

## The reconstruction for proximal nail fold mucous cyst using reverse and island flap

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### ABSTRACT

We performed nail fold reconstruction after digital mucous cyst (DMC) excision using an island-type lateral finger flap on seven patients (four males and three females). Our procedure is a simple and useful method to repair minor nail fold lesion defects after DMC excision.

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Digital mucous cyst;  
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### Introduction

Several reconstructive procedures for defects of the dorsal fingertip have been reported [1–11]. We previously reconstructed minor nail fold lesion defects due to digital mucous cyst (DMC) excision using a rotation flap [3,10,11]. This flap is a popular flap which is designed at the dorsal side of the finger. However, rotation flap may cause long and visible scars. In 2016, we reported a new reconstructive procedure for nail fold defects using a lateral finger flap (LFF). LFF is reverse transposition flap which is harvested from the lateral aspect of the finger. The LFF is easy to harvest [12], but minor dog ear deformities can occur. To solve this problem, we invented an island-type LFF (iLFF). In this report, we describe the details of our procedure, as well as the surgical results.


### Patients and methods

From 2010 through 2015, we treated seven patients (four males and three females) with a mean age of 67 years (range: 44–72 years). The clinical data are shown in Table 1. Surgery was performed under digital nerve block using 1% lidocaine solution (AstraZeneca Japan, Osaka, Japan). A 2.5-mm rubber catheter (Izumo Health, Azumino, Japan) was used as a finger tourniquet. The DMC excision and minimum osteophyctomy were done. The size of the skin defect was

measured and the iLFF was designed at the volar side of the finger, just below the mid-lateral line (Figure 1(a)). To harvest the iLFF, flap elevation was started from the proximal side of the finger with the fat. The subcutaneous pedicle was located at distal and volar side of finger and its size was  $5 \times 4$  mm (Figure 1(b)). The flap was fixed to the defect site using 5-0 nylon suture (Ethicon, Baltimore, MD) and the donor site was closed directly (Figure 1(c)). Postoperatively, fingers were wrapped with Coban (3M, Maplewood, MN) for 1 week. Patients were allowed to move their finger from 1 week after surgery. Two week postoperatively, all sutures were removed. The pre- and 1-year postoperative active range of movement (ROM) of the distal interphalangeal (DIP) joint was compared using the *t*-test, and statistical significance was defined as a *p*-value of less than .05.

### Results

The skin defects were located as follows: on the ring finger in three cases, the middle finger in two cases, the little finger in one case and the fourth toe in one case (Table 1). Preoperatively, three patients felt uncomfortable feeling at finger. And two patients felt pain in finger. The average preoperative ROM of the DIP joint ranged from  $45^\circ$  to  $85^\circ$  (mean:  $67.9^\circ$ ). Two patients had DIP joint deformity. The average defect size ranged from  $4 \times 3$  mm to  $7 \times 6$  mm (mean:  $5 \times 5$  mm).

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Table 1. Patient profiles.

Case	Age	Sex	Location of tumour	Tumour size (mm)	Subjective symptom	Deformity of DIP	Flap size (mm)	ROM of DIP (degrees)		Dog ear deformity	Follow-up (years)
								Preoperative	Postoperative		
1	60	M	Left middle finger	6 × 6	Uncomfort	(-)	25 × 7	0-75	0-70	(-)	6
2	67	F	Left ring finger	4 × 4	Uncomfort	(-)	20 × 5	0-65	0-65	(-)	4
3	62	M	Left fourth toe	5 × 6	(-)	(-)	17 × 6	0-80	0-80	(-)	2
4	70	M	Left middle finger	4 × 4	Pain	(+)	23 × 5	5-50	5-60	(-)	3
5	72	F	Right ring finger	4 × 4	Pain	(+)	20 × 6	10-60	10-55	(-)	7
6	67	M	Right ring finger	6 × 7	(-)	(-)	25 × 6	0-75	0-75	(-)	7
7	44	F	Left small finger	4 × 3	Uncomfort	(-)	20 × 5	0-85	0-80	(-)	4

ROM: range of motion; DIP: distal interphalangeal joint.

The average flap size was 21 × 6 mm (range: 20 × 5 to 25 × 7 mm). There was no flap necrosis, infection or haematoma. Dog ear deformity was not observed. The mean follow-up period was 4 years (range: 2–7 years). One year postoperatively, the average ROM of the DIP joint ranged from 45° to 80° (mean: 67.1°). There was no significant difference between the pre- and postoperative active ROM of the DIP joint. No tumour recurrence was observed. The scars were considered aesthetically acceptable. All patients could use their fingers without interference of their daily life.

## Case report

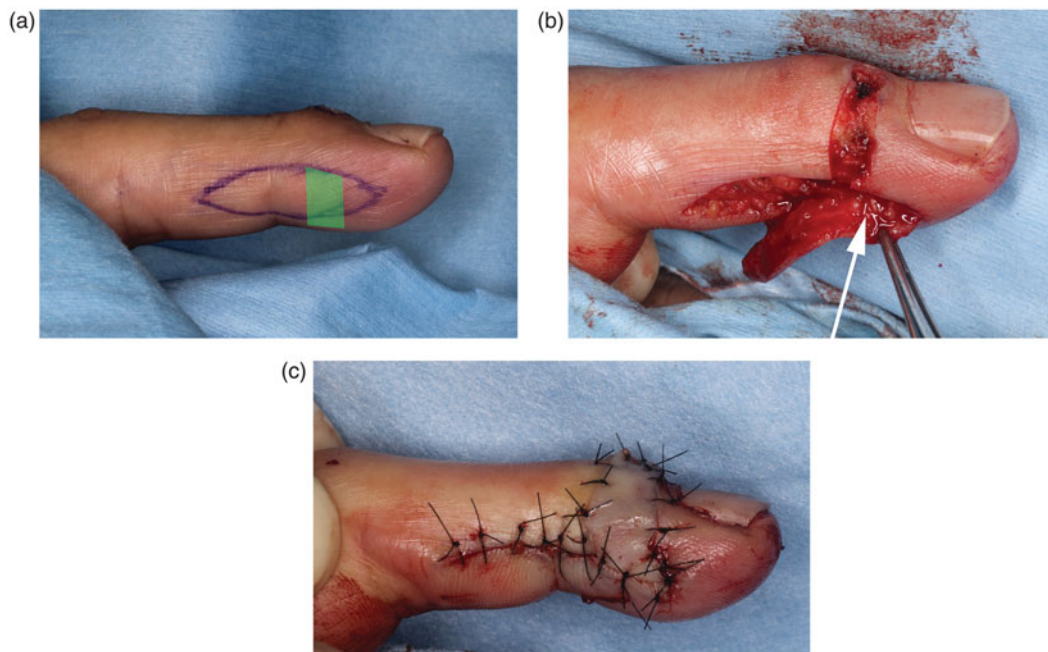
### Case 1: 60-year-old male

The patient presented with a small tumour on the left middle finger and was referred to our department (Figure 2(a)). The tumour was excised under digital nerve block and the flap was elevated from the proximal side of the finger (Figure 2(b)). The flap was then sutured to the defect (Figure 2(c)). Six years postoperatively, he had no tumour recurrence (Figure 2(d)).

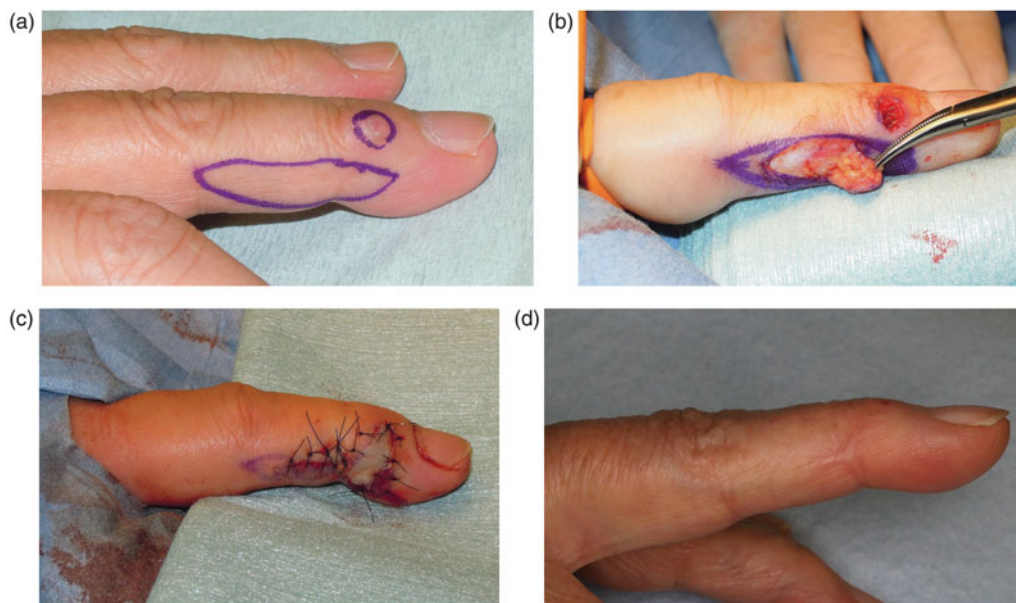
## Discussion

DMC excision can cause minor skin defects. A simple and easy reconstruction method is required for these defects. Common reconstruction methods include reconstruction of the distal dorsal finger using a bipedicle flap transfer [1] or rotation flap, which is designed at the dorsal side of the finger [3,10,11]. These flaps are easy to harvest; however, a large flap is required even if the defect is small. Additionally, a long and visible scar remains. Imran et al. reported a rhomboid flap which is easy to harvest, to reconstruct skin defects after DMC resection [4]. However, the flap size is limited because the donor site is the groove of the DIP joint.

Recently, fingertip or dorsal toe reconstruction using a digital artery perforator (DAP) flap has been reported [7–9,13]. Defects larger than 2cm can be covered with a DAP flap [7]. However, to harvest DAP flap, confirming and dissecting the perforator is required. On the other hand, confirmation of the perforator is not required to harvest an iLFF, because the vascular network of the fingertip is included in the subcutaneous pedicle of iLFF. This rich vascular network is found in the subcutaneous tissue of the pulp [6,7], suggesting that harvesting this flap is simple and easy. To close the donor site of the iLFF directly, the maximum width of flap should be less than 7 mm. The donor-site scar of the iLFF is linear and simple, and



**Figure 1.** (a) Flap design of the island-type lateral finger flap: the flap was designed just below the mid-lateral line. The green area indicates the location of the subcutaneous pedicle. The subcutaneous pedicle was  $5 \times 4$  mm. (b) The flap was elevated from the proximal side of the finger and harvested with fat. The subcutaneous vascular network of the finger pulp was included with the subcutaneous pedicle of the flap (arrow). (c) The flap was fixed using surgical nylon. The flap donor site was closed directly.



**Figure 2.** (a) View of the flap design. (b) The flap was elevated from the proximal side of the finger. (c) Immediately after flap fixation. (d) Six years postoperatively. There was no tumour recurrence. The scar was considered aesthetically acceptable.

the scar on the pulp side is considered aesthetically acceptable. Although the iLFF scars crossed over the DIP joint in all our cases, there was no influence on DIP function.

Many authors have reported operative procedures and results of DMC treatment [5,10,12–15]. Recently, osteophyctomy has been shown to be an important

step in treating DMC [3,14]. However, Kanaya et al. [16] and Kasdan et al. [15] have suggested that aggressive osteophyctomy causes a decreased ROM of the DIP. And both Constant et al. and Johnson et al. also reported successful treatment without osteophyctomy [5,11]. Constant et al. reported the surgical results of skin grafting, after which only 3% of their

patients showed tumour recurrence [5]. Johnson et al. reported tumour recurrence in only 1.4% of their patients [11] who had undergone reconstruction using a rotation flap. We performed cystectomy and minimum osteophyctomy to prevent damage to the DIP joints, and none of the patients in the present study experienced tumour recurrence, even at a long-term follow-up. We believe that further studies are required to examine the necessity of aggressive osteophyctomy. Our results suggest that the iLFF is easy and useful for the reconstruction of skin defects of nail matrix lesions after DMC excision.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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