

Original research article

Comparative Study of Perforator Flaps and Free Flaps in Reconstruction of Leg and Foot Defects

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Abstract

Background: The present day thinking in management of lower extremity damage is surgeries shifted from the concept of amputation of unwanted lower extremity to making it a functional lower extremity. We had conducted a comparative study on perforator flaps and free flaps and their use in lower extremity reconstruction and to compare the perforator flap and free flap in reconstruction of lower leg and foot defects in various advantages and disadvantages of these procedures.

Materials and methods: The present study was a prospective and comparative study that was done between the use of perforator flaps and free flaps in the reconstruction of leg and foot defects on patients who were admitted with leg and foot defects in PMCH, Patna. Study duration of Two Years. Those who were willing were evaluated thoroughly by a team of plastic surgeons who met a consensus on the procedure chosen and the timing of the flap surgery.

Results: 50 -60 years constituted 33.33 %. The males comprised 73% (22 cases) Heel lesions seen in 30 % Between the two groups difference duration of surgery, expenditure for the procedure was statistically significant with a p value <0.0001, was lesser for the free flap Secondary Procedures were done in 23.33% ,STSG was done in 3 cases 10% Between the two groups the complications for the procedure was no statistically significant with a p value 1. We had Flap Necrosis in 4 case major loss in tow, tip loss in 1 and partial loss in 12 case.

Conclusion: In the present study we concluded that flap reconstruction is a useful technique that restores the function and to an extent the cosmesis in lower limb tissue loss.

Keywords: perforator flaps; free flaps; lower extremity; amputation; reconstruction.

Introduction

The management of the lower extremity damage is one of the branches of reconstructive surgery that has evolved to a very great extent over time ⁽¹⁾. Centuries ago in the era of the first world war; the only option available for managing a badly injured lower limb was amputation the lower extremity. This concept has become outdated over time and the concept of management changed from amputation to salvaging the limb ⁽²⁾. The present day thinking in management of lower extremity damage is surgeries shifted from the concept of amputation of

unwanted lower extremity to making it a functional lower extremity⁽³⁾. This has been possible as a result of various advances in the field of medical science and the medical technology. One of the most important parts of the reconstructive ladder that is used in the lower extremity reconstruction is the flap reconstruction techniques, though this concept is not a recent one in reconstruction. Now, flap reconstruction is being used widely with the aim of providing adequate wound cover along with good function^(4,5). There are several flaps that can be used in the field of reconstructive surgery especially of the lower extremity; but the commonly employed flaps for this purpose are the free flap and perforator flaps^(6,7,8,9). Each type of flap has its own advantages and disadvantages. Pedicled perforator flaps encompass a number of apparent advantages over the free flaps. As these flaps can be performed very easily and rapidly, without the need for any special instruments, but these have a drawback-sometimes on transferring the vascularity can be compromised. In comparison to this the local flap surgery has an advantage that it restricts the scar and morbidity to a single extremity; but it also can have deleterious cosmetic defects at the donor area, but never the vascularity is compromised of vascularity at the recipient site. The hospital where this study was conducted is a highly specialized tertiary care centre that deals with a lot of lower extremity wounds which are have a bad tissue loss and need restorative surgery. Diabetic foot make up the chronic wounds that need restoration and traumatic injury makes a chunk of the acute tissue loss wounds that need restoration. Considering the various advantages and disadvantages of both perforator flaps and free flaps we had conducted a comparative study on perforator flaps and free flaps and their use in lower extremity reconstruction.

Objectives

To compare the perforator flap and free flap in reconstruction of lower leg and foot defects in various aspects such as

*Duration of surgery

*Total expenditure for the procedure

*Number of days of post operative hospital stay

Complications

To assess the relation of size of defect and anatomical site with the outcome of flap reconstruction in leg and foot defects.

Material and methods

The present study was a prospective and comparative study that was done between the use of perforator flaps and free flaps in the reconstruction of leg and foot defects on patients who were admitted with leg and foot defects in Patna medical college and Hospital Patna, Bihar. The study was started after due clearance from the ethical committee and written informed consent from the patients. Duration of the study Two years. The source of data was the patients who had leg and foot defects and visited the Department of General Surgery, Department of Plastic Surgery and Department of Hand and Micro Surgery at the PMCH, Patna. who were willing for perforator flaps or free flap reconstructive surgery. Sample size was of 30 patient.

Inclusion criteria

Patients admitted for reconstruction of leg and foot defects using either free flap or perforator flap.

Exclusion criteria

Patients who are having peripheral occlusive vascular disease

Patients for whom the leg defects are treated by primary healing or skin grafting.

methodology

All cases who were requiring lower limb reconstruction were counselled of the study. Those cases who were willing were asked to give an written consent that was signed by the patient and or the legal heir who accompanied the patient. Those who were willing were evaluated thoroughly by a team of plastic surgeons. The team of plastic surgeons then would meet a consensus on the procedure chosen and the timing of the flap surgery.

Results

Table 1: Age

	FREE FLAP	PERFORATOR FLAP
Mean	42.733	50.933
Std. Deviation	14.2401	16.1885
Minimum	20.0	20.0
Maximum	62.0	76.0

The mean age in our study was 42.73 years in the free flap group; and 50.93 years in the perforator flap group. Between the two groups the difference was not statistically significant with a p value less than 0.05 hence the two groups are comparable. In the age group 50 -60 years we had the most number of cases with 10 cases constituting 33.33 % of the study.

Table 2: Gender

Gender	Free Flap	Perforator Flap	Total	Percentage
Female	3	5	8	27
Male	12	10	22	73
Total	15	15	30	100

In our study the males predominated the study with 73% of cases (22 cases). Between the two groups the difference was not statistically significant with a p value less than 0.05 hence the two groups are comparable.

Table 3: Side of lower limb defect

Side of Lower Limb Defect	Free Flap	Perforator Flap	Total	Percentage
LEFT	8	13	21	70
RIGHT	7	2	9	30
Total	15	15	30	100

In our study we had 21 left sided and 9 right sided lesions were studied and was analysed.

Table 4: VESSEL OF THE FLAP

TYPE/ GROUP		FREQUENCY	PERCENT
Free flap	RADIAL	15	100.0
Perforator Flap	Anterolateral Thigh	5	33.3
	Distally Based Perforator Sural Flaps	7	46.7
	RADIAL	1	6.7
	Supramalleolar Flap	2	13.3
	Total	15	100.0

In our study we had 15 free flaps that were based on the radial and 15 perforator flaps' among them we had Anterolateral Thigh based flap in 5, Distally Based Perforator Sural Flaps 8 cases

and Supramalleolar based Flap 2 cases.

Table 5: COMPLICATIONS

ANY COMPLICATIONS	FREEFLAP	PERFORATOR FLAP	TOTAL
Bulky Flap	0	1.00	1.00
Flap Necrosis	2	0	2
Flap Edge Necrosis	0	1	1
partial flap loss	1	0	1
Nil	11	11	22
Wound Infection	1	2	3
Total	15	15	30

Between the two groups the complications for the procedure was no statistically significant with a p value 1 .we had Flap Necrosis in 4 case major loss in tow, tip loss in1 and partial loss in 12 case.

Discussion

The need to be independent is every ones dream. Being able to walk is the most important aspect to it. When the limb is damaged the person becomes crippled for life, dependent on the family and friends for support. The lower extremity wounds constitute amajor chunk of the wounds that don't heal especially the heel ulcers that are in higher incidence in those with metabolic diseases like diabetes , the traumatic wounds are also on rise as a result if the increase in the vehicular accidents as a result of the fast the better concept when on roads The present study was a prospective and comparative study that as done between the use of perforator flaps and free flaps in the reconstruction of leg and foot defects on patients who were admitted with leg and foot defects in Patna medical college and Hospital Patna. The study was started after due clearance from the ethical committee and written informed consent from the patients. Here we compare our findings with other studies. The mean age in our study as 42.73 years in the free flap group; and in the 50.93 perforator flap group. Between the two groups the difference was not statistically significant with a p value less than 0.05 hence the two groups are comparable. In the age group 50 -50 years we had the most number of cases with 10 cases constituting 33.33 % of the study. Syed Kamran Ahmed et al ⁽¹¹⁾ studythe mean age of the study group was 59.8 years. Min Jo Kang et al in their study had mean age of 32.7 years with the age range from 3-72years). ⁽¹⁰⁾ In our study the males predominated the study with 73% of cases (22 cases) Between the two groups the difference was not statistically significant with a p value less than 0.05 hence the two groups are comparable. Syed Kamran Ahmed et al ⁽¹¹⁾ study females comprised 60% of the study groupMin Jo Kang et al in their study had 42 males. Pokkula Ramesh et al in their study of the total 114 patients, only 9 were females⁽¹²⁾ . In our study heel lesions predominated the study with 9 cases 30 % .Syed Kamran Ahmed et al. heel lesions predominated the study with 19 cases 40 % Yogesh C. Bhatt et al in their study post-traumatic tissue loss made up of 50% of the defects ⁽¹³⁾. In our study we had 15 free flaps that were based on the radial and 15 perforator flaps' among them we had Anterolateral Thigh based flap in 5, Distally Based Perforator Sural Flaps 8 cases and Supramalleolar based Flap 2 cases. Ting-ChenLu et al⁽¹⁴⁾ in their study used propeller flap used in 11 cases , (B) peninsular flap was used in 5 cases, (C) advancement flap was used in 2 cases.

Between the two groups the complications for the procedure was no statistically significant with a p value 1 .we had Flap Necrosis in 4 case major loss in tow ,tip loss in1 and partial loss in 12 case. In our study no cases of congestion was noted Hasegawa, Morimasa et al ⁽¹⁵⁾. in their study thirty six percent that included partial or complete necrosis of the flap, infection of the flap , and hematoma at the site of flap . Chowdhury Maruf Alam et al ⁽¹⁶⁾. 41 (82%) had an

uneventful recovery, 8 cases had a partial flap necrosis and one case had a complete flap. One case had seroma and 5 cases had wound infection. complete flap necrosis was healed by wound debridement and STSG and 1 patients had total flap loss which was managed by other reconstructive options. RN Ciofu et al in their study that was done in the year 2017 on ten cases who had defects around the ankle and heel found that the rate of complication more, as high as 30 % in those with diabetes mellitus, arterial or venous diseases. In our study all the four cases of necrosis had PVD and diabetes mellitus.

Venkata Mahipathy et al in their study stated the factors that decided complications ranging 10 to 38%. were advanced age, pre existing co morbidities, narrow pedicle and arc of rotation more than 180°⁽¹³⁾. Jeng et al in their study that was found that 87.5%), the flaps survived completely and one case had partial flap necrosis⁽¹⁰⁾.

Conclusion

The lower limb reconstruction can be done in a variety of different ways by using flaps perforator flaps. In the lower limb reconstruction both free flaps and perforator flaps are useful can be used in the treatment of defects. Most often a single setting of flap useful if the wound is clean. In most cases, when perforator flaps are used for reconstruction of the defects of the lower limb perforator, flaps that are based on a single perforating vessel is sufficient. Among all the perforator flaps peroneal artery based flaps are predictable and reliable for Flap reconstruction is a useful technique that restores the function and to an extent the cosmesis in lower limb tissue loss.

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