

Extracorporeal Pedicles For Free Flap Reconstruction In Diabetic Lower Extremity Wounds



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Abstract

Purpose: Diabetic foot ulcers (DFU) represent a reconstructive challenge. Here we present the “Extracorporeal” free flap for the reconstruction of lower extremity DFUs (Figure.1).

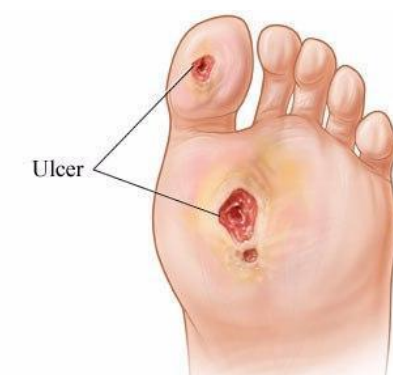
Methods: Following patient optimization, our reconstruction involves standard free flap harvest, end-to-end anastomosis, and inset. We then cover the “hanging” pedicle with a skin graft instead of making extraneous incisions or tunnels within undisturbed tissues that can compress the vessels. While the flap incorporates, the exposed pedicle is protected with a soft dressing. After incorporation, a second-stage surgery is performed which entails pedicle division, flap inset revision, and end-to-end reconstruction of recipient vessel (Figure.2).

Results: This technique was used to reconstruct 10 distal lower extremity DFUs. Defects ranged between 18-23cm2. Defects were reconstructed using the first dorsal metacarpal artery perforator, radial forearm, and anterolateral thigh free flaps. All patients underwent successful flap division with 100% flap survival rate. One patient developed partial necrosis of the flap distal tip that was managed conservatively.

Conclusion: In addition to decreasing the number of incisions, our technique utilizing “extracorporeal” pedicle simplifies flap monitoring and inset, and allows reconstruction of recipient vessel to reestablish distal blood flow, with no substantial increase in required operative skill.

Diabetic Foot Ulcers: A Challenging Pathology

- Diabetic foot ulcers are a severe complication of diabetes
- Limb salvage is the ultimate goal
- Microsurgical free-tissue transfer



Mitigating Risk Factors for Complications

- End-to-side anastomoses
- Long pedicles
- Supermicrosurgery



Sato T, Yana Y, Ichioka S. Free flap reconstruction for diabetic foot limb salvage. J Plast Surg Hand Surg. 2017;51(6):399-404. doi:10.1097/200656X.2017.1285782

The Exteriorized Pedicle Technique

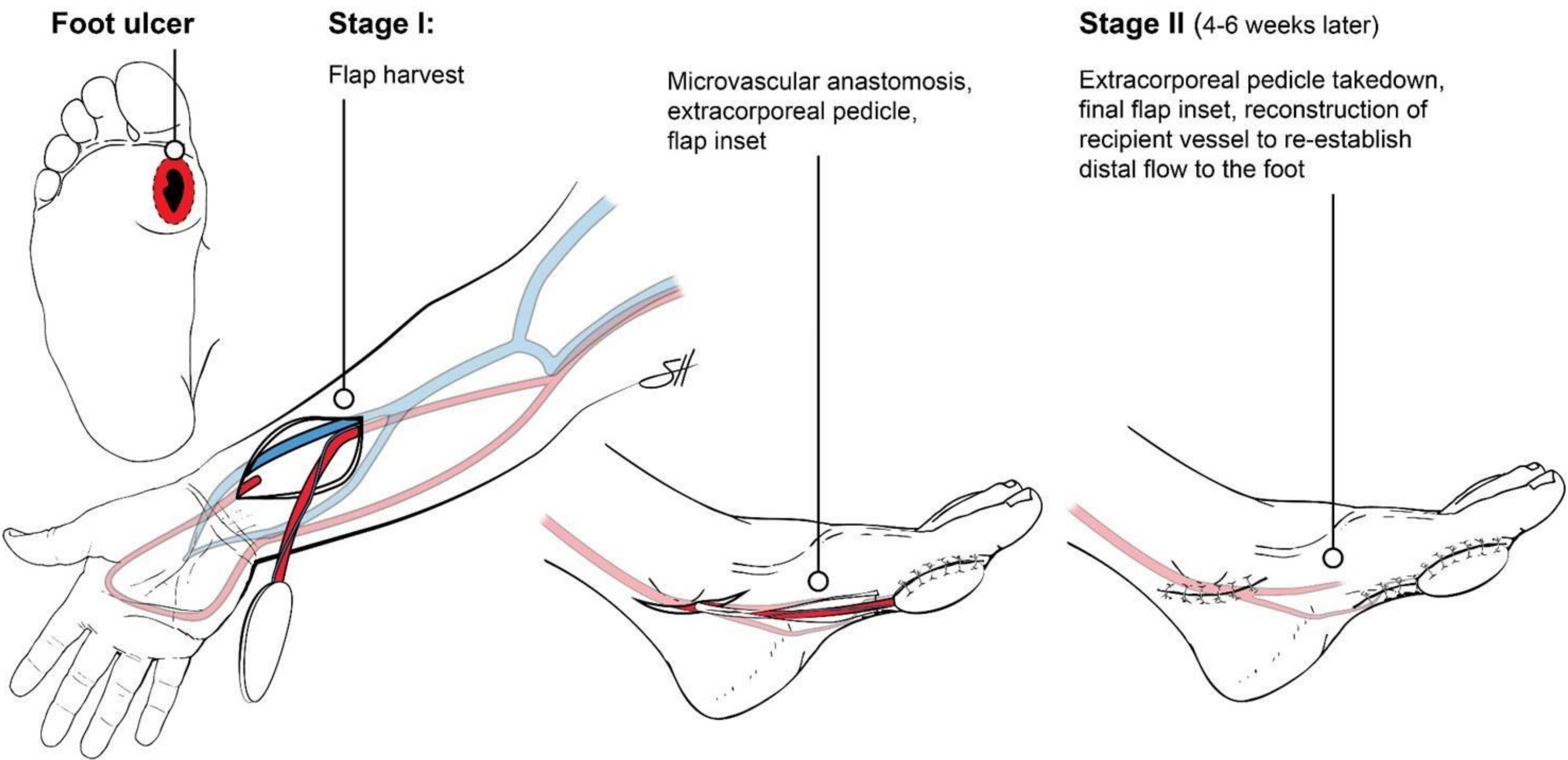


Figure. 1



The figure on the left demonstrates the hanging pedicle in the immediate postoperative period covered with a STSG obtained from the thigh, an area away from the zone of pathology. And on the left, we can see the same flap, alive, and well perfused, following pedicle division and reconstruction of the recipient vessels.

Conclusion

- Despite these limitations, our technique utilizing the “extracorporeal” pedicle is a safe, versatile, and a reliable option in the armamentarium of the reconstructive surgeon
- It requires no substantial increase in operative skill to incorporate into surgical practice.
- Besides decreasing the number of incisions on diabetic patients this approach simplifies flap inset as well as monitoring

Results

No. Patients	10
Age	41-57
DFU	Stage 3
Defect size	18-23 cm2
Defect location	Distal leg or foot
Flaps	RFFF 4 ALT 4 FDMA 2
Complications	1; partial necrosis
Flap survival	100%
Follow up	9-13 months

LIMITATION

- Two stages
- Two or more lower extremity vessels
- STSG donor site morbidity
- Prolonged hospitalization
- Patient selection

References

Kotha VS, Fan KL, Schwitzer JA, et al. Amputation versus Free Flap: Long-Term Outcomes of Microsurgical Limb Salvage and Risk Factors for Amputation in the Diabetic Population. Plast Reconstr Surg. 2021. doi:10.1097/PRS.0000000000007644

2. Evans KK, Attinger CE, Al-Attar A, et al. The importance of limb preservation in the diabetic population. J Diabetes Complications. 2011. doi:10.1016/j.jdiacomp.2011.02.001

3. Oh TS, Lee HS, Hong JP. Diabetic foot reconstruction using free flaps increases 5-years survival rate. J Plast Reconstr Aesthetic Surg. 2013. doi:10.1016/j.bjps.2012.09.024

4. Suh HS, Oh TS, Hong JP. Innovations in diabetic foot reconstruction using supermicrosurgery. Diabetes Metab Res Rev. 2016. doi:10.1002/dmrr.2755

5. Suh HP, Park CJ, Hong JP. Special Considerations for Diabetic Foot Reconstruction. J Reconstr Microsurg. 2021. doi:10.1055/s-0040-1714431.