IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 11 Ser.11 (November. 2019), PP 36-38
www.iosrjournals.org

Clinical Evaluation of Reconstruction of Thumb Defect with First Dorsal Metacarpal Artery Flap.

Dr. Sanjay Kumar [1] Dr. Ajoy kumar [2]
[1] *Senior Resident, Department of Plastic surgery , PMCH Patna,India.*
[2] *Associate prof. Department of Plastic surgery , PMCH Patna,India.*
Corresponding Author: Dr. Sanjay Kumar

Abstract: *Thumb defects are not so uncommon . Causes include burn and traumatic injuries. Reconstruction of these defects require sensate flap. First dorsal metacarpal artery flap is very good option for pulp defect of the thumb. Our study was done over a period of 1 year and involved 8 cases of thumb pulp defects treated at our institution. The flap size ranged from 2 × 1.5 cm to 4 × 3 cm. We had only one complication in the form of partial flap necrosis, which fortunately healed following debridement without the need for a secondary procedure. All our cases were done under brachial block or local anesthesia with tourniquet control. All the patients had satisfactory outcome with minimal or no donor site morbidity.*
Keywords*: First dorsal metacarpal artery flap, Thumb pulp defect, Sensate flap*

Date of Submission: 11-11-2019 Date of Acceptance: 27-11-2019

I. Introduction

Thumb defects are commonly due to electric burn and traumatic injury. While superficial defects can be treated with skin grafts, deeper defects with exposure of tendon or bone require flap cover. It is very important to reconstruct these defects using sensate flaps.

Various options used for reconstruction of thumb pulp defects include Littler's neurovascular island flap[1], pulp tissue transfer of toe and other small free flaps[2] and sensate cross-fingered flaps.[3] A very good option for coverage of these defects is the first dorsal metacarpal artery flap.[4–6]

The first dorsal metacarpal artery flap (FDMA) was first described by Foucher and Braun who demonstrated that a sensate skin island flap created from the dorsum of the index finger could be raised based upon the first dorsal metacarpal artery and sensory branch of the radial nerve.[7]

The first dorsal metacarpal artery is a constant vessel arising from the radial artery just distal to the tendon of the extensor pollicis longus and proximal to the point at which the radial artery pierces between the radial and ulnar heads of the first dorsal interosseous muscle. The artery runs over the fascial layer of the first dorsal interosseous muscle and divides into the radial branch to the thumb, the intermediate branch to the first web space, and the ulnar branch to the index finger.[8]

II. Aims And Objectives

The aim of this study was to evaluate the usefulness of the first dorsal metacarpal artery flap for coverage of thumb pulp defects.

III. Material And Methods

Our study was done over a period of 1 years and involved 8 consecutive cases of thumb pulp defects caused by electric burn in 5 patients and avulsion injury in 3 patients. The patients included 7 males and 1 female, ranging in age from 15 to 50 years. All the flaps were studied for sensory return in the form of fine touch.

Surgical Technique

All cases were done under brachial block and or local anesthesia with tourniquet control. The flap size determined by the defect of the thumb following debridement was made over the proximal phalanx of the adjacent index finger. The width of the flap was so designed that it does not extend beyond the radial and ulnar midaxial lines of the proximal phalanx. The flap is raised from the distal to the proximal side and from the ulnar to radial side. The tourniquet was released following flap harvest to ensure viability of the flap. The flap insetting, and grafting of the donor area were done without tourniquet control.

After preoperative planning and markings, the limb was exsanguinated and the tourniquet was raised. The flap must not extend beyond the proximal interphalangeal joint[5] although the extended first dorsal metacarpal artery island flap including the skin over middle phalanx has been described.[6]

The distal margin of flap was first incised then ulnar and radial incision given and flap undermined to identify the first dorsal metacarpal artery. Care must be taken to preserve the paratenon at the donor area of the flap. After identifying the main pedicle and raising the flap, proximal incision given to cut only epidermis and dermis. In the pedicle area, the flap was harvested taking a sufficient cuff of subcutaneous tissue along with the pedicle proximally. ensuring sufficient pedicle length. The flap was then tunneled into the defect, which had been sufficiently debrided. The islanded flap was insetted after ensuring adequate bleeding. The donor area was covered with a split thickness graft harvested from the thigh area under local anesthesia. Graft dressing and protective splinting were applied.

The graft dressing was done on the 5th day. The hand and fingers were mobilized once the graft settled usually at 2 wweek. Post-operatively, the patient was evaluated for sensory return with tests for fine touch.

IV. Results

The clinical data is summarized in Table 1. The flap size ranged from 2 × 1.5 cm to 4 × 3 cm. We had only one complication in the form of partial flap necrosis, which fortunately healed following debridement without the need for a secondary procedure. The tourniquet was used only until the flap was harvested. The average duration of surgery was 45 minutes, whereas the longest duration of surgery was 1 hour. All the patients had satisfactory outcome with good fine touch. One peculiar problem encountered was the feeling of sensation of the flap coming from the dorsum of the index finger, which the patient's learnt to adjust to over time (double sensibility phenomenon).[1] Cortical disorientation did not persist and faded with time.

Table 1

Clinical data

Age/sex	Flap size	Complications	Fine touch	Etiology
50/M	3x1.5	Nil	Present	Electric burn
36/M	2.5x1.5	Nil	Present	Electric burn
28/M	4x3	Partial necrosis	Present	Trauma
41/M	3.5x2	Nil	Present	Trauma
22/M	3x2	Nil	Present	Trauma
15/M	3x1.5	Nil	Present	Electric burn
31/M	2x1.5	Nil	Present	Electric burn
42/F	3x1.5cm	Nil	Present	Electric burn

M = Male; F = Female

Thumb length is usually less than the level of proximal interphalangeal joint of the index finger, and since we have used an islanded flap; its reach to the tip of the thumb was never a problem. In case such a problem arises, the extended first dorsal metacarpal artery flap as described in the literature can always be used.[6]

V. Discussion

Thumb pulp defects were initially reconstructed using non sensate flaps such as the cross-fingered flaps. However, the realization of the importance of a sensate pulp led to the use of sensate flaps.

Littler's neurovascular island flap is one such useful flap. However, the incorporation of the digital vessel is a major disadvantage.[1] Other alternatives are the sensate cross-fingered flap, which is quite tedious as it requires micro vascular co-aptation of the nerves.[3] Small free flaps such as the toe wrap around flap are alternatives.

The pedicle of the first dorsal metacarpal artery flap with an average length of 7 cm includes the ulnar branch of the first dorsal metacarpal artery, the dorsal veins, and the cutaneous branch of the radial nerve.[9,10]

Although the first dorsal metacarpal artery flap and its applied vascular anatomy have been well documented in literature, very few articles have focused on its usefulness for reconstruction of thumb pulp defects.[4,11]

Its advantages include the ease of harvest. It does not require much expertise and can be performed under local anaesthesia also. It is a sensate flap with minimal donor site morbidity.

Its disadvantages are the size limitation of the flap, which can extend distally to the proximal interphalangeal joint and proximally to the metacarpophalangeal joint, and possible donor site graft loss if paratenoon is not preserved.

VI. Conclusion

First dorsal metacarpal artery flap is one the best flaps for sensate reconstruction of thumb pulp defects. It replaces the soft tissue loss at the thumb pulp with minimal donor site morbidity and with good return of thumb pulp sensation.

Thumb pulp defects with tendon and bone exposure are not so common. Even though in our series only 8 cases have been reported, the purpose of this article is to stress the success in restoring a sensate pulp.

Source of Support: Nil
Conflict of Interest: None declared.

References

[1]. Xarchas KC, Tilkeridis KE, Pelekas SI, Kazakos KJ, Kakagia DD, Verettas DA. Littler's flap revisited: An anatomic study, literature review, and clinical experience in the reconstruction of large thumb pulp defects. Med Sci Monit. 2008;14:CR 568–73.
[2]. Guelmi K, Barbato B, Maladry D, Mitz V, Lemerle JP. Reconstruction of digital pulp by pulp tissue transfer of the toe. Apropos of 15 cases. Rev Chir Orthop Reparatrice Appar Mot. 1996;82:446–52.
[3]. Woon CY, Lee JY, Teoh LC. Resurfacing hemipulp losses of the thumb: The cross finger flap revisited: Indications, technical refinements, outcomes and long-term neurosensory recovery. Ann Plast Surg. 2008;61:385–91.
[4]. Chang SC, Chen SL, Chen TM, Chuang CJ, Cheng TY, Wang HJ. Sensate first dorsal metacarpal artery flap for resurfacing extensive pulp defects of the thumb. Ann Plast Surg. 2004;53:449–54.
[5]. Sherif MM. First dorsal metacarpal artery flap in hand reconstruction. Anatomical study. J Hand Surge Am. 1994;19:26–31.
[6]. El-Khatib HA. Clinical experiences with extended first dorsal metacarpal artery island flap for thumb reconstruction. J Hand Surge Am. 1998;23:647–52.
[7]. Foucher G, Braun JB. A new island flap transfer from the dorsum of the index to the thumb. Plast Reconstr Surg. 1979;63:344–9.
[8]. Earley MJ. The arterial supply of the thumb, first web and index finger and its surgical application. J Hand Surg. 1986;11B:163–74.
[9]. Ratcliffe RJ, Regan PJ, Scerri GV. First dorsal metacarpal artery flap cover for extensive pulp defects in the normal length thumb. Br J Plast Surg. 1992;45:544–6.
[10]. Earley MJ, Milner RH. Dorsal metacarpal artery flaps. Br J Plast Surg. 1987;40:333.
[11]. Satish C and Nema S. First dorsal metacarpal artery islanded flap: A useful flap for reconstruction of thumb pulp defects. Indian J of plastic surgery. 2009; 42(1): 32–35.

Dr. Sanjay Kumar. "Clinical Evaluation of Reconstruction of Thumb Defect with First Dorsal Metacarpal Artery Flap." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 11, 2019, pp 36-38.