

Comparison of the Functional and Aesthetic Outcomes of Thenar, V-Y Advancement and Cross Finger Flap in Management of Fingertip Injuries in Children with Exposed Bone

Dr. Pooja Gupta¹, Dr. Gourav Siwas², Dr. Anubhav Gupta³

¹Senior Resident Doctor, Dept. of Plastic Surgery, Sir Gangaram Hospital, Delhi, India
Corresponding author Email: [poojag.18\[at\]rediffmail.com](mailto:poojag.18[at]rediffmail.com)
Mobile: +91-9552766992

²Senior Resident Doctor, Dept. of Plastic Surgery, Sir Gangaram Hospital, Delhi, India
Email: [siwasgourav\[at\]gmail.com](mailto:siwasgourav[at]gmail.com)
Mobile: +91-8950406670

³Senior Consultant, Dept. of Plastic Surgery Sir Gangaram Hospital, Delhi, India
Email: [anubhavgupta1976\[at\]gmail.com](mailto:anubhavgupta1976[at]gmail.com)
Mobile: +91-9953052380

Abstract: *Fingertip injuries in pediatric patients can have significant functional and aesthetic implications if not managed properly. This study aimed to compare the functional and aesthetic outcomes of fingertip injuries with exposed bone in children treated with thenar flap, V-Y advancement flap, or cross finger flap. Fifty inpatients aged 8-18 years with fingertip injuries were included in the study. Clinical evaluations, including wound healing time, sensation recovery, functional recovery, range of motion, and two-point discrimination, were conducted during follow-up visits. Aesthetic outcomes such as color match, texture, shape of the tip, and appearance of the nail were also assessed. Patients were followed up for a minimum of three months and then after six months. In conclusion, the V-Y advancement flap demonstrated shorter recovery time, better range of motion, and lower donor site morbidity. However, it was limited to smaller defects. The thenar and cross finger flaps were more suitable for larger defects. This study provides valuable insights into the selection of flap techniques for managing fingertip injuries in children.*

Keywords: Fingertip injuries, Thenar flap, Cross finger flap, V-Y advancement flap, Hand surgery

1. Introduction

Injuries to fingertip comprise of some of the most common form of hand injuries. With its highly developed sensorimotor mechanisms, fingertip carries out various functions such as hooking, pinching, grasping and also gives information about an object's size, shape and texture. Unique exposed position gives it a significant cosmetic value but also places it at higher risk for injury.

A variety of treatment options are available, making it extremely difficult to decide the best alternative. The management approach depends on many variables like patient's age, sex, handedness, affected finger, location, bony exposure, angle and size of the defect, involvement of nail bed, soft tissue status and other co-morbidities. Treatment goals in fingertip injuries include a painless fingertip with durable and sensate skin with maximal functional length, satisfactory appearance and no donor disfigurement.

Aim

To evaluate and compare the functional and aesthetic outcomes of thenar, V-Y advancement and cross finger flap in management of fingertip injuries in children with exposed bone at a tertiary care hospital. We evaluated the donor site morbidity, the functional outcome in terms of healing time,

two point discrimination and range of motion at different joints and also the aesthetic outcomes by observing colour match, texture, shape of the tip and appearance of nail for all the three flaps.

2. Materials and methods

This prospective study was done in Dept. of Plastic Surgery, Sir Gangaram Hospital, New Delhi including 60 patients between 8-18 years with fingertip injury with exposed bone. The choice of technique (thenar or V-Y advancement or cross finger flap) was dependent on the nature of the injury, operating surgeon's preference and willingness of the subject's parent/guardian. Patients were followed up at the end of 3 months and then 6 months.

The functional evaluation was done by measuring

- Healing time of wound,
- Return of sensations by measuring the mean static two point discrimination (in mm),
- Range of movements at each joint (DIP, PIP, MCP)

Donor site morbidity was recorded.

Aesthetic outcomes i. e. colour match, texture, shape of the tip and appearance of nail were evaluated photographically and by two independent observers preferably parents after 6 months from the date of procedure by comparing with the

contralateral finger and rating it on a scale of 1-10. Mean rating of the above variables was assessed as:

- Fully Satisfied (8-10)
- Satisfied (4-7)
- Not Satisfied (0-3)

Results: 60 patients with fingertip defects with exposed bone of age 8-18 years underwent reconstruction.

Table 1: Distribution of flaps used

Flap used for fingertip reconstruction	No. of cases
Thenar flap	19
VY advancement flap	26
Cross finger flap	15
Total	60

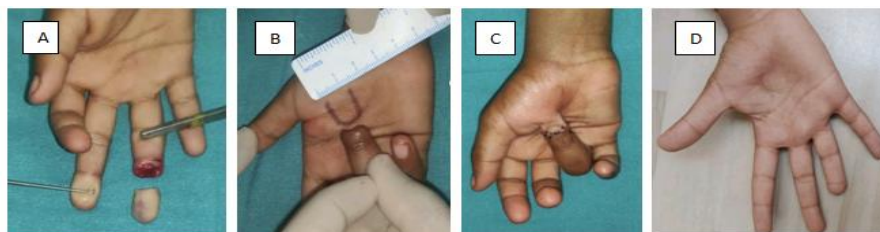


Figure 1: Thenar flap case

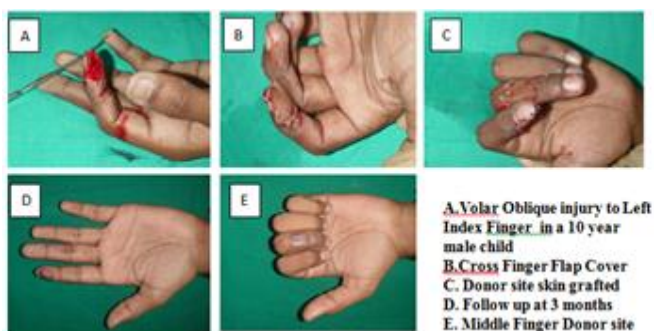


Figure 2: Cross Finger flap



Figure 3: V Y Advancement flap

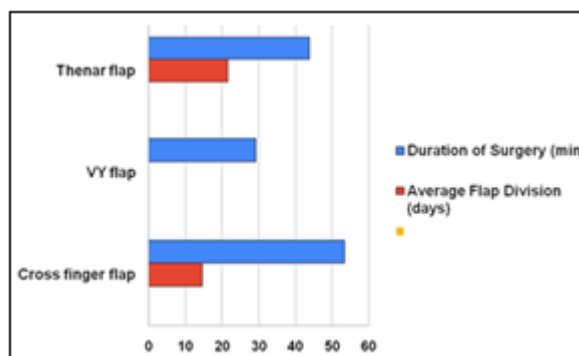


Figure 4: Duration of surgery in each flap

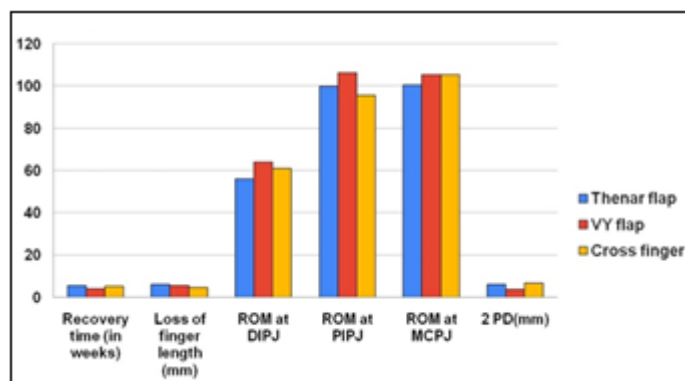


Figure 5: Range of motion achieved post op in each flap

Most common mode of injury in patients who underwent thenar flap cover was crush injury and amputation in VY and Cross finger flap.

Statistical significant difference was found in average duration of surgery, shortest being in VY flap [1]. Recovery time was much shorter in VY flap group [1].

Significant statistical difference was found in terms of ROM at DIP/PIP/MCP joint, being more in VY flap group [1] as compared to Thenar and cross finger flap group. No joint stiffness was found at 6 month follow up in all groups but was observed in 15.8% of thenar group at 3 month follow up which later resolved. Mean 2 PD was 6 mm in thenar flap group, 3.78 mm in VY flap group and 7 mm in cross finger group at the end of 6 month follow up.

Good contour of tip was observed in all groups. Cold intolerance was present in 0% in thenar group, 26.1% of cases of VY flap and 15% in Cross finger flap group the end of 6 month follow up. Donor site morbidity was none in all groups, however hypertrophic scar was observed in 2

patients of Cross finger group at 3 month follow up which later resolved. Hook nail deformity was found in 6 cases of thenar group and 5 cases of VY flap group. Majority of

patients were fully satisfied, highest satisfaction found in VY flap group.

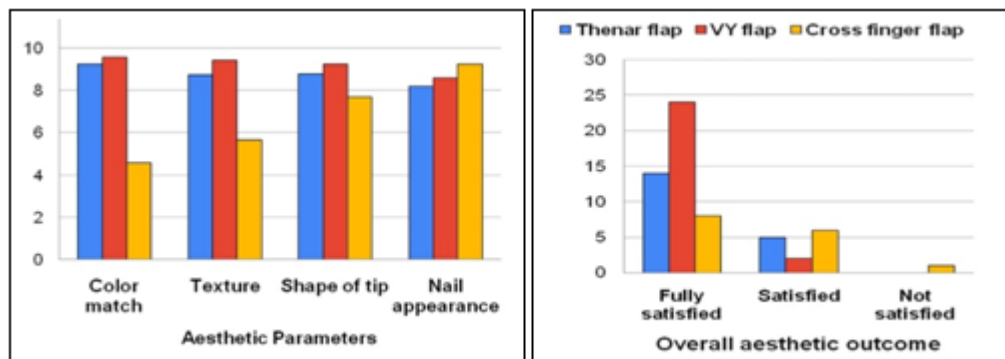


Figure 6: Comparison of aesthetic parameters and overall aesthetic outcomes in each flap

3. Conclusion

Our study confirms that all 3 flaps are reliable and can be used safely in children. VY flap is best suited single stage procedure for a volar oblique or transverse injury with good sensation and glabrous skin. Advantages include single stage, full range of motion, early recovery, better return of sensation and ease of dissection with no donor site morbidity. Disadvantages include limited flap size with limited advancement, cold intolerance in few cases. Thenar flap can cover transverse and volar unfavourable injuries with more extensive pulp losses involving index, middle and ring finger. Advantage being good tissue and color match, easy flap dissection and donor site can be primarily closed. Disadvantages include 2 stages, stiffness of digit, delayed recovery and donor scar contracture and sensitivity. The cross finger flaps are suited for larger defects [2] and can also cover little finger defects with lesser digit stiffness as compared to thenar flap [3]. In conclusion, V-Y flap showed shorter recovery time and better range of motion at all three joints in comparison to the thenar flap and cross finger flap, also showed lower donor site morbidities, but limited for smaller defects, whereas thenar and cross finger flaps were better for larger defects.

References

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