

## Cross Leg Flap

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A cross leg flap is a direct pedicle flap from a sound leg to the other, recipient leg (Fig 1). The donor area usually is the calf of the leg. A flap is used to cover an area or a wound, where a split skin graft cannot serve the desired function. In India the legs are always covered by the ladies dress and hence this procedure is not contra-indicated in our female patients.

Hamilton used the cross leg flap first in 1854 for nonhealing ulcer of the leg and

created this procedure for amputated stumps. Padgett (1942) recommended this procedure for the sole of the foot, where the deep tendons are exposed, bone has been denuded or the joint is opened. Brown (1943) preferred it because it is less likely to contract.

The ideal conditions required for a cross leg flap are :

1. The sound leg must be free from disease

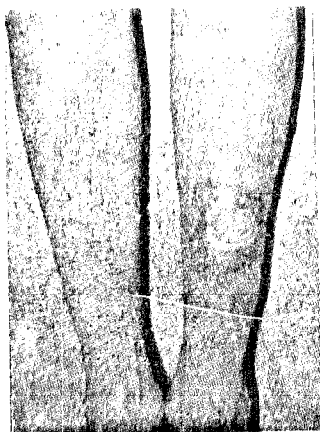


Fig. 1-(a) Chronic ulcer on tibial crest in the middle of leg and had repeatedly split skin grafting procedures,



Fig. 1-(b) Cross leg flap in position



Fig. 1-(c) Shows the leg after completion

termed "Elkoplasty", meaning reconstructive surgery upon an ulcer. Gillies (1932) preferred it because this shortens the stay of the patient in the hospital. Morley (1942) advo-

and scarring.

2. The leg should be of sufficient girth and area to supply the required size of

the flap.

3. The hip and knee joints should be mobile to get the desired position of the two legs, to transplant the flap from the donor leg or thigh to the recipient leg.
4. The last but not the least, is the co-operation of the patient who should be mentally prepared to maintain the difficult position for the next two or three weeks.

#### Indications :

1. The split skin graft has been used as cover and is unstable and has ulcerated;



Fig. 2 (a) Adherent Scar on mobile tendo-Achillis



Fig. 2-(b) Cross leg flap from anterior thigh in position



Fig. 2-(c) Post operative appearance.

especially over promonotaries, malleoli, tibial crest or the mobile tendo-Achillis. (Fig. 1 2).

2. It is planned to do some reconstructive work like bone grafting, tendon transplantation or transfer, or nerve repair, which is possible only through the flap, consisting of skin and subcutaneous tissue and not through the scar, (Fig. 3).

3. A bone or a joint is exposed and the split skin graft cannot be used to close the area. (Fig. 4).
4. A flap also gives additional vascularity to an extremity whose circulation is marginal.
5. The cross leg flap is a rapid procedure requiring a shorter time with less number of surgically planned operations, than the tube, I-pedicle flap procedure.

#### Contra Indications :

1. The scars on the normal opposite leg.
2. Peripheral vascular disease, thrombo-

phlebitis, and in the arteriosclerotic patients.

3. Stiff knee and hip joints.
4. Old age : Because the patient is to be bed ridden for 3 to 4 weeks.

#### Material & Methods :

The present series comprises of 15 selected cases for cross leg flap, which have been

under taken in the Plastic and Maxillofacial Surgery unit of Irwin Hospital, New Delhi, with a follow up of more than three years. A minor but important precaution has been observed to save the cutaneous branches which pierce the fascia and supply the skin and may be called the perforating cutaneous blood vessels, some of which are quite constant.

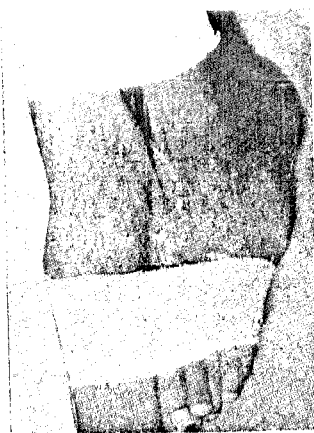


Fig. 3 (a) Shows cross leg flap for crush injury foot, where triple arthrodesis is indicated.

The wound and the additional damaged tissue is out lined by skin pencil. At times a part of healthy skin is sacrificed to give a good inset to the flap. The flap area is planned about 20% more and its pedicle has a good play. It was strictly observed that the ratio between length and breadth should not exceed 1 : 1. The pedicle is based on perforating branches of posterior tibial artery on the medial surface of the leg. A pattern is cut out of the jaconet and the area is marked on the donor leg by the the method of reverse planning. The post operative position is also indicated by a proper-marking. All these markings are scratched with a sharp needle as soon as the patient

is under anaesthesia.

In this series, the medial surface of upper two thirds of the leg is used as donor area for other leg in 10 cases and dorsum foot in 2 cases. The anterior surface of the thigh has been used for the heel and to cover tendo-Achillis in 3 cases.

In the following table, the other series

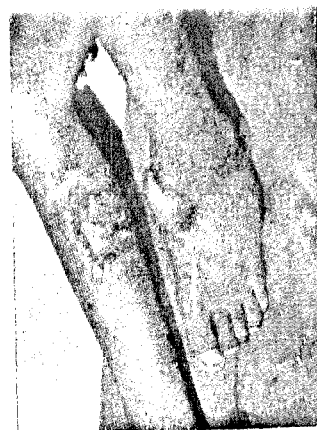


Fig. 3 (b) Shows the foot after completion.

of the literature are mentioned :

Ghormly and Lips Comb.	1944	48
Padgett & Gaskin.	1945	58
Converse.	1948	379
Lewin.	1948	33
Jayes.	1950	60
Stark.	1952	20
Our series.	1971	15

#### Cutaneous circulation of leg and thigh :

Stark (1948) extensively studied the cutaneous circulation in the lower extremity. The vascularity of the medial surface of the leg and the anterior surface of the thigh is much better than that of later and post surface of leg and thigh. The medial surface

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of the calf is supplied by medial inferior geniculate artery, posterior tibial artery and saphenous artery. The anterior thigh is supplied by the deep perforating branch of femoral artery. We have observed during surgical operation, and dissection in cadavers, that there are constant leash of vessels along the medial border of the tibia where the cutaneous branches from the posterior tibial artery come out along the septum of the deep fascia (Fig. 5). The septum separates the flexor muscles of the toes from the superficial muscles of the calf. There are

the medial surface of the upper two thirds of the leg, have best survival, because of the direct cutaneous branches of the posterior tibial artery, as shown in Fig. 5.

**Technique :**

Once the post operative position of the two legs is properly planned, the flap is marked on the donor extremity, and the patient is laid in the prone position. The flap is raised and the donor area is covered by the split skin graft, which lines also the pedicle of the flap, (Macombe and Rubin,



Fig. 4—(a) Shows the tibia is lying exposed.



Fig. 4—(b) Cross leg flap in position.



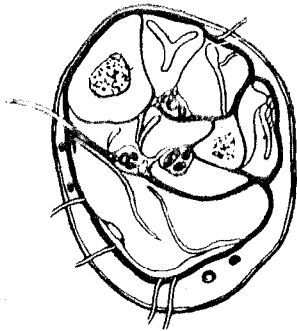
Fig. 4—(c) Post operative appearance.

also constant cutaneous branches on the medial surface, piercing through the deep fascia. On the posterior surface, these vessels come out in the mid-line between the two bellies of gastrocnemius muscle. On the lateral surface, the cutaneous branches are few. On the anterior, lateral and posterior surface the cutaneous vessels are through muscular branches of posterior tibial, peroneal or anterior tibial arteries because the later two vessels are deeply situated in the calf muscles. The flaps based anteriorly on

1947). While the flap is raised on the medial surface of the leg utmost care is taken to look for the leash of vessels in a row, near the medial border of the tibia where the fascial septum of the posterior compartment of the muscles of the leg, is attached. The patient is turned in the supine position, the recipient area is prepared, to receive the flap with legs in their final position. A flap of normal tissue sometimes is turned back to give cover to under surface of the pedicle, as described by Braithwaite (1949). The

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U foam or Polythene sponge is used as padding between the two legs and under the heel and they are strapped together by adhesive elastoplast. The plaster of Paris has been used only in a difficult position on one occasion and in all the cases of the thigh flaps. The legs have never been strapped pre-operatively in this series. But it is very essential to make the patient under-



Cross Section through the Leg,  
to explain Perforating cutaneous  
vessels useful in Cross leg flap

Fig. 5—Cross section of leg.

stand and win his confidence, for what he is to undergo during the next three weeks. A Balkan beam is very useful and it allows the patient to move in the bed.

Davis (1919) advised that the extremities after operation, should be kept in the plaster casts which are prepared before operation. Macey (1943), Ghormley and Lips Comb (1944) prepared pre-operative casts before operation. Matthews (1944) used adhesive strapping supplemented with knee caps fitted with metal clamps, having multiple adjustable joints. Stark (1947) Letterman, (1948) Braidthwaite (1948), Jayes, (1949), Barskey (1950), also strongly advocated the

pre-operative casts with a window.

A drainage tube is very essential under the flap for about 24 hours. It is either a corrugated drain or a suction drain. In two of the cases the flaps have been saved by timely evacuation of haematomas. The damage to the flap has been only a marginal necrosis, as no drainage tube was kept in these case.

In this series, none of the flaps were delayed prior to transplantation and the flap is only delayed if the length and breadth ratio is more or the flap is based distally. The delay should be in two stages. Stark (1948), Lexer (1917) desired that the flap should be delayed before transfer. Perthes (1917) compressed the pedicle between two darning needles to develop collateral circulation Blair (1921) advised total delay of pedicle before transplantation. Lexer, (1929), Brown & Canon and Matthews (1943), always delayed before the transplantation. Brown (1951) advocated that the whole flap should be elevated and transplanted.

A Partial severance or delay before detachment of the flap is a conservative measure, when one is not bold enough to detach the flap in one stage after three weeks. On complete severance of the flap, no trimming or dissection of the flap is done. The inset, into the damaged leg is either by loose sutures or without sutures, to prevent any loss of flap at this stage due to oedema and tension.

Post operatively, postural excercises are given before ambulation and weight bearing is started. The flap is supported by crepe bandage or elastic stockings for 3 months.

In case of foot, padded shoes are used and the care of anaesthetic flap is advised and impressed upon.

### Summary

A series of 15 cases of cross leg flap have been presented with the donor area

from the medial surface of the leg and the anterior surface of the thigh, because of the better vascularity of these areas. An anatomical basis of the vascularity of the medial surface of leg is discussed, and the importance of the preservation of these cutaneous branches of the posterior tibial artery, is impressed upon.

### REFERENCES

1. Barsky, A.J., Kahn, : Principale of Practice of Plastic Surgery Baltimore, The William & S. and Simon, B. E. Wilkins Co. 1950.
2. Blair, V. P. : Surg. Gyane. & Obst., 33: 261, 1921.
3. Braithwaite, F. and : J. Bone & Surg., 31 B: 228, 1949.  
Moore, F.T.
4. Brown, D.O. : Brit. J. Surg., 30 : 307, 1943.
5. Brown, J.B. and : Ann. Surg., 120 : 417, 1944.  
Canon, B.
6. Brown, J.B. and : Proceedings the American Association of Plastic Surgeons, June 1961,  
Freyer, M.P. Cited by Stark, R. B. No. 24.
7. Converse, J.M. : J. Bone and Jt. Surg., 30 : 163. 1948.
8. Davis, J.S. : Plastic Surg. Philadelphia P. Blakiston's Son & Co. 1919 p. 693.  
Cited by Stark No. 24.
9. Ghormley, R.K. : J. Bone and Jt. Surg., 26 : 483, 1944.  
and Lips Comb,  
P.R.
10. Gillies, H.D. : Brit. Med. J., 2 : 1008, 1932.
11. Hamilton, F.H. : New York, Holmon Gray & Co., 1854. cited by Stark No. 24.
12. Jayes, P.H. : Brit. J. Plast. Surg., 3: 1, 1950.
13. Letterman, G.S. : Plast. Reconst. Surg., 3 : 553, 1948.
14. Lexer, E. : Cited by Stark, R.B. No. 24.
15. MacComber, : Plast. Reconst. Surg., 2 : 163, 1947.  
W. B. :

16. Macey, H.B. : Surg. Clin. North Amer , 23 : 1030, 1948.
17. Matthews, D.N. : The Surgery of Repair, Springfield, c.c. Thomas 1943, p. 143.
18. Morley, G H. : Proc. Roy. Soc. Med., 35 : 762, 1942.
19. Padgett, E.C. : Skin grafthing. Springfield, I 11, c.c. Thomas, 1942.
20. Padgett, E.C. : Surgery, 18 : 287, 1945.  
and Gaskin, J.H.
21. Perthes, G. : Cited by Stark, R.B. No. 24.
22. Stark, R.B. : Plast. Recon. Surg., 2 : 433, 1947.
23. Stark, R.B. : Plast. Recons. Surg., 3 : 694, 1948.
24. Stark, R.B. : Plast. Recons. Surg., 9 : 173, 1952.