Extended Hueston Flap: New Solution for Primary Closure

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Abstract

Keywords

- fingertip injury
- flap
- thumb amputation

Thumb tip injuries are very common in hand trauma, and several flaps are available to restore the defect. One of them is the Hueston flap. It is very simple and quick to harvest, but it could lead to donor site problems. The variant “radial extended” of this flap, proposed in this article, allows a primary closure of donor site avoiding making scar on contact areas subject to frequent use. We performed this technique in a clinical case that presented a distal thumb amputation with good aesthetic result and satisfactory function.

Introduction

Thumb tip injuries are very common in hand trauma. When replantation of a fingertip amputation is not possible and the loss of substance exposes the bone, flap reconstruction may be necessary for a functional and aesthetical outcome.¹

Several options are available and each of them has its proper applications and drawbacks. For covering these kind of injuries, we could use microsurgical, regional, or local flap, always keeping in mind the reconstructive principles of hand surgery.^{2,3}

In fact, in fingertip reconstruction, the ideal flap should have skin quality like one being replaced, be harvested from the same finger to avoid problem of cortical reorientation, and leave minimal damage to the donor site.⁴

In this light, local flaps seem to be the better option especially in emergency, and in distal thumb amputation, one of the most used is Hueston flap.

The Hueston flap⁵ is a rectangular flap harvested from volar side of the thumb with pivot point on the ulnar margin of the metacarpophalangeal (MCP) crease.

Described in 1966 by Hueston, this flap is defined by an “L” incision where the dissection begins superficial on the vertical branch and progressively deepens to the contralateral side including the neurovascular bundle in the pivot point. At the end of procedure, the flap is transposed distally and the donor site is covered with skin graft.

This flap presents a simple and quick dissection but could lead to many donor site problems such as infection and primary or secondary contraction.⁶

Methods

Operative Technique

We designed the Hueston flap in the original manner but modified the technique by extending flap harvest proximally in a triangular-shaped fashion—centered along the midaxial incision on the radial side—to resurface the open area left by flap rotation. This triangular distally based flap is designed large in dimension as the advancement needed to cover the defect on the fingertip and long one-third more than the width of MCP crease to compensate its rotation, while in depth dissection is carried directly above the thenar muscle fascia (► Fig. 1).

Once the triangular flap is transposed into the defect, the donor site on radial margin is closed by direct skin approximation.

Clinical Case

A 54-year-old man presented with fingertip thumb amputation occurred in the workplace with loss of pulp and part of the bone phalanx. Because of transverse amputation, the Hueston flap, modified according to our technique, was

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Fig. 1 The flap project: P pivot point; P¹ flap apex; A–B flap width; A–B = B–C = B¹–C¹ flap advancement.

selected for covering the defect and skin graft was used to treat the nail bed.

In local anesthesia and using microsurgical loupes, we proceeded prior to the debridement of bone fragments and after to harvest the modified Hueston flap (►Fig. 2A, B).

At the end of the procedure the flap was perfused, and the immediate postoperative did not present major complications (►Fig. 2C).

Results

At the control 6 months after surgery, the thumb presented satisfactory recovery with good healing of the flap and the donor site (►Fig. 2D). The interphalangeal joint showed full range of motion (ROM) without residual stiffness. Post-operative objective assessment consisted of ROM of the thumb, pinch strength, and two-point discrimination test.

Fig. 2 (A) Measurement to harvest a correct flap to cover the defect. (B) Advancement of the modified Hueston flap. (C) Flap at the end of the surgical procedure. (D) 6 months postoperatively with good healing of the flap and the donor site and satisfactory functional recovery.

Table 1 Follow-up at 3 months after surgery

	Pinch strength (kg)	Kapandji score	2 PD test (mm)	ROM MCP (degree)	ROM IP (degree)	VAS
Operated side	7.4	9	5	56	45	1
Contralateral side	8.0	10	3	62	51	

Abbreviations: 2 PD, two-point discrimination; IP, interphalangeal joint; MCP, metacarpophalangeal joint; ROM, range of motion; VAS, visual analogue scale (0 = very satisfied; 10 = not at all).

All measurements were compared with the contralateral side (► **Table 1**). Furthermore, postoperatively the patient was asked to judge satisfaction and functionality using a visual analogue scale (VAS). He returned to work within 3 weeks, and the dog ear, caused by rotation of the flap extension, decreased spontaneously without impairing the function.

Discussion

The thumb has a wide ROM and is indispensable to the prehensile function of the hand; therefore, the loss of distal phalanx or part of it could compromise its opponent ability in the pinch. Preserving length should be the main objective in selecting method of repair in cases involving amputation injuries distal to the interphalangeal joint.

The Hueston flap is a versatile, easily accomplished, and reliable with great advancement, but it presents some drawbacks. In fact, it leaves donor site healing spontaneously or to be repaired by skin graft, and this kind of approach can result in unsatisfactory recovery.⁷

In later years, several authors have proposed different surgical solutions for primary closure of the donor site.

In 1970, Joshi published a technique in which the donor site was covered by a rotational flap obtained from the dorsal skin of the second metacarpal that left a further defect difficult to close.⁸

Alternately Argamaso⁹ presented a volar thumb flap based on radial side and a transposition flap from the web space to repair the secondary wound.

The variant “radial extended” Hueston flap, proposed in this article, allows to restore the pivot point in the ulnar side according to the standard method.

This concept has some advantages. First, the ulnar side of the thumb, important for the grasping, remains sensitive avoiding more proximal dissection of the neurovascular bundle to provide adequate flap advancement.¹⁰

Moreover, contrary to previous versions, our technique avoids making scar on contact areas subject to frequent use such as web space, web skin, and opposing space of the thumb and index finger. Ultimately the modified flap is simple to harvest and set up, and it provides an early recovery and better functional and cosmetic result.

Note

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Conflict of Interest

None.

References

- 1 Moberg E. Aspect of sensation in reconstructive surgery of the upper extremity. *J Bone Joint Surg Am* 1964;46:817–825
- 2 Foucher G, Smith D, Pempinello C, Braun FM, Citron N. Homodigital neurovascular island flaps for digital pulp loss. *J Hand Surg [Br]* 1989;14(2):204–208
- 3 Snow JW. The use of a volar flap for repair of fingertip amputations: a preliminary report. *Plast Reconstr Surg* 1967;40(2):163–168
- 4 Sammut D. Fingertip injuries. A review of indications and current methods of management. *Curr Orthop* 2002;16(4):271–285
- 5 Hueston J. Local flap repair of fingertip injuries. *Plast Reconstr Surg* 1966;37(4):349–350
- 6 Foucher G, Dallaserra M, Tilquin B, Lenoble E, Sammut D. The Hueston flap in reconstruction of fingertip skin loss: results in a series of 41 patients. *J Hand Surg Am* 1994;19(3):508–515
- 7 Mathes SJ. The hand and upper limb. In: Mathes SJ, ed. *Plastic Surgery*. Vol. 7. Philadelphia, PA: Elsevier; 2007:162
- 8 Joshi BB. One-stage repair for distal amputation of the thumb. *Plast Reconstr Surg* 1970;45(6):613–615
- 9 Argamaso RV. Rotation-transposition method for soft tissue replacement on the distal segment of the thumb. *Plast Reconstr Surg* 1974;54(3):366–368
- 10 Souquet R. The asymmetric arterial advancement flap in distal pulp loss (modified Hueston's flap. *Ann Chir Main* 1985;4(3):233–238