



Plastic Surgery

A STUDY OF SIMULTANEOUS FLAPS IN RECONSTRUCTIVE PLASTIC SURGERY

Dr.S.Lokesh

MBBS, DNB Gen.Surgery., MCh Post graduate Department of Burns, Plastic & Reconstructive Surgery Govt. Kilpauk Medical College, Chennai

Dr.Nirmala Ponnambalam*

MS., Mch., Professor & HOD Department of Burns, Plastic & Reconstructive Surgery Govt. Kilpauk Medical College, Chennai *Corresponding Author

Dr.G.Karthikeyan

MS., Mch., Associate Professor Department of Burns, Plastic & Reconstructive Surgery Govt. Kilpauk Medical College, Chennai

ABSTRACT

Aim: Patients with post electrical burns, poly trauma and multiple pressure sores usually present with multiple defects. This usually requires multiple surgeries, prolonged hospital stay and poor patient compliance towards rehabilitation. The aim of our study is to evaluate the challenges and outcome of simultaneous multiple flaps.

Materials and methods: A prospective study was conducted on patients admitted in our department between Jan 2016 and Jan 2018, presenting with multiple defects. All these patients underwent multiple flap covers and were followed up meticulously. Analysis of the patients were done based on their age, etiology, region of defect, flaps used and flap survival.

Results and Analysis: 26 patients with soft tissue defects underwent simultaneous multiple flap covers. A total of 52 flaps were done and only 5 flaps had complications. All other flaps settled well and patients were sent for early rehabilitation

Conclusion: Simultaneous multiple flaps definitely have better outcome in patient rehabilitation rather than flaps which are done separately. It is a challenge to plan for multiple defects, but multiple flaps form a very important tool in the armamentarium of a reconstructive surgeon.

KEYWORDS :Multiple Defects, Multiple Flaps, Post Electrical Defects, Pressure Sores.**Introduction**

It is a great challenge to manage patients presenting with multiple defects requiring flap cover for each of the defects. These defects usually result following electrical burn injuries, poly trauma and pressure sores. Patients usually undergo flap cover for one defect at a time thereby requiring multiple surgeries. So patients have a prolonged stay in the hospital and increased stress due to repeated surgeries. Therefore, the rehabilitation process gets delayed.

When simultaneous multiple flaps are done it leads to reduced hospital stay, reduced number of surgeries and faster rehabilitation. Our study is to analyse the challenges and outcomes of patients undergoing simultaneous multiple flaps. These flaps are for multiple defects or sometimes a very large single defect. The flaps used were local, regional and distant flaps. The sites commonly involved were the extremities, but the scalp and trunk were also involved.

The challenges involved were the general condition of the patient, timing of surgery, planning i.e., flap for each defect should not affect the other, post-op management and rehabilitation.

Materials and methods

A prospective study was conducted on patients admitted in our department with multiple defects, between Jan 2016 and Jan 2018. All these patients irrespective of their etiology underwent multiple flap covers simultaneously and were followed up. The parameters analysed were types of flap, flap survival, difficulty in planning, early and late complications and response to rehabilitation.

A total of 26 patients underwent surgery after getting written informed consent and appropriate counseling to both patient and their relatives regarding post-operative care. The flaps were planned for each patient - taking into account their general condition, size and site of the defect, and also future reconstruction if required. The flaps were monitored closely in the post op period for potential complications and necessary interventions undertaken.

**Fig 1: Post electrical burn multiple defects****Fig 2: Multiple defects in hand, reconstructed with double abdominal flap**



Fig 3: Multiple defects involving wrist forearm, double abdominal flap

Results and analysis

Out of the total of 26 cases, 17 were post electrical defects, 5 were post traumatic and 4 pressure sores. The number of defects were 50 and their distribution was - 7 scalp defects, 22 hand defects, 11 involving the wrist/forearm, 1 sacral, 4 gluteal/ischial and 5 leg defects. A total of 52 flaps were done of which - 17 were local, 2 regional, 32 distant and 1 free flap.

Defect sizes ranged from 2x2 cms to 17x12 cms, which was the largest. During planning, extra length of flap was taken into account for the elastic recoil of the skin. All flaps were planned meticulously so as not to affect the plan for other flaps. Immobilization and support of limbs were provided as required. Special care was given to patients who had both their hands immobilized. The distant flaps used were - abdominal, groin and para-umbilical perforator based flaps. These flaps were divided at 3 weeks and flap inset given. Delay procedure was done for 3 flaps at 2 weeks and divided a week later.



Fig 4: Large leg defect managed with two local fasciocutaneous flaps.

Out of the total 52 flaps, 3 flaps were completely lost, which was managed later with split skin grafting. 2 flaps had wound dehiscence, which required repositioning and suturing. Sutures were removed on the 10th post-op day and patients discharged.

All these patients had reduced hospital stay due to less number of surgeries. In our study we found that patients recovered well following surgery and responded faster to rehabilitation. Multiple flaps give good results and outcome when planned appropriately. Patients were comfortable with reduced number of surgeries and lesser hospital stay. The draw back was longer operating time when simultaneous multiple flaps were done which was minimized by planning meticulously.

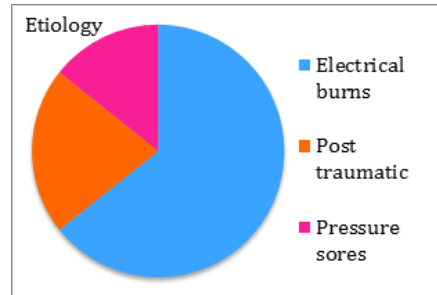


Fig 4. Etiology of defects

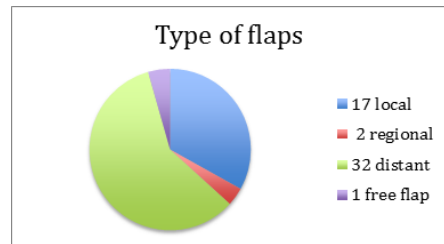


Fig 5. Types of flaps.

Table 1: Demography of patients, defects and reconstructive details

S. No	Age	Sex	Etiology	Site of defect	Type of flap	Complications
1.	15	M	Electrical Burns	Scalp	Double transposition	Nil
2.	33	M	Electrical Burns	Scalp	Double transposition	Nil
3.	47	M	Electrical Burns	Scalp/hand	Transposition flap/reverse FDMA flap	Regional flap loss
4.	30	M	Electrical Burns	Scalp	Double rotation flap	Nil
5.	23	M	Electrical Burns	Hand	Double abdominal flap	Nil
6.	22	M	Electrical Burns	Hand	Double abdominal flap	Nil
7.	8	F	Electrical Burns	Hand	Double abdominal flap	Nil
8.	24	M	Electrical Burns	Hand	Abdominal/transposition	Regional flap loss
9.	44	M	Electrical Burns	Hand	Double abdominal flap	Nil
10.	48	M	Electrical Burns	Hand	Double abdominal flap	Nil
11.	29	M	Electrical Burns	Hand	Double abdominal flap	Partial loss
12.	35	M	Electrical Burns	Hand	Double abdominal flap	Nil
13.	28	F	Electrical Burns	Hand	Double abdominal flap	Nil
14.	40	M	Electrical Burns	Hand	Abdominal/Groin flap	Nil
15.	51	M	Electrical Burns	Wrist/forearm	Double abdominal flap	Nil
16.	33	M	Electrical Burns	Wrist/forearm	Double abdominal flap	Flap dehiscence

17.	24	M	Electrical Burns	Wrist/forearm	Abdominal/Groin flap	Nil
18.	26	F	Post traumatic	Wrist/forearm	Double abdominal flap	Nil
19.	37	M	Post traumatic	Leg/foot	Free Anterolateral thigh flap/Reverse Sural artery flap	Nil
20.	44	M	Post traumatic	Hand	Double abdominal flap	Nil
21.	56	M	Post traumatic	Leg/foot	Superiorly based and inferiorly based fasciocutaneous flap	Nil
22.	23	M	Post traumatic	Leg/foot	Superiorly based and inferiorly based fasciocutaneous flap	Nil
23.	28	M	Pressure sore	Gluteal/ischial	Gluteus maximus/rotation flap	Flap dehiscence
24.	30	M	Pressure sore	Gluteal/ischial	Double rotation flap	Nil
25.	64	M	Pressure sore	Gluteal/ischial	Rotation/ posterior thigh flap	Nil
26.	60	M	Pressure sore	Sacral	Double rotation flap	Nil

Discussion

The biggest challenge in doing simultaneous multiple flaps, is planning - as each defect presents with different problems. In the case of post burns defect many a times there is paucity of adequate donor areas, which has to be tackled.

In the case of double scalp defect, usually two local transposition flaps are used. The drawback is donor site skin grafting, which leads to alopecia. Therefore the flaps were designed so that the region of alopecia is hidden inside the hairline and it does not affect the vascularity of the flap.

In small hand defects, small size flaps needs to be taken in close proximity. Hence axial pattern flaps based on para-umbilical perforators is always better to ensure survival of the flap.

In defects involving both the volar and dorsal aspect of the wrist, bilobed abdominal flaps were planned. These flaps were raised on a narrow pedicle so that the play of the flaps are better and allows flap inset without tension.

In cases where both the hands were immobilized, the caretakers of the patient were counseled well regarding the nature of surgery and their role in the post-op care. Both the hands were positioned appropriately and strapped so as to avoid tension along the suture lines.

In the lower limbs, larger flaps are always better for good outcomes and make sure that it does not cross 2/3rd circumference of the leg. There will be difficulty in positioning of the patient when the defect involves the anterior and posterior aspect. All these things need to be considered while planning the flaps.

In general when patients undergo one flap at a time, the duration of hospital stay is prolonged which leads to decreased patient compliance for subsequent rehabilitation procedures. Patients undergo tremendous amount of stress when subjected to multiple surgeries. Patients can acquire nosocomial infections during prolonged stay, which can further prolong the treatment. Further procedures and physiotherapy to get the limbs functional is also delayed. Therefore it is prudent to do simultaneous multiple flaps in these patients.

The advantages are - reduced number of surgeries, lesser hospital stay, faster rehabilitation and better patient compliance. The complication rate is the same as when flaps are done one after the other. Even though patients have some difficulty in the immediate post-op period due to immobilization and pain, in the long run they do well.

Conclusion

From the study it is concluded that patients with multiple defects who underwent simultaneous flap cover had very good outcome in relation to flap survival, patient compliance and faster rehabilitation. It is a challenge to plan for multiple defects, but multiple flaps form a very important tool in the armamentarium of a reconstructive surgeon.

References:

- Jiao, Hongsheng et al. "Clinical Experience of Multiple Flaps for the Reconstruction of Dorsal Digital Defects." *International Journal of Clinical and Experimental Medicine* 8.10 (2015): 18058-18065.
- Miura T, Nakamura R. Use of paired flaps to simultaneously cover the dorsal and volar surfaces of a raw hand. *Plast Reconstr Surg.* 1974, 54: 286-9.
- Emmett AJ. Finger resurfacing by the multiple subcutaneous pedicle or louvre flaps. *Br J Plast Surg.* 1974, 27: 370-4.
- Hurwitz PJ. The many-tailed flap for multiple finger injuries. *Br J Plast Surg.* 1980, 33: 230-2.
- Hyza P, Vesely J, Stupka I, Cigna E, Monni N. The bilobed arterialized venous free flap for simultaneous coverage of 2 separate defects of a digit. *Ann Plast Surg.* 2005, 55: 679-83.
- Trovato MJ, Brooks D, Buntic RF, Buncke GM. Simultaneous coverage of two separate dorsal digital defects with a syndactylizing venous free flap. *Microsurgery.* 2008, 28: 248-51.
- Ulrich D, Pallua N. Treatment of avulsion injury of three fingers with a compound thoracodorsal artery perforator flap including serratus anterior fascia. *Microsurgery.* 2009, 29: 556-9.
- Voche P, Merle M. The homodigital subcutaneous flap for cover of dorsal finger defects. *Br J Plast Surg.* 1994, 47: 435-9.
- R. Vecchione, Thomas & Griffith, Lee. (1978). Closure of scalp defects by using multiple flaps in a pinwheel design. *Plastic and reconstructive surgery.* 62. 74-7. 10.1097/00006534-197807000-00009.
- MARCHI, M. et al. "Surgical Reconstructive Procedures for Treatment of Ischial, Sacral and Trochanteric Pressure Ulcers." *Il Giornale di Chirurgia* 36.3 (2015): 112-116.
- Kim CM, Yun IS, Lee DW, Lew DY, Rah DK, Lee WJ. Treatment of Ischial Pressure Sores with Both Profunda Femoris Artery Perforator Flaps and Muscle Flaps. *Arch Plast Surg.* 2014;41(4):387-393.
- Lee SS, Huang SH, Chen MC, Chang KP, Lai CS, Lin SD. Management of re-current ischial pressure sore with gracilis muscle flap and V-Y profunda femoris artery perforator-based flap. *J Plast Reconstr Aesthet Surg.* 2009;62(10):1339-46. Epub 2008 Jul 2.
- Ipsilateral fasciocutaneous flaps for leg and foot defects Bhattacharya V, Watts R K, Year :2003 | Volume: 36 | Issue Number: 1 | Page: 30-35
- Shetty, Naren et al. "Double Free-Flap for a Bimalleolar Defect of Lower Leg and Ankle." *Indian Journal of Plastic Surgery : Official Publication of the Association of Plastic Surgeons of India* 49.1 (2016): 95-98. PMC. Web. 4 May 2018