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FDMA Flap for Reconstruction of Thumb Defects and SDMA Flap for Coverage of Donor FDMA Flap Defect

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ABSTRACT: FDMA flap is an excellent flap choice for coverage of thumb composite defects as well as thumb amputation stump defects. Certain key points for successful flap are discussed. Donor FDMA flap site can also be closed using second flap giving good functional recovery. Reported here are some clinical cases and results.

KEYWORDS: Thumb Reconstruction, First dorsal metacarpal artery flap, Second dorsal metacarpal artery.

I. INTRODUCTION

First dorsal metacarpal artery based flap (FDMA) is an excellent choice for coverage of small thumb defects volar as well as dorsal (1). The flap gives good sensation recovery and has less complications if dorsal veins are included in the flap pedicle with proper dissection (2). The donor site over index finger requires coverage which is done by split thickness skin graft (3) or by using the reverse second dorsal metacarpal artery flap (SDMA) from the same incision, wound over the dorsum is closed primarily.

Various flaps described in the literature for reconstruction of small thumb composite defects includes Littler's hetero digital neuro vascular flap, Foucher's first dorsal metacarpal artery flap, Moberg advancement Flap, V-Y Advancement Flap having their own advantages and disadvantages.

We describe some cases with first dorsal metacarpal artery flap for various thumb defects and modifications in technique that we did in cases.

II. FLAP PEDICLE VASCULAR ANATOMY

First and second dorsal metacarpal artery after origin from radial artery and or deep palmar arch at the level of base of second metacarpal bone course through fascia of interosseous muscles and reach the web spaces and supply the dorsum skin upto proximal phalanx level of index and middle finger. Venous drainage in this area is done by dorsal venous network present in this area.

Various flaps are described based on this vascular anatomy for coverage of small defects located around thumb and index finger.

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III. MATERIAL AND METHODS

We describe cases of thumb defects which were reconstructed using First Dorsal metacarpal artery flap and its results. All thumb defect cases were carefully evaluated preoperatively, FDMA flap was planned, using hand held doppler study course of FDMA was confirmed. Under tourniquet and under loop magnification flap is elevated from distal to proximal in all cases. The pedicle of flap is harvested as a single unit adipofascial tissue which includes artery, veins and nerve raised along the course of artery over the interosseous muscle. No effort is made to identify the artery or vein inside the adipofascial tissue. Interosseous muscle is meticulously bared. Once the flap reaches the defect the flap is tunneled through intact skin bridge into the defect and sutured. The FDMA defect is closed by split thickness skin graft but in few cases we closed the defect using second flap based on Second dorsal metacarpal artery from the same incision.

III. RESULTS

Cases data

Sr no	Thumb Defect	FDMA Flap size	Complications	FDMA donor site closure
1	Right amputation stump	2 x 1.5 cm	Nil	Skin graft
2	Left thumb dorsum defect	3x 1.5 cm	Nil	Skin graft
3	Right amputation stump	3x 1.5 cm	Venous congestion	SDMA Flap
4	Left amputation stump	2x 1.5 cm	Nil	SDMA flap
5	Right amputation stump	2x 1.5 cm	Nil	Skin graft

Following are some cases.

Case 1

45 yrs old male presented with amputation of Right thumb at IP joint level coverage with FDMA flap was done with good sensation recovery and able to do his daily work.

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Figures

Case 1



Figure1-Thumb amputation defect



Figure 2 - Adipofascial tissue containing FDMA flap pedicle



Figure 3 – Final appearance

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Case 2

20 years Male with right thumb dorsum defect reconstructed with FDMA flap with good recovery.

Figures

Case 2



Figure 1- Thumb dorsum defect



Figure 2 – FDMA flap coverage



Figure 3 – Final appearance

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Case 3

A 23 year right handed male sustained avulsion injury to left thumb. Local examination showed thumb defect just distal to IP joint level. The defect was covered using the Island sensate first dorsal metacarpalartery flap (FDMA) which was tunneled through first web space. The FDMA defect was covered using the adjacent skin flap which was islanded and propelled in the FDMA defect based on reverse second dorsal metacarpal artery in second web space. Both the flaps healed well giving good aesthetic as well as functional recovery to patient.

Figures
Case 3



Figure 1- Thumb Amputation Defect



Figure 2- FDMA flap tunneled into defect



Figure 3- SDMA flap harvested

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Figure 4- FDMA and SDMA flap Inset completed



Figure 5- venous congestion of FDMA flap



Figure 6- Final appearance

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Case 4

25 year male with right thumb tip injury distal to lunula with intact distal phalanx and intact partial nail bed. After repairing nail bed, FDMA flap was planned for the defect. SDMA flap was used to cover FDMA flap defect with good recovery.

Figures
Case 4



Figure 1- Thumb amputation defect distal to Lunula



Figure 2- Nail bed repair and FDMA harvest



Figure 3- SDMA flap covering FDMA flap defect and FDMA inset done, after 1 week postoperative .

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IV. DISCUSSION

FDMA flap is a very good option for treatment of small defects of thumb volar and dorsum.

Successful FDMA flap can be harvested by carefully harvesting the adipofascial tissue over the interosseous muscle as a single unit and not dissecting individual perforator, vein and nerve supplying FDMA flap.

Insetting of the flap should never be tight.

Venous congestion when present usually is managed by strict limb elevation and no active intervention. As the flap settles in couple of weeks, following suture removal scar massage and use of operated hand is promoted to avoid any stiffness.

Reverse second dorsal metacarpal artery is a good option for coverage of dorsal hand defects, (4,5). In some cases we use it in coverage of FDMA flap defect giving good aesthetic and functional recovery with avoidance of additional skin graft donor site.

V. CONCLUSION

Thus FDMA is workhorse flap for coverage of small thumb composite defects volar as well as dorsal and amputation stump defects. Donor area can be covered by skin graft or second flap based on SDMA from the same incision.

Careful flap pedicle elevation in which adipofascial tissue is harvested as a single unit is a key for successful flap.

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