

The Subcutaneous Pulp Flap for Management of Fingertip Injuries - Revisited

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Received August 16, 2020; Revised September 19, 2020; Accepted September 28, 2020

Abstract Fingertip is the most important part of the finger. It has been described by Moberg as an organ of sensibility or the third eye. Injuries of the fingertips are very frequent as a result of industrial and domestic accidents which can result in permanent disability. We provide our experience about the indications, surgical technique and outcome of subcutaneous pulp flap in management of fingertip.

Keywords: *fingertip injuries, subcutaneous pulp flap, SPF*

Cite This Article: Ahmed Emam, and Mohamed Maklad, "The Subcutaneous Pulp Flap for Management of Fingertip Injuries - Revisited." *Global Journal of Surgery*, vol. 8, no. 2 (2020): 29-31. doi: 10.12691/js-8-2-2.

1. Introduction

The hand is a highly sensitive prehensile organ in which stability and great strength are provided within very small volume [1].

The fingertip is a highly specialized end-organ that is adapted for touch. It is richly supplied with special sensory receptors that enable the hand to "see" by relaying the shape, texture and temperature of manipulate objects [2].

Fingertip injury is a mechanical injury distal to the distal interphalangeal (DIP) joint of the finger and distal to the interphalangeal (IP) joint of the thumb [3].

The goal of surgical management of the fingertip injuries is to provide near normal sensation, non-tender fingertip, maximum length, good nail appearance and support, normal movement and best cosmetic results [4].

Many factors affect choice of surgical options such as the patient's age, sex, occupation, functional demands, the defect topography, the affected finger, injuries to the other digits and the potential need for post-operative rehabilitation.

Nailbed and fingertip injuries usually result in time off work and, if improperly repaired, can be permanently disability [5].

The use of local flaps needs thorough knowledge of the surgeon about fingertip structures and vasculature.

We provide our experience about the indications, surgical technique and outcome of subcutaneous pulp flap in management of fingertip injuries in a Major Trauma Centre.

2. Methods

The Subcutaneous Pulp Flap is performed in 34 patients with fingertip injuries between 2018 - 2020.

The inclusion criteria are patients between 5 - 40 years with volar, transverse or dorsal fingertip defects with bone exposure distal to nail root.

Patients with peripheral vascular disease or diabetes mellitus were excluded from this study.

3. Assessment

All patients are reviewed at 1 week, 6 weeks, 3 months and 6 months postoperatively.

Clinical assessment included time to full healing, wound healing complications, and 2-point discrimination sensibility evaluation using the 2-point aesthesiometer (Smith and Nephew). Pain was assessed by visual analog score on palpation of the fingertip.

Goniometric assessment of range of movement at the Distal Interphalangeal joint.

An overall patient satisfaction was documented as a part of their follow up.

4. Surgical Technique

All patient had routine preoperative x-ray.

The procedures were performed under local anesthesia with finger tourniquet.

The technique is performed as originally described by Han et al [7].

After prepping and draping, the injured finger was thoroughly debrided under loupe magnification. The skin was incised proximally to the distal interphalangeal joint crease and transversally along the crease like an L-shaped line (Figure 1).

A dermo-epidermal flap was raised with a sharp dissection. With preservation of the dominant neurovascular bundle,

the subcutaneous pulp was sharply freed from the periosteum, and, if necessary, might be carried to the level of the distal interphalangeal joint.

The subcutaneous pulp was raised from the underlying skeleton including the single neurovascular bundle as turning a book page (Figure 2).

The tourniquet was released, and flap perfusion is checked. The flap is transposed and advanced to cover the exposed bone and then secured in place by sutures without any tension (Figure 3).

The raised dermoepidermal flap was then redraped into donor site (Figure 4) and secured by sutures.

Moist dressing is applied to the flap only to allow full mobilization of the hand.

All patients have a 5 days course of oral antibiotics, Penicillin based.

First change of dressing was done in the dressing clinic 1 week postoperatively.



Figure 1.

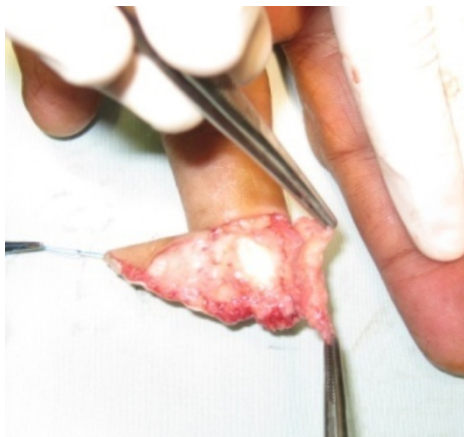


Figure 2.



Figure 3.



Figure 4.



Figure 5.

5. Results

All of patients are males with mean age was 30.4 years. 52.9 % of the patients are active smokers and the highest incidence of injuries occurred among machinist (41 %) followed by carpenters and students 15 % each.

The most common mechanisms of injury are the crushing by heavy object followed by road traffic accidents, saw and heavy door injuries.

The pattern of amputation in 19 patients was transverse, dorsal oblique in 8 patients and volar oblique in 7 patients.

The incidence of injury was higher in the right hand (25 patients) than the left hand (9 patients), the middle finger was the most commonly affected finger 70% injuries followed by the index 20%.

All flaps survived completely, and time required for complete healing ranged from 21 - 29 days.

Pain and sensitivity of the healed flap were noticed in 3 patients at 6 weeks, but this fully recovered at 6 months follow up.

Two patients suffered from superficial wound infection. They responded to another course of oral antibiotics and local wound care without need for further surgical intervention.

Only one patient complained from nail hook deformity which was functionally asymptomatic.

The duration to return to work ranged from 7 - 21 days with the mean of 11.7 days when the patients were able to manage the dressing and are pain free.

Twenty-eight patients (82%) achieved 5 mm recovery of static 2-point discrimination while 2 patients achieved 6 mm and 2 had 7 mm recovery. 86% of the patients

achieved similar 2PD recovery compared to the contralateral similar uninjured digit.

All patients could restore the preoperative range of movement at the Distal Interphalangeal Joint. Only 3 of them required referral to hand therapy to help with mobilization exercises.

Overall 32 patients 94% are satisfied with the final result of the procedure (Figure 5).

6. Discussion

Fingertip is the most important part of the finger. It has been described by Moberg as an organ of sensibility or the third eye [6].

Injuries of the fingertips are very frequent as a result of industrial and domestic accidents, and their treatment will always constitute a significant part of the workload in the emergency department. Good judgment in surgical reconstruction of fingertip amputations is needed to preserve maximum function.

Different techniques are described to cover such injury. Some flaps are technically challenging, yet no procedure is widely acceptable that restores both optimal function and cosmetic outcome rapidly [7].

The ideal final result of fingertip injuries should be a non-tender, durable, sensate pulp preserving the length of the finger and providing normal hand pinch and grip functions [7].

We used the subcutaneous pulp flap [8] to cover fingertip injuries.

We find this flap easy to perform with predictable outcome and no long term functional or cosmetic concerns.

The SPF is sensate, and most patients achieved normal sensory recovery with no pain or tenderness at the fingertip at 6 months postoperatively.

The flap has advantage maintaining the length of the injured digit with no need for further bone shortening.

There was no reduction of range of movement after full healing. Physiotherapy input was not a routine practice.

The overall immediate, short term and longterm satisfaction of patients with this procedure was always maintained with reasonable return to work time frame.

Acknowledgements

No funding or conflict of interests to declare.

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