



## 타지 도서형 피판술 후 조기 피판 분리

이정훈<sup>1,2</sup> · 신진용<sup>1,2</sup> · 노시균<sup>1,2</sup> · 장석주<sup>1,2</sup> · 이내호<sup>1,2</sup>

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## Early Flap Detachment of Heterodigital Island Flaps

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Many surgical techniques for the reconstruction of fingertip injuries and soft tissue defect have been described depending on the type of injuries. Heterodigital island flap is useful for the repair of various fingertip injuries. Although usually surgical detachment procedures have been performed about 14 postoperative days (POD), we introduce early detachment technique as an effective surgical method. Twenty-three cases undergone a heterodigital island flap from 2013 to 2017 were included in this study. Among them in 10 cases undergone flap detachment between 7 to 10 POD. After detachment, flap survived with no severe complications. Patient's mean hospital days from day of surgery to discharge were shortened.

**Key Words:** Heterodigital island flap, Fingertip injury, Early flap detachment

Traumatic soft tissue defects of the fingertips pose challenging problems for hand surgeons. Depending on the type of injuries, numerous surgical techniques have been described for reconstructions<sup>1</sup>. Of these, the heterodigital island flap surgery is useful for repair of diverse fingertip injuries. Although surgical detachment procedures are generally performed at about postoperative day (POD) 14, we introduce an early detachment technique as an effective surgical method. From 2013 to 2017, twenty three cases who undergone a heterodigital island were included in this study. Data regarding the patient's medical history, vector, level of injury, hospitalization day after surgery acquired from the medical records (Table 1). Among

them, 10 cases had undergone early detachments between days 7 to 10 after surgery. There was complete survive of all flaps, with no accompanying severe complications. The mean hospital days from day of surgery to discharge were also significantly decreased (Informed consent was performed).

## CASE REPORT

A male patient, 48 years old, had a history of grinding injury. The defect size was about 1.5×2.0 cm over the right thumb (Fig. 1). Debridement and coverage by heterodigital island flap surgery was done (Fig. 2). As the

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**Table 1.** Patient data conventional group and early detachment group

Variable	Case (n=23)	Conventional detachment (n=13)	Early detachment (n=10)	p-value
Sex				<0.999
Male	17	3	3	
Female	6	10	7	
Age (yr)	50.48±15.99	52.31±18.14	48.1±13.24	0.544
Cause				0.083
Door	1	1	0	
Grinder	2	2	0	
Saw	3	0	3	
Mixer	1	0	1	
Press	9	4	5	
Roller machine	1	1	0	
Snakebite	3	3	0	
Traffic accident	1	0	1	
Wire	2	2	0	
Lesion				0.102
Index finger	8	3	5	
Little finger	2	2	0	
Middle finger	1	1	0	
Ring finger	4	4	0	
Thumb	8	3	5	

Values are presented as number only or mean±standard deviation.



**Fig. 1.** A 48-year-old male with fingertip injury, the defect size was 1.5×2.0 over the right thumb.



**Fig. 2.** Heterodigital island flap was elevated from middle finger and donor site covered by full thickness skin graft.

name implies, a heterodigital island flap is, applied from the side of a finger. It is a large rectangular flap raised from nearly half of the digital skin without including any distal pulp. The technique is performed using the tourniquet control with the skin strip excision including the digital artery was performed<sup>2</sup>. The skin flap is elevated to include the underlying adipofascial tissue. After the proximal digital artery is dissected, the elevated skin flap is sutured to the defect of finger using a 5-0 or 6-0 nylon

suture. The donor site is then covered by a full thickness skin graft. Donor site was right wrist. After POD 3, donor site was intact without any complications (Fig. 3). Patient had undergone flap detachment at POD 7 (Fig. 4). The patient's hospital day was 10 days after heterodigital island flap surgery.

## DISCUSSION

A well-performed fingertip reconstruction requires preservation of the length of the finger and if possible, provision of a sensate and durable tip for patients activities of daily living (ADL) for the patient<sup>3</sup>. However, conventional heterodigital island flap reconstruction requires immobilization of the finger joint for approximately two



Fig. 3. Donor site was intact at postoperative day 3.



Fig. 4. Flap detach at postoperative day 7 and flap circulation was intact.

weeks, thereby resulting in longer hospital stays<sup>4</sup>. To overcome these disadvantages, we applied the early flap detachment technique to the patients who had undergone heterodigital island flap surgery. In all cases, all defects were successfully covered by the flap without donor site complications. In the early detachment group, the mean detachment day was 8.5 days compared to 12.38 days in the conventional group. Joint stiffness was observed in 1 patient, and partial flap necrosis in 1 patient was managed by debridement and daily dressing changes in the conventional group. In the early detachment group, 1 patient complained of trigger finger which was resolved by personal training exercise. In both groups, dehiscence was observed in 3 patients in each case, but all were resolved by simple primary suturing (Table 2). Hospital day for the flap detachment was 15.8 days in the early detachment group as compared to 19.77 days in the conventional method group. Statistically significant differences were observed between early detachment group and conventional method group ( $p=0.02$ ) (Table 3).

Hence, heterodigital island flap is a widely used operation methods in fingertip injuries. In general, flap detachment requires stabilization for about 2-3 weeks before resuming the formation of stable vascular supply<sup>4-6</sup>.

Table 3. Postoperative outcomes of conventional group and early detachment group

	Conventional detachment	Early detachment	p-value
Detachment day*	12.38±0.33	8.5±0.37	<0.001
Hospital day <sup>†</sup>	19.77±0.83	15.8±1.29	0.02

Values are presented as mean±standard deviation.

\*Postoperative days from heterodigital island flap surgery to flap detachment. <sup>†</sup>Postoperative days from heterodigital island flap surgery.

Table 2. Comparison of complications rates in the conventional and early detachment groups

Characteristic	Case (n)	Conventional detachment (n)	Early detachment (n)	p-value
Dehiscence	6	3	3	<0.999
Necrosis*				
Partial necrosis	2	1	1	<0.999
Total necrosis	0	0	0	
Joint problem <sup>†</sup>	2	1	1	<0.999
None	21	12	9	

\*Partial necrosis and total necrosis were included. <sup>†</sup>e.g., stiffness, flexion contracture, trigger finger, Dupuyren's contracture.

However, previous studies, by using salvage procedure, several authors have studied the timing of the venous channel formation of the flap to overcome congestion<sup>7</sup>. Also, early division of skin bridge has been noted in the other literatures<sup>8,9</sup>. In the cases reviewed in the current study, we designed early detachment methods with skin strip excision that was achieved by the same method used for the formation of stable vascular supply. We expected that early detachment would be effective in decreasing the several complications as compared to conventional detachment especially with regards to minimize the hospital stay. And to prevent any risk of early detachment, we use vascular clamp in proximal and distal skin bridge. After that, confirming the skin color of flap was intact, detachment was performed. And surrounding infection sign was found, the flap was not detached. Taking into consideration all the above aspects, we tried to early detachment at the heterodigital island flap.

In the early detachment group, the hospital day was statistically and significantly decreased compared with the conventional group. Additionally, all patients resumed their ADL earlier.

In addition our study, no severe venous congestion which may influence flap viability was observed in both groups. These results indicate that the formation of neovascularization was occurs before the flap detachment. This study has clearly indicates that early flap detachment of heterodigital island flap is associated with favorable outcomes in terms of length of hospitalization. Additionally, early detachment results in a shortend period for joint immobilization period. There by directly improving the quality of life of the patient and their return to daily living. Also, we noticed venous channel formation is completed at flap detachment. We expect this technique has the potential to be further researched and developed

in the surgical field of fingertip reconstruction.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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## 타지 도서형 피판술 후 조기 피판 분리

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외상성 척부손상의 재건은 손상의 정도 및 기전에 따라 여러 가지 방법이 고려되고 있다. 그 중 타지 도서형 피판술은 다양한 척부손상의 재건에서 이용될 수 있다. 이러한 타지 도서형 피판술은 많은 장점에도 보통의 경우 술 후 2주째에 피판 분리를 시행하는 것으로 알려져 있다. 본 논문에서는 수술 후 7일에서 10일째에 조기 피판 분리를 통한 임상 결과를 분석하였다. 2013년부터 2017년까지 23건의 타지 도서형 피판술을 받은 환자를 대상으로 그 중 10명에 대하여 조기피판분리를 시행하였다. 수술 후 피판은 특별한 합병증 없이 회복되었으며, 재원기간 감소를 하여 일상생활로 조기복귀가 가능하였다.

**색인단어:** 타지 도서형 피판술, 척부손상, 조기 피판 분리

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