

SCOPE: New analysis to be recommended.

Here, statistical analysis was performed using Prism 9.0 (GraphPad, LaJolla CA). A revised Figure 5 is provided (at the end). Additionally, revised statistics, methodology and results section are included.

MATERIALS AND METHODS

Outcome evaluation

The cases were divided into three groups. Group A was a conventional WAF group in which the plantar part of the WAF had been elevated above the periosteum or paratenon and secondary pulp plasty had not been performed. Group B comprised cases in which the WAF had been harvested by the conventional method and secondary pulp plasty had been performed. Group C comprised cases in which thinning of the plantar skin flap had been performed at the time of the WAF harvest.

Reviewed items included sex, age, reconstructed side and digit, the year of surgery (early: 2014 and 2015, middle: 2016 and 2017, late: 2018 and 2019), follow-up period, presence or absence of flap survival, complications, timing of the secondary pulp plasty in Group B, and the Semmes–Weinstein Monofilament Test (SWMT) on the pulp of the reconstructed digits. The SWMT set containing 20 monofilaments was used: marking number 1.65–2.83 (normal light touch), 3.22–3.61 (diminished light touch), 3.84–4.31 (diminished protective sensation), 4.56–6.65 (loss of protective sensation). In groups A and C, the author reviewed SWMT

results at 6 months after surgery and at the last follow-up. In Group B, the author reviewed SWMT results immediately before secondary pulp plasty and at the last follow-up.

~~The author investigated~~Due to the difference of group composition, whether there was a difference~~heterogeneity~~ in the fingers being compared, the mean SWMT ~~results at the last~~max follow-up ~~of between reconstructed thumbs and non-thumb and those of finger, and whether there was a difference in the SWMT results at the last~~digits were compared. Additional comparisons included scores between acquisition date ranges, max follow-up ~~depending on the year of surgery. The author compared the SWMT results at the last~~scores between surgical techniques, and differences between 6-month and max follow-up in each group. In groups A and C, the author compared SWMTs at 6 months after surgeryeach technique. Finally, scores pre and at the last follow up. In Group B, the author compared SWMTs immediately before post-secondary pulp plasty and at the last follow up.were considered.

Statistical analysis

~~For statistical evaluations, comparison in each group of sex, reconstructed side, reconstructed digit, and the year of surgery were performed by Fisher's exact test. Comparisons in each group of age and follow up period were performed by Welch's test.~~

~~SWMT results comprise an ordinal variable. Therefore, comparison of thumb and finger about the SWMT results at the last follow up~~Statistical analysis was performed ~~by using~~

Prism 9.0 (GraphPad, LaJolla CA). Our sample size was one of convenience, and included all patients operated upon during the study period that met our inclusion criteria. Given our limited sample we presumed that our data was non-parametric. We therefore compared SWMT scores using the Mann-Whitney U test. Comparison depending on the year of surgery of the SWMT results at the last follow-up and comparison in each group of the SWMT results at the last follow-up were performed by for two-group comparisons and the Kruskal–Wallis test and the Steel–Dwass method was used for with Dunn’s multiple comparison. Comparison of change in SWMT results over time in each group was performed by the Wilcoxon signed-rank test. post-test for >2 group comparisons. Categorical comparisons were performed using Fisher’s Exact Test or a Chi-Squared test for > 2 groups. A p value of < 0.05 was considered to be a significant difference. The author did all the statistical analysis with EZR, a statistical software, which in all cases. All data is modified version of R commander.⁷ written as mean (median) ± standard deviation.

RESULTS

35Thirty-five cases met ~~theour~~ inclusion ~~criterion~~criteria. The sex, age, reconstructed digit, ~~the~~ year of surgery, and mean follow-up ~~period~~ of each group are shown in Table 1. All flaps survived and did not demonstrate signs of partial or frank necrosis. One patient in Group A developed a flap infection 4 weeks after the operation and was cured by removing the bone

fixation steel wire and administering antibiotics. There were no other postoperative complications in each group. The pulp plasties in Group B took place at mean 6.9 months (± 2.8 months) after the WAF surgery. Group C had a significantly shorter follow-up ($17.0 (16.0) \pm 4.2$ months) than Group A ($33.7 (36.0) \pm 15.6$ months, $p = 0.03$) and Group B ($28.7 (26.5) \pm 28.7$ months, $p = 0.03$). Groups A and B had equivalent follow-up periods ($p > 0.99$).

There was no significant difference between the SWMT measurements of thumbs and fingers of the SWMT results non-thumb digits at the lastmax follow-up ($p = 0.3233$). There was all no significant difference in the SWMT resultsmeasurements at the lastmax follow-up depending on the between year of surgery (Early $3.7 (3.8) \pm 0.4$, Middle $3.4 (3.6) \pm 0.7$, Late $3.5 (3.6) \pm 0.5$, $p = 0.54$). All cases acquiredhad diminished protective sensation or better at the latest follow-up, withdefined as SWMT resultsmarkers of 4.31 or less. The SWMT results at the last follow up are shown in Figure 4, with median values 4.08, 3.61, and 3.42 in groups A, B, and C, respectively. Kruskal Wallis test showed a significant difference (in SWMT measurement at max follow-up was observed between group A ($3.9 (4.1) \pm 0.3$) and group C ($3.3 (3.4) \pm 0.4$, $p = 0.017$). In multiple comparisons, Group C showed significantly better sensory results than Group A ($p = 0.007$).01, Figure 4) No significant differences were shownmeasured between groups A and B ($3.5 (3.6) \pm 0.6$, $p = 0.20$), or between groups B and C ($p = 0.33$).

In all cases, the changes in40). SWMT results over timemarkers measurements were the same

or better, equivalent regardless of when the surgery was done (Early period $3.7 (3.8) \pm 0.4$, Middle period $3.4 (3.6) \pm 0.7$, Late period $3.5 (3.6) \pm 0.5$, $p = 0.5$).

SWMT results improved from 6 month to max follow-up except for one easepatient in Group B (changed from 3.84 to 4.08). Changes in SWMT results over time in each group are shown in Figure 5. The median SWMT results 6 months after surgery in groups A and C were $4.312 (4.3) \pm 0.5$ and 3.96 , respectively. $4.0 (4.0) \pm 0.5$. The median SWMT results immediately before the secondary pulp plasty in Group B were $3.96-9 (4.1) \pm 0.3$. The sensation in Groups B $(3.5 (3.6) \pm 0.6)$ and C both gained $(3.3 (3.4) \pm 0.4)$ significantly better sensation improved over time ($p = 0.003049$ and 0.005001 , respectively), but it was not significant in Group A $(3.9 (4.1) \pm 0.3, p = 0.402)$.

TABLE

Table 1: Patient background Demographics and Surgical Breakdown

	Group A ($n = 7$)	Group B ($n = 18$)	Group C ($n = 10$)	p
	$n = 7$	$n = 18$	$n = 10$	
Sex (male)	7	16	9	1
Age (years)				0.06
mean	42.3	38.7	49.7	

<i>SD</i>	11.0	15.7	7.5	
<i>range</i>	25–57	19–73	35–64	
<i>Side</i>				0.74
<i>left</i>	3	8	6	
<i>right</i>	4	10	4	
<i>Digit</i>				0.01
<i>thumb</i>	5	0	3	
<i>index</i>	1	7	4	
<i>middle</i>	0	4	2	
<i>ring</i>	1	5	0	
<i>little</i>	0	2	1	
<i>Year of surgery</i>				< 0.001
<i>early (2014, 2015)</i>	6	5	0	
<i>middle (2016, 2017)</i>	1	9	0	
<i>late (2018, 2019)</i>	0	4	10	
<i>Follow-up (months)</i>				0.003
<i>mean</i>	33.7	28.7	17	
<i>SD</i>	15.6	12.1	4.2	

range

12–56

12–59

12–24

FIGURE LEGENDS

FIGURE 1: (A) Flap harvesting area in conventional WAF. (B) 36-year-old man who underwent left index finger reconstruction using conventional WAF, 6 months postoperatively. The pulp was bulging.

FIGURE 2: (A) Excision area in secondary pulp plasty. (B) The same case as in Figure 1B. Immediately after secondary pulp plasty. (C) 24 months postoperatively. The bulging pulp has been corrected.

FIGURE 3: (A) Flap harvesting area in thin WAF. (B) 50-year-old man who underwent right index finger reconstruction using thin WAF, immediately after surgery. (C) 24 months postoperatively. The pulp looks natural with no bulging.

FIGURE 4: Boxplot of Semmes–Weinstein Monofilament Test (SWMT) at the last follow-up with whiskers from minimum to maximum.

*: significant difference between groups A and C ($p = 0.007$).

FIGURE 5: Boxplots ~~of change~~comparing changes in Semmes–Weinstein Monofilament Test (SWMT) ~~over time with whiskers~~results from ~~minimum~~6 month to ~~maximum~~.

~~†: Immediately before max follow-up. Group B's measurement compared pre- vs.~~
post-secondary pulp plasty, which was done 6 months after the initial procedure.

108 *: significant difference in group B ($p = 0.003049$).

109 **: significant difference in group C ($p = 0.005001$).

