgery.



Fig 1 (A) Complex hand syndactyly, with marking of the flap on the dorsum of the hand. (B) The wide apex of the flap extends to the junction of the distal third and middle thirds of the proximal phalanges of the thumb and index finger. (C) On the flexor aspect of the hand, the release is extended proximal to the metacarpophalangeal joint of the thumb. (D) Late post operative appearance after release of another patient (E) The apex of flap has retracted proximally but the web release has been maintained.

RESULTS

In all cases, the result was satisfactory with respect to the degree of widening and the cosmetic appearance. The flap gives a rounded and wide web which is as near as possible to the normal appearance. The first web angle tripled in cases of thumb–index syndactyly. The donor site heals without complication, but it leaves a visible scar on the dorsum of the hand. Mild superficial necrosis of the edge of the flap occurred in 1 case. During follow-up, proximal retraction of the edge of the flap occurred in all cases. However, because the apex of the flap is rectangular and wide, narrowing of the web did not recur.

DISCUSSION

Axial pattern cutaneous flaps from the forearm, viz. the radial artery forearm flap and the reversed posterior interosseous artery flap can be used (Upton et al., 1996) for the narrowed 1st web space. The radial artery forearm flap leaves an ugly donor site, especially in children, and may have an effect on the circulation of the hand. The reversed posterior interosseous artery flap carries the risk of injuring the nerve supply to the extensor carpi ulnaris muscle (Buchler and Frey, 1991)^{7,8}

The dorsal rotation advancement flap described by Buck-Gramcko (1998) is a good, wide flap for release of the web, without the need to use skin graft for cover of the donor site on the dorsum of the hand. It solves many of the problems of other flaps. It is large enough to provide wide release of the web, is a simple procedure and has minimal donor site morbidity. However, its apex is tapered and does not reach far enough into the palm. As the apex of the flap retracts proximally during healing, the narrow apex comes to occupy the edge of the web, with some recurrence of web narrowing. The blood supply to this flap is mainly from branches of the dorsal carpal arch and the first and second dorsal metacarpal arteries. These named arteries are not identified and dissected during surgery, because they are elevated within the flap. Making the apex of this flap long and rectangular in shape increases its capacity for widening the first web space and for proper release of the tight palmar skin at the base of the thumb, which is necessary in cases of severe narrowing of the first web space and thumb index syndactyly. The length of the modified flap allows advancement far beyond the edge of the web and provides good release of the palmar skin. The advancement of the flap to almost mid palmar level (Fig 1c) ensures that there will be less likelihood of proximal migration of the apex of the flap to the level of the web, with scarring across the web space. The width of the web is maintained because of the rectangular shape of its apex. This flap is larger in size than the alternative local flaps and has less donor site morbidity. It does, however, require delicate dissection and, even then, necrosis of the edge of the flap did occur in one of our cases, although this did not affect the final results. This flap cannot be used in small hands and in cases of scarring of the dorsal skin. Distally based forearm flaps¹⁰ should be reserved for these cases.

REFERENCES

1. Buck-Gramcko O. Microsurgery in congenital malformations of the hand. In: Brunelli G, editor. Textbook of Microsurgery. Milano, Paris: Masson; 1988, p. 933-40.
2. Cronin TD. Syndactylism: results of zig-zag incision to prevent postoperative contracture. *Plast Reconstr Surg* 1956; 18: 460-8.
3. Cronin TD. Syndactylism. Experiences in its correction. *Tri-State Med J* 1943; 15(2): 869-2871, 2884.
4. Bauer TB, Tondra JM, Trusler HM. Technical modification in repair of syndactylism. *Plast Reconstr Surg* 1956; 17: 385-92.
5. Millesi H. Kritische Betrachtungen zur Syndaktylie Operation. *Chirurgia Plastica et Reconstructiva* 1970; 7: 99-116
6. Buck-Gramcko D. Syndactyly between thumb and index finger. In: Buck-Gramcko D, editor. *Congenital Malformations of the Hand and Forearm*. Edinburgh: Churchill Livingstone; 1998, p. 141-7.
7. Brown PW (1972). Adduction-flexion contracture of the thumb; correction with dorsal rotation flap and release of the contracture. *Clinical Orthopaedics*, 88: 161-168.
8. Buchler U, Frey HP (1991). Retrograde posterior interosseous flap. *Journal of Hand Surgery*, 16A: 283-292.
9. H. Abdel Ghani, Modified dorsal rotation advancement flap for release of the thumb web space *Journal of Hand Surgery (British and European Volume, 2006)* 31B: 2: 226-229.
10. Upton J, Havlik RJ, Coombs CJ (1996). Use of forearm flaps for the severely contracted first web space in children with congenital malformations. *Journal of Hand Surgery*, 21A: 470-47