

**ORIGINAL RESEARCH**

# Comparison of free flap with pedicled flaps for coverage of defects of the leg or foot

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**ABSTRACT**

**Background:** Due to a lack of soft tissue, the foot and ankle are vulnerable to infections and injuries. The present study was conducted to compare free flap with pedicled flaps for coverage of defects of the leg or foot.

**Materials & Methods:** 60 patients of defects of the leg or foot of both genders were divided into 2 groups of 30 each. Group I patients were managed with free flap and group II were managed with pedicled flaps. Parameters such as etiology, wound bed inflammation, partial necrosis, complete necrosis, postoperative wound infection and comorbidities was recorded.

**Results:** In group I and group II, etiology was skin ulcers and inflammation in 7 and 6, trauma in 5 and 8, scar contracture in 6 and 3 and diabetic foot in 12 and 13. Comorbidities were hypertension in 3 and 1, osteomyelitis in 2 and 4 and diabetes mellitus in 17 and 16. Wound bed inflammation was seen in 1 and 2, partial necrosis in 3 and 2, complete necrosis in 1 and 3 and postoperative wound infection in 1 and 2 respectively. In group I, flaps used were free ALT perforator flap in 14, free AMT perforator flap in 10 and free medial plantar flap in 2 cases. In group II, antemalleolar flap in 8, dorsalis pedis flap in 5, first dorsal metatarsal artery flap in 6, medial pedis flap in 4 and sural neurocutaneous flap in 7 cases. The difference was significant ( $P < 0.05$ ). Flap type and postoperative wound infection were responsible for flap survival and failure ( $P < 0.05$ ).

**Conclusion:** For lower limb reconstruction, both free and pedicled flaps seem to be good surgical techniques with comparable surgical results. Flap type and postoperative wound infection were both independent risk factors influencing the flap survival rate in the foot and ankle.

**Key words:** Flap type, pedicled flaps, wound infection

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**Introduction**

Due to a lack of soft tissue, the foot and ankle are vulnerable to infections and injuries. Exposed tendons, neurovascular bundles, and complex soft tissue abnormalities of the foot and ankle that are brought on by trauma, infection, tumors, cancer, or diabetes are frequent. There are numerous alternatives for reconstructing intricate soft tissue abnormalities in using both pedicled flaps and free flaps in various regions (such as a lateral supramalleolar flap). Peroneal artery perforator flap, perforator of the posterior tibial artery a sural flap. A medial pedis flap, a dorsal metatarsal flap and a neurocutaneous/neurofascio cutaneous flapa pedicled or free medial plantar flap, a free groin flap, a dorsalis pedis flap, a free groin flapa free anterolateral flap. Although flap transfers have become the primary method of reconstruction of complex soft tissue defects of the foot and ankle and although microsurgical techniques have advanced, skin flap failure often occurs during the perioperative period. Once skin flap failure has occurred, it can have

devastating consequences. When selecting a skin flap, several factors must be considered, such as the pliability of the skin flap, the stability of standing and walking, donor site morbidity, the vascular condition at the recipient site, the size of the soft tissue defect, and the flap survival rate. The present study was conducted to compare free flap with pedicled flaps for coverage of defects of the leg or foot.

**Materials & Methods**

The present study consisted of 60 patients of defects of the leg or foot of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 30 each. Group I patients were managed with free flap and group II were managed with pedicled flaps. Parameters such as etiology, wound bed inflammation, partial necrosis, complete necrosis, postoperative wound infection and comorbidities such as hypertension, diabetes mellitus and osteomyelitis was recorded. Data

thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## Results

**Table I: Distribution of patients**

Groups	Group I	Group II
Method	free flap	pedicled flap
M:F	20:10	16:14

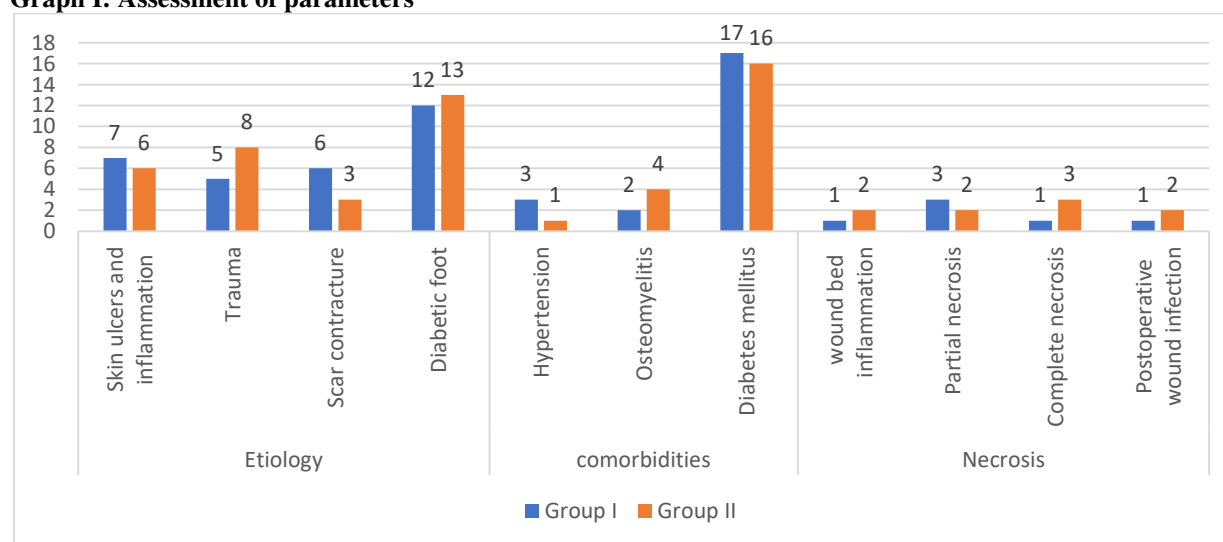
Table I shows that group I had 20 males and 10 females and group II had 16 males and 14 females.

**Table II: Assessment of parameters**

Parameters	Variables	Group I	Group II	P value
Etiology	Skin ulcers and inflammation	7	6	0.83
	Trauma	5	8	
	Scar contracture	6	3	
	Diabetic foot	12	13	
comorbidities	Hypertension	3	1	0.04
	Osteomyelitis	2	4	
	Diabetes mellitus	17	16	
Necrosis	wound bed inflammation	1	2	0.05
	Partial necrosis	3	2	
	Complete necrosis	1	3	
	Postoperative wound infection	1	2	

Table II, graph I shows that in group I and group II, etiology was skin ulcers and inflammation in 7 and 6, trauma in 5 and 8, scar contracture in 6 and 3 and diabetic foot in 12 and 13. Comorbidities were hypertension in 3 and 1, osteomyelitis in 2 and 4 and diabetes mellitus in 17 and 16. Wound bed inflammation was seen in 1 and 2, partial necrosis in 3 and 2, complete necrosis in 1 and 3 and postoperative wound infection in 1 and 2 respectively. The difference was significant (P< 0.05).

**Graph I: Assessment of parameters**



**Table III: Type of flap used**

Groups	Flap type	Number	P value
Group I	Free ALT perforator flap	14	0.05
	Free AMT perforator flap	10	
	Free medial plantar flap	2	
Group II	Antemalleolar flap	8	0.72
	Dorsalis pedis flap	5	
	First dorsal metatarsalartery flap	6	
	Medial pedis flap	4	
	Sural neurocutaneous flap	7	

Table III shows that in group I, flaps used were free ALT perforator flap in 14, free AMT perforator flap in 10 and free medial plantar flap in 2 cases. In group II, antemalleolar flap in 8, dorsalis pedis flap in 5, first dorsal metatarsal artery flap in 6, medial pedis flap in 4 and sural neurocutaneous flap in 7 cases. The difference was significant ( $P < 0.05$ ).

**Table IV: Multivariate Cox model results for predictive factors influencing flap survival rate**

Parameters	Coefficient	P value
Flap type	0.94	0.01
Anatomical region	-0.018	0.81
Postoperative wound infection	-1.4	0.01
Osteomyelitis	0.205	0.75

Table IV shows that flap type and postoperative wound infection were responsible for flap survival and failure ( $P < 0.05$ ).

### Discussion

Lower limb reconstruction is a complex task requiring a multidisciplinary approach. It requires plastic surgery and orthopaedic skills to cope with soft tissue defects, bone loss, and fractures from diverse aetiologies ranging from trauma to chronic wounds. The orthoplastic concept has been implemented in reference centres to improve the success of the procedures, as failure can have dramatic functional and aesthetic outcomes such as limb amputation. The present study was conducted to compare free flap with pedicled flaps for coverage of defects of the leg or foot.

We found that group I had 20 males and 10 females and group II had 16 males and 14 females. Scampa et al.<sup>10</sup> selected 10 studies. While the flap necrosis rate did not differ significantly between techniques, the partial flap necrosis rate was significantly lower in free flaps. The overall complication rate and revision surgery rate did not differ significantly. No significant difference was found in the high aesthetic satisfaction rate and post-operative infection rate.

We found that in group I and group II, etiology was skin ulcers and inflammation in 7 and 6, trauma in 5 and 8, scar contracture in 6 and 3 and diabetic foot in 12 and 13. Comorbidities were hypertension in 3 and 1, osteomyelitis in 2 and 4 and diabetes mellitus in 17 and 16. Wound bed inflammation was seen in 1 and 2, partial necrosis in 3 and 2, complete necrosis in 1 and 3 and postoperative wound infection in 1 and 2 respectively. Li et al.<sup>11</sup> determined the correlation between non-technical risk factors and the perioperative flap survival rate and to evaluate the choice of skin flap for the reconstruction of foot and ankle. The overall flap survival rate was 85.42%. The necrosis rates of free flaps and pedicled flaps were 5.26% and 20.69%, respectively. According to the Cox regression model, flap type and postoperative wound infection were found to be statistically significant risk factors associated with flap necrosis. Based on the logistic regression model, preoperative wound bed inflammation was a statistically significant risk factor for postoperative wound infection.

We found that in group I, flaps used were free ALT perforator flap in 14, free AMT perforator flap in 10 and free medial plantar flap in 2 cases. In group II, antemalleolar flap in 8, dorsalis pedis flap in 5, first dorsal metatarsal artery flap in 6, medial pedis flap in 4 and sural neurocutaneous flap in 7 cases. We found that flap type and postoperative wound infection were responsible for flap survival and failure ( $P < 0.05$ ). Bhullar et al.<sup>12</sup> reported high infection rates (47% FF/43% PF) [21]. Those rates can be explained by the study population, which comprises only complex open fractures rated Gustillo 3. Bekkara et al.'s<sup>13</sup> meta-analysis included only fascio-cutaneous pedicled flaps in the comparative arm (pedicled flaps) and found similar results with higher partial flap necrosis in the pedicled flap arm and no significant difference in the complete flap failure or overall complication rates.

The limitation of the study is small sample size.

### Conclusion

Authors found that for lower limb reconstruction, both free and pedicled flaps seem to be good surgical techniques with comparable surgical results. Flap type and postoperative wound infection were both independent risk factors influencing the flap survival rate in the foot and ankle.

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