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COMPARATIVE STUDY OF DISTALLY BASED SURAL ARTERY FLAP IN YOUNG & OLD PATIENTS

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ABSTRACT

Objective: To compare the use of distally based Sural Artery flap in old and young patients.
Design : Descriptive and Clinical study.
Setting & Period: Dept. of Plastic Surgery and Dept. Of Orthopedic Surgery, Dow University of Health Sciences & Civil Hospital, Karachi.
Patients & Methods: The records of all patients who under went reapir of their defect with Distally based Sural Artery flap were sought and examined in detail. First age of the patients was seen and records were divided into two groups. One group of patients above 40 years and other group of patient below 40 years. Among the two groups every patient record was scrutinized for site of the wound, co-morbidity, procedure done, any complications noted, stay of the patient, number of procedures done and final outcome.
Results: Twenty seven (27) were gathered in two groups. In the first group there were 15 patients and in second group there were 12 patients.
In the first group(<40 years) there was complete survival of 8 flaps out of 15(53%). There was marginal necrosis of the distal margin in 6 cases (25%) and complete necrosis in one case (7%).
In the second group (>40 years) there was complete survival of 3 flaps out of 12 (25%). There was marginal necrosis of the distal margin in 5 cases(42 %) and complete necrosis in four cases e(34%).So overall survival rate in the first group was 93% and in the second group it was 66%.
Conclusion: Looking at the complication of DBSA flap in patients above 50 it can be concluded that it should be avoided, if , possible, especially if co- morbidities like Diabetes Mellitus, peripheral vascular disease, ischemic heart disease, vasculitis or any other co exist.

Key Words: Flaps, Sural Flap , lower limb trauma .

INTRODUCTION:

Reconstruction of the lower 1/3rd of leg had always remained a difficult area to reconstruct. Before the advent of free flaps cross leg flap was one of the most preferred flaps at our center. Though local flaps & muscle flaps were occasionally used but were never on top priority. With the advent of free flaps all over world, we were not able to utilize it at our centre because of logistic problems in government set up. At that time in 1992, Masquelet et.al.[1] describe a flap based on reverse flow through the anastomsis between the median superficial sural artery and the lower most perforator from the peroneal artery. Hasegawa[2] in 1994 give name "distally based sural artery (DBSA) flap" that breaks the ice & give a new dimension to reconstruction of lower 1/3rd of leg. Initial reports [3,4,5] from various centers gave very favorable results, but with passage of time there were reports of its failed utility in patients older than 50 years. [6,7].
In order to see the rate of complication in different age groups, we did a retrospective study of our operated patients. The purpose of this paper is to present our study on

comparison of use of DBSA flaps in young up to 40 & old (>40).

PATIENTS & METHODS:

All patients operated at the Department of Plastic Surgery and Dep't of Orthopedic Surgery, Civil Hospital Karachi with Distally based Sural Artery Flap were analysed. Their records were sought and examined in detail. First age of the patients was seen and records were divided into two groups. One group of patients above 40 years and other group of patient below 40 years.

Among the two groups every patient record was scrutinized for site of the wound, co-morbidity, procedure done, any complications noted, stay of the patient, number of procedures done and final outcome.

In each patient , investigations were noted for Complete Blood Picture, Wound swab for culture& sensitivity and X-Ray of lower limb. Viral markers were also noted.

DBSA was raised and applied as described by Masquelet[1] and Hasegawa[2]. The only difference between original technique and ours was that we never passed pedicle under the tunnel and always skin graft the pedicle. We close the donor area with split thickness skin graft.(STSG)

Post operatively patients were managed with no special dressings or off load devices. They were put in light dressings and were advised to stay in bed with foot elevated on pillows. In four of the patients drains were also used.

RESULTS:

From Jan.2007 to Dec.2009, Twenty seven (27) were gathered in two groups. In the first group there were 15 patients and in second group there were 12 patients.

Age in the first group varies from 12 to 39 years with a mean of 26±SEM 1.2. Age in the second group varies from 40 years to 65 years with a mean of 46±SEM 2.8.

With regard to gender it was surprising that all the patients were male.

With regard to etiology of the wound majority of patients in the first group had it because of trauma. Nine out of fifteen had it because of spoke wheel injury of the motor cycle and rest because of other forms of trauma. In only one patient uncontrolled Diabetes was the cause of the wound. (Table I)

The second group of 12 patients exhibit Diabetes (9) as the leading cause followed by trauma (2) and neurotrophic ulcer (1). In the first group co-morbidity was present in only one case whereas in the second group it was present in 9 cases.

Post operative results of the two groups with regard to survival of flaps were quite different.

In the first group (<40 years) there was complete survival of 8 flaps out of 15(53%). There was marginal necrosis of the distal margin in 6 cases (25%) and complete necrosis in one case (7%). In the second group (>40 years) there was complete survival of 3 flaps out of 12 (25%). There was marginal necrosis of the distal margin in 5 cases (42 %) and complete necrosis in four casese (34%).So overall survival rate in the first group was 93% and in the second group it was 66%.

Donor areas in both the groups behave nicely and grafts were well taken in both groups.

DISCUSSION:

Distally based Sural Artery flap has become a workhorse in the reconstruction of the lower leg, heel and foot after the flap was first described by Masquelet in 1992.Its success when performed correctly in appropriately selected patients, is well documented. Despite these successes, flap necrosis and other complications rate remain significant. In one of the bold retrospective study the complication rate of 59 % was found. In this study by Baumeister et.al.[9] one factor that was found to be significant was patient's age.Patients above age 40 without medical problems showed necrosis rate of 11%. Patients with systemic diseases other then Diabetes , venous insufficiency and peripheral vascular disease showed necrosis rate of 33%.Patients with one or more of the three diseases showed necrosis rate of 60%.

In our series, the flap survival rate in the first group(<40) was 93% and in second group it was 66%, which is quite significant. The cause of flap failure in the second group can be multiple. Venous congestion is described as one of the major cause of flap failure[10] . In order to avoid this we passed the pedicle over the

FIGURE 1: A:
Unstable wound at calcaneal region. B: wound created. C: flap raised. d: Flap inset and donor area skin grafted.



FIGURE 2: A:
Unstable traumatic wound at heel and tendo Achilles region. b: Covered by DBSA flap. d: Flap in position. After detachment showing partial necrosis.



TABLE I :
Shows the age of patient, etiology of the wound, presence of absence of com-morbidity and final outcome of the flap applied.

CASE NO.	NAME	AGE	ETIOLOGY	CO-MORBID	OUTCOME
1.	Mr.ABC	30	soft tissue infection	absent	flap survived
2.	Master T	12	spoke wheel injury	absent	flap survived
3.	Mr.Y	25	Road accident	absent	flap necroses
4.	Mr.G M.	32	spoke wheel injury	absent	partial necrosis
5.	Mr.S	55	ulcer over calcaneum	present	flap necrosis
6.	Master B	12	Motor cycle Silencer burn	absent	flap survived
7.	Master K	10	surgical wound infection	absent	flap survived
8.	Master I	13	Motor cycle Silencer burn	absent	flap survived
9.	Mr.Im	66	Diabetic ulcer	present	flap necrosis
10.	Master Ka	12	Road Traffic accident	absent	flap survived
11.	Master Kh	14	spoke wheel injury	absent	flap survived
12.	Master Sha	10	Burned foot	absent	flap survived
13.	Master Kh	08	Road Traffic accident	absent	partial necrosis
14.	Mr.Al	65	Ischemic ulcer over calcaneum	present	flap necrosis
15.	Mr.Ra	52	Neurotrophic ulcer	present	partial necrosis
16.	Mr. G	68	Marjolin's ulcer	absent	partial necrosis.
17.	Mr.Gh H	58	Venous ulcer	present	flap necrosis
18.	Master Ghaz	14	spoke wheel injury	absent	flap survived
19.	Mr.C R	68	Squamous cell carcinoma	present	flap necrosis
20.	Mr. Sh	53	Malignant Melanoma	present	flap necrosis
21.	Mr.Us	61	Squamous cell carcinoma	present	flap necrosis
22.	Mr. Iy	59	Marjolin's ulcer	absent	partial necrosis
23.	Qasim	54	Neurotrophic ulcer	present	flap necrosis
24.	Master Os	12	spoke wheel injury	absent	flap survived
25.	Mr.H Bu	52	Road Traffic Accident	present	flap necrosis
26.	Mr. Q L	32	Marjolin's ulcer	absent	partial necrosis
27.	Mr. Q N	18	Road Traffic accident	absent	flap survived

tunnel. In fact we never kept the tunnel and always incised the skin bridge between pivot point of the pedicle and inset site. We apply the STSG over the pedicle and the area created by incising the skin. We did not apply other methods like delaying the flap [11,12,13] and supercharging the flap[14]. Alternative to supercharging is exteriorizing the lesser saphenous vein[15], which was only employed in one case but didn't work in our hands. In order to exclude Surgeon bias in the study , it was seen that all those cases were included that were operated by the first author.

Marginal flap necrosis was seen in 25% of cases in the first group and 42% in the second group. This can attributed to sometime going beyond mid 1/3rd of the leg in raising the flap[16]. Co- morbidity can also be one of the factor that contributes to complete or partial flap failure after the age factor. Ischemic heart disease, diabetes mellitus, peripheral vascular diseases, vasculitis are major determinant for the successful outcome[17].

In spite of high failure rate with distally based sural artery flap, its usefulness cannot be looked upon. Even in many cases of partial or complete failure , DBSA often serves as valuable biological dressing . In many cases of complete flap necrosis , a well vascularized, granulating wound bed after debridement results, that allowed for successful split skin graft [9].

In order to increase the chance of DBSA flap to survive , one or combination of following steps should be taken:

1. The flap should be raised below the mid 1/3 of the leg.
2. The pedicle should not go distally more than 7cmm form the lateral mallelous.
3. Small saphenous vein and sural nerve should be incorporated in the pedicle which should be up to 3cm broad.
4. Pedicle should not pass under the tunnel up to recipient area. Instead skin should incised between pedicle pivot point and recipient area in order to prevent congestion.
5. Small saphenous vein should be supercharged by anastomosing it with any vein in the area of the recipient defect site.
6. The small saphenous vein should be exteriorize if supercharging is not possible.

7. Operated limb should be off loaded by putting external pins or any other device.
8. Flap should be delayed , if there is any doubt about viability and venous congestion.

CONCLUSION:

Looking at the complications of DBSA flap in patients above 50 it can be concluded that it should be avoided, if , possible, especially if co- morbidities like Diabetes mellitus, peripheral vascular disease, ischemic heart disease, vasculitis or any other co exist. However if it has to be done because of any reason then one or combination of all the above mentioned measures or precautions should be undertaken.

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