Journal of Bangladesh College of Physicians and Surgeons
Vol. 42, No. 2, April 2024

Reverse sural Island Flap for Reconstruction of Ankle and Posterior Heel Defect: Clinical Experience with Surgical Modifications of Pedicle

A SARKER[a], MR HASAN[b], MI ALAM[c], MH SAMRAT[d], MA CHOWDHURY[e], P BARUA[f]

Abstract:

Introduction: *Soft tissue defects around the ankle and posterior heel need stable flap coverage for proper healing and satisfactory recovery of function. Constant and reliable vascular supply of reverse sural island flap (RSIF) have made it a popular choice for reconstruction of these defects. In this study, the outcome of RSIF with few modifications in the pedicle area were discussed.*

Methods: *This prospective study was carried out in National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka duing April 2019 to June 2020. Total 31 patients with soft tissue defect around ankle and posterior heel were reconstructed with reverse sural artery island flap. The soft-tissue defects were located, infront of ankle in 3 cases, over lateral malleolus in 7 cases, over medial malleolus in 5 cases, over tendoachilles in 12 cases, involving two or more areas of posterior heel, tendoachilles and lateral malleolus in 4 cases. Average Flap length and width were 9.67(+1.60) cm & 6.38(+0.76) cm respectively. Pedicle area of flap was modified by including a 2 cm skin extension in the middle along with additional adipofascial tissue on both sides to improve venous return. Pedicle length to width ratio was maximum of 3:1. Average length of pedicle was 7.2 + 1.7 cm.*

Results: *All flaps except three survived completely without any complications. One patient (3%) had partial necrosis and another one (3%) had marginal necrosis of flap due to venous congestion. Epidermolysis was observed in 3% cases.*

Conclusions: *The distally based superficial sural artery island flap is a versatile, reliable procedure useful in reconstruction of the lower extremity. Modifying the design of pedicle area increases safety by reducing venous congestion which ultimately leads to increase flap survivability.*

Key Words: *Reverse sural island flap, soft tissue defect, ankle, posterior heel.*

(J Bangladesh Coll Phys Surg 2024; 42: 126-132)
DOI: https://doi.org/10.3329/jbcps.v42i2.72432

Introduction:

Soft tissue defects over distal third of the leg and foot following trauma frequently exposes the bones and tendons due to superficial position of bones and most muscles become tendons at this level. Stable flap cover around ankle is essential for proper healing and satisfactory recovery of function by reducing complications. The posterior heel area is subject to shearing forces that needs durable flap coverage to wear normal shoes. To preserve the function of Achilles tendon, soft tissue coverage must cushion the tendon and permit gliding. Reconstruction of the ankle and posterior heel soft tissue defects remains a challenging problem for reconstructive surgeons due to limited availability of local tissue and poor blood supply[1].

a. Dr. Avijit Sarker, Junior Consultant, Department of Burn & Plastic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka.

b. Dr. Md. Rakibul Hasan, Assistant Registrar, Department of Orthopaedic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka.

c. Dr. Md. Iftekharul Alam, Registrar, Department of Orthopaedic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka.

d. Dr. Mohsin Hasan Samrat, Junior Consultant, Department of Orthopaedic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka.

e. Dr. Maruf Alam Chowdhury, Associate Professor , Department of Burn & Plastic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) , Dhaka.

f. Dr. Prattay Barua, Assistant Registrar, Department of Burn & Plastic Surgery, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) , Dhaka.

Address of Correspondence: Dr. Avijit Sarker, Room no 230, Department of Burn & Plastic Surgery, NITOR, Dhaka, Bangladesh. Cell : 01712904441, Email: *sarker_avijit.plastic@yahoo.com*

Received: 14 July, 2023 **Accept:** 28 January, 2024

An ideal solution for soft tissue coverage should provide a stable coverage, thereby shorten wound healing time, reduce wound complications, provide satisfactory function, minimize morbidity and if possible, provide better cosmesis[2]. Various flaps have been described in literature for cover around ankle and posterior heel area including distally based faciocutaneous flaps, advancement flap, free tissue transfers, perforator flaps, reverse sural island flap[1,2,3]. The ability to cover soft tissue defects have been improved by the use of free flaps.

However free flaps need microsurgical expertise and to sacrifice a major leg vessel. Reverse sural island flap (RSIF) provide considerable versatility for coverage of these defects[4].

In 1992, Masquelet et al. introduced the concept of neurocutaneous island flap and described the sural neurocutaneous flap lately referred to as reverse sural island flap. The median sural artery generally accompanies the sural nerve and short saphenous vein in the proximal calf[4]. In distal third of leg around lateral malleolus the median superficial sural artery communicates with the sepcutaneous branch of the peroneal artery directly or through the suprafascial network[5].This communication provides the vascular supply to the flap in a reverse direction. Due to reliable vascular pedicle and relatively simple dissection with low donor site morbidity the RSIF is a reliable choice for ankle and posterior heel defects[4]. Multiple surgical modifications of the flap has been made to improve venous return and reduce complications.

The aim of this study was to evaluate the outcome of RSIF with pedicle modifications on coverage of soft tissue defects of ankle and posterior heel region.

Methods:

This prospective study was carried out in National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka duing April 2019 to June 2020. Total 31 patients with soft tissue defect around ankle and posterior heel were reconstructed with reverse sural artery island flap. Among them 26 patients were males and 5 were females. Convenient sampling technique was applied. The age range was from 10 to 63 years. The etiology included road traffic accidents in 19 cases, 8 following toilet pan tendoachilles injury, 2 following physical assault and another 2 due to accidental heavy weight fall. Mean follow up time was ranging from 3-6 months.

The soft-tissue defects in this study were located, infront of ankle in 3 cases, over lateral malleolus in 7 cases, over medial malleolus in 5 cases, over tendoachilles in 12 cases, involving two or more areas of posterior heel, tendoachilles and lateral malleolus in 4 cases. The associated fractures were treated with external fixator and tendoachilles injury was planned to manage after stable soft tissue coverage. Preoperatively the patients were screened for patency of peroneal perforators especially the one at around 5 cm from lateral malleolus using 8 mhz hand held doppler.

The average dimension of the defect was 5.8cm x 5.1cm ranging from 6cm x 4cm to 11cm x 9cm. The average dimension of flap was 9.67cm x 6.38cm ranging from 7cm x 5cm to 12cm x 10cm. In all cases, pedicle was planned with a maximum length to width ratio of 3:1 and a 2 cm intact skin was kept in the middle of pedicle with additional adipofascial tissue on both sides. Flap donor areas were covered by split skin graft in all cases. Data collections were done in a prescribed data collection sheet and analysis done using SPSS (Version 16). Informed written consent were taken from the patient or legal guardian.

Preoperative workup

Preoperatively, a line is marked from the midline between gastrocnemius heads in the popliteal fossa to a point halfway between the Achilles tendon and the lateral malleolus which roughly marks the course of the sural nerve as well as the axis of pedicle. The pivot point is posterior to the fibula and about 5cm proximal to the lateral malleolus. The Posterior aspect of leg was divided into three equal part from popliteal crease to a line joining both malleolus. Distance between proximal edge of the defect and the pivot point was measured. Pedicle length is determined by adding 1cm to this value and transposed proximally along the axis of pedicle. The pedicle was planned with a maximum length to width ratio of 3:1. In the middle of the pedicle, a 2 cm intact skin was marked which was in continuity with skin paddle and on both side of skin extension additional 1 cm was marked to include adipofascial tissue only. So, finally the pedicle was planned as a strip of adipofascial tissue which includes subdermal tissue, lesser saphenous vein, sural nerve, and deep fascia with a

modification to keep around 2 cm intact skin in the midline of pedicle. Template of the defects were made and transposed over the proximal end point of pedicle which represents the skin island to be harvested. Skin island was designed in continuity with the pedicle and additional 0.5 cm was added all around the skin paddle for tensionless suturing after transfer.

Operative technique

After spinal anaesthesia, the thigh tourniquet was applied without exsanguination. Patient was kept in a prone position. The skin incision was made along the medial side and distal margin of the flap. Skin subcutaneous tissue along with the deep fascia were raised and retracted laterally to identify the sural nerve and saphenous vein. Once identified, the sural nerve and saphenous vein were ligated at distal margin of flap and taken along with the flap. Incision completed along all margins of skin island and extended over pedicle up to pivot point keeping 2 cm skin over pedicle. To isolate adipofascial pedicle, skin only flaps raised on both side of skin extension over pedicle and reflected laterally. Width of the pedicle adjusted according to position of saphenous vein keeping length to width ratio of 3:1. Dissection was then completed subfascially in a proximal to distal fashion after securing the fascia with the skin. Incorporation of sural nerve in the flap was done by subfascial dissection between the gastrocnemius heads . Fasciocutaneous Perforators of the peroneal axis and musculocutaneous perforators emerging through gastrocnemius muscle were cauterized as the dissection progressed. Harvesting of the flap completed by raising the skin island in continuity with pedicle upto pivot point by carefully preserving the lesser saphenous vein, sural nerve, and deep fascia throughout the length.

The vascularity of the flap was confirmed at the distal most part. Flap delay was not done in any case. The subcutaneous tunnel was opened for the pedicle, which connected from the pivot point to the defect site. Mobilization of the skin on each side was done by raising thin skin flaps. This tunnel provided sufficient space for the pedicle with a skin extension.

The flap was transposed to the recipient site and secured in place by interrupted suture using 4-0 prolene. The skin extension of pedicle was sutured to the laterally mobilized skin flaps. Defect created after flap harvest was closed primarily in the pedicle area and by split skin graft in skin island area. Above knee anterior cast was applied to restrict movements of the limb.

Postoperative care and follow up

Light dressing was applied and a window kept for flap monitoring. The skin paddle of the flap was observed every 12 hourly for the first 48 hours and then once every day to detect any venous congestion or diminish vascularity by checking colour, temperature, skin turgor and in some cases by pin prick at distal flap margin. Prone position of the patient was maintained along with leg elevation and adequate hydration. First dressing was done on 4th postoperative day and presence of infection, marginal necrosis or flap loss was checked at that time. Flap donor site was inspected for presence of any infection and graft loss. Second dressing change was done on 8th postoperative day and decision was made regarding further procedure (conservative treatment/skin graft/alternate flap) in case of flap loss. Patient was discharged on that day with removing the stapler pin in SSG site. Patient came for flap suture removal on 21st postoperative day.

Partial weight bearing walking was allowed at the end of 6thweek and this was according to the presence of bone fractures and the method of bone fixation. Patients were followed up for 3-6 months period. On 3rd postoperative month, all operative areas were checked

for assessment of outcome of the procedure. At final follow up, outcome was measured as excellent (flap survived completely, donor area healed without complications, no limitations of ankle movement), satisfactory (partial flap loss or marginal necrosis, infection in donor area managed conservatively, limitations of ankle movement), poor (complete flap loss, donor area needed secondary procedure, limitations of ankle movement).

Results:

Total 31 patients with soft tissue defect around ankle and posterior heel were reconstructed with reverse sural artery island flap with a male to female ratio of 26:5. The mean age of patients was 33.6 years (range 10 to 63 years).

The mechanism of injury was road traffic accident in majority of the cases (61.2%). Other causes includes wound dehiscence over tendoachilles following toilet pan injury (25.8%), physical assault (6.5%) and

accidental heavy weight fall (6.5%). Mean follow up time was ranging from 3-6 months.

The most common indications for flap cover were exposed tendoachilles (38.7%) and exposed lateral malleolus (22.6%). Three patients (9.7%) had defect infront of ankle, five (16.1%) had defect over medial malleolus and another 12.9% patients had defect involving two or more areas of posterior heel, tendoachilles and lateral malleolus. The average dimension of flap (skin paddle) was 9.67cm x 6.38cm. Smallest one being 7cm x 5cm and largest flap of 12cm x 10cm. Average length of pedicle was 7.2 + 1.7 cm.

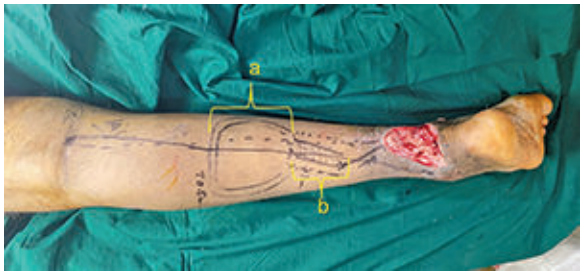

Figure 1: *Marking of sural island flap (a- skin island, b- pedicle with intact skin in the middle) .*

All flaps except three survived completely without any complications. Partial necrosis due to venous congestion was seen in one patient which was managed with serial debridement followed by split

skin graft with less reliable outcome. Marginal necrosis seen in one patient was managed by secondary suture. Epidermolysis seen in one patient was managed by dressing only.

Donor area healed without any loss of split skin graft. At final follow up, 90.32% cases ended up with excellent outcome and rest 9.68% cases had satisfactory outcome.

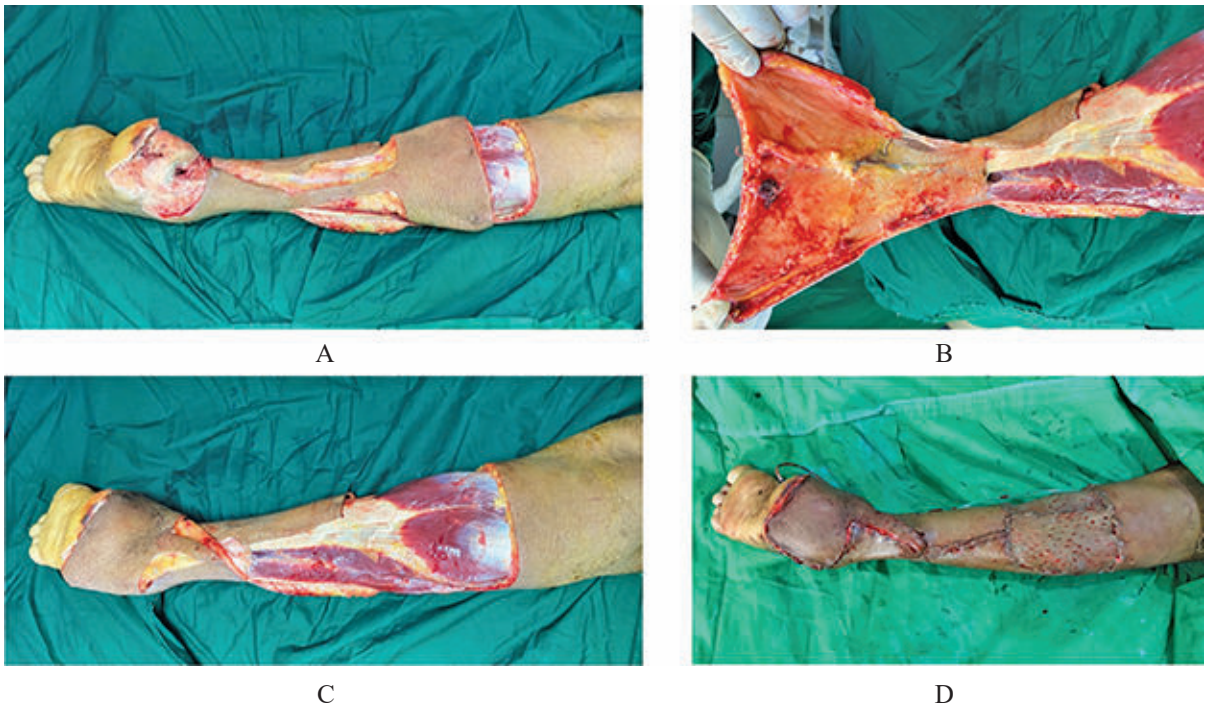

Figure 2: *Soft tissue defect over posterior heel of right lower limb covered with sural island flap. A. wound over posterior heel and sural island flap harvested. B. sural flap with pedicle. C. flap positioning over defect D. final flap inset and donor area covered with split skin graft.*

Figure 3: *Soft tissue defect over posterior heal region (a,b) and over ankle(c,d) covered with distally based sural artery island flap.*

Table-I

Distribution of patients by survivability of flaps (n=31)

Flap survivability	Number	Percentage
Completely survived	28	90.32
Epidermolysis	01	3.22
Marginal necrosis (< 10% flap loss)	01	3.22
Partial flap loss (10% - 30% flap loss)	01	3.22

Discussion:

Soft tissue defects around ankle needs durable and early coverage for wound healing without complications and satisfactory ankle movement. Wound over posterior heel exposes calcaneum and tendoachilles which needs to be covered with a durable flap for tendon gliding and stable coverage which can combat the shearing forces.

There are many possible reconstructive options for wound around ankle and foot including skin graft, loco-regional flap, cross leg flap and free flaps[6,7,8,9,10]. Skin graft is not suitable to cover exposed tendons and bones as it will ultimately lead to an unstable scar and limitations of movement[6]. Cross leg flap is considered as a rescue option only after failure of initial flap. Free flap is an excellent choice but it requires special instruments and expertise. In addition, there is need to sacrifice one of the major vessel for microvascular anastomosis. This is why it is not considered routinely and considered in cases with large or complex wound[6,7]. Loco-regional flap options includes distally based fascio-cutaneous flap, perforator flaps, local transposition flaps and reverse sural island flap[7].

Reverse sural island flap (RSIF) for foot and ankle reconstruction has gradually increased in popularity over the last decade. The major advantage of this flap is the relatively large size that can be harvested with little donor-site deformity or morbidity. Flap dissection is relatively easy with minimal blood loss during the operation. Microvascular anastomosis is not required

and operative time is short. This is a one-stage procedure. RSFF has a wide arc of rotation on its pedicle at approximately 5-7 cm superior to the lateral malleolus and is useful for reconstruction of defects on heel, malleoli, ankle as well as foot[11].

In the current study, reversed sural island flaps have been used to cover defects in 31 cases over tendoachilles and posterior heel areas. The average dimension of flap (skin paddle) was 9.67cm x 6.38 cm. Smallest one being 7cm x5 cm and largest flap of 12cm x10 cm. The size of the flap varied from 3x3 to 9x12 cm in the study done by Costa–Ferreira et al[11] Satyapal et al[4] in their study showed the average dimension of the flap was 5×15 cm. H.I. Lee et al[12] in their study showed the flap size varied from 4.0 x 5.0 to 9.0 x 15.0 (mean 5.9 + 1.8 x 9.2 + 2.7) cm. Average length of pedicle was 7.2 + 1.7 cm. The mean pedicle length was 11.5 (range 4 to 27) cm in the study done by H.I. Lee et al[12]. In this study, the pedicle length to width ratio was taken around 3:1.

Total 90.32% flaps survived completely without any complications. Partial necrosis was observed in 3.22% cases and marginal necrosis was seen in another 3.22% cases which occurred due to venous congestion. Samo et al.[13] reported flap necrosis in 2 cases (10.52%) out of 19 cases. Study done by Pirwani et al.[14] showed 90.91% flap survived although most flaps showed slight venous congestion initially which cleared within a few days. A. Rý´os-Luna et al[7] reported loss of 1 flap (7.14%) out of 14 patients due to venous congestion while Almeida et al.[1] in their large study showed complete flap loss in 4.2% cases and partial flap loss in 22.1% cases. H.I. Lee et al.[12] in their study showed of the 25 flaps, 23 survived completely (92%). Two flaps (8%) developed partial necrosis, at 20% and 40% of their dimensions, respectively.

Venous congestion is the most important complication that may cause flap loss[14,15,16,17]. In our series partial necrosis due to venous congestion was occurred in two cases. Nakajima et al.[18] showed venous congestion as the major complication of their series.

To overcome the problems with venous congestion few modifications were made in the pedicle area including keeping a skin extension of around 2 cm with the pedicle and maintaining the ratio of pedicle length to width around 3:1. The skin over the pedicle reduces the chance of torsion of the pedicle which could lead to flap failure. This modification has decreased the tension of the tunnel and also, this skin extension minimizes traction injury to blood vessels and the subdermal plexus. This also reduces the compression of the pedicle by a hematoma or a lack of elasticity in the skin over the roof of the tunnel. Dhamangaonkar and Patankar[19] described a utility of the RSFF with a cutaneous pedicle. Flap survival was 89.21% in his series. Abdellah et al.[20] in their study showed that modification of sural flap by preserving a lane of skin over the pedicle and open passage between donor and recipient site increase venous return of the flap and increase flap viability. Price et al.[21] emphasizes the importance of careful dissection to incorporate a wide adipofascial pedicle. Sugg et al.[22] in their study recommended a pedicle width of at least 4 cm to maintain venous drainage and preserve flap viability.

Flap delay was not done in any case to reduce venous congestion. Foran et al.[23] modified the procedure by delaying in inset of flap for 5days to 2 weeks for reducing venous congestion. 54.84% (17) patients noticed cutaneous hypoaesthesia along the distribution of sural nerve over lateral aspect of foot which improved within 6 months. Although some authors suggested that the sural nerve must not be taken with the flap[24,25], we took sural nerve with flap in order to increase vascularity of flap and to prevent damage to vascular structures.

Conclusion

Reverse sural island flap is a versatile, reliable procedure useful in reconstruction of the lower extremity. The vascular supply to the flap area is relatively constant. Venous congestion that occurs in few cases can be reduced by modifying the design of pedicle area by including a skin extension with pedicle and keeping pedicle length to width ratio of 3:1. It's easy planning and straightforward harvesting technique have made it a popular choice for reconstruction of these defects.

Conflict of Interest

There is no conflict of interest regarding the research, authorship and publication of this article.

References:

1. R Gopalakrishnan, M Rajalingam, B Rajagunasekaran, R Esakimuthu. A clinical study on reconstruction of small and medium sized defects of tendo Achilles and heel regions with fascio cutaneous flaps. International Surgery Journal 2020 Jul;7(7):2294-2299.

2. Surya Rao Rao Venkata Mahipathy et al., A Clinical Study on Islanded Reverse Sural Artery Flap for the Reconstruction of Defects over the Lower third of Leg and Foot. Journal of Clinical and Diagnostic Research. 2017 Dec, Vol-11(12): PC01-PC06.

3. Kaya Turan, Mesut Tahta, Tugɇrul Bulut, Ulas Akgün, Muhittin Sener. Soft tissue reconstruction of foot and ankle defects with reverse sural fasciocutaneous flaps. Rev bras ortop.2018; 53(3):319–322.

4. Kumar Satyapal. Study of versatility of reverse sural fasciocutaneous flap for reconstruction of lower third leg defect. International Journal of Medical and Health Research 2019; 5(2):112-119.

5. Singh S, Naasan A. Use of distally based superficial sural island artery flaps in acute open fractures of the lower leg. Ann Plast Surg 2001;47: 505–510

6. Alam Mk, Shaheen Ms, Hossain S, Anam S, Rahman S. Sural Island Flap – A Good Option For Coverage Of The Exposed Heel (Tendoachillis). J Dhaka Med. Coll. 2010; 19(1): 19-24.

7. Antonio Rý´os-Luna, Manuel Villanueva-Martý´nez, Homid Fahandezh-Saddi, Fernando Villanueva-Lopez, Miguel del Cerro-Gutie´rrez . Versatility of the sural fasciocutaneous flap in coverage defects of the lower limb. Injury, Int. J. Care Injured 2007; 38: 824-831.

8. Pierluigi Tos et al., Perforator based Propeller flaps treating loss of substance in the lower limb, Journal of Orthopedic trauma: 2011;12: 93-99.

9. Mustafa Yilmaz, Ozlem Karatus, Ali Barutcu. The distally based superficial sural artery island flap: Clinical experiences and modifications. Plas. Reconstr. Surg. 1998;102:2358-2368.

10. Ciofu RN, Zamfirescu DG, Popescu SA, Lascar I. Reverse sural flap for ankle and heel soft tissues reconstruction. Journal of Medicine and Life 2017;10(1):94-98.

11. Costa–Ferreira A, Reis J, Pinho C, et al. The distally based island superficial sural artery flap: clinical experience with 36 flaps. Ann Plast Surg 2001;46:308–313.

12. Hyun Il Lee, Sung Han Ha, Sun O. Yu, Min Jong Park, Sang Hoon Chae, Gi Jun Lee. Reverse Sural Artery Island Flap With Skin Extension Along the Pedicle. The Journal of Foot & Ankle Surgery xxx (2016) 1–6.

13. Saeed Samo, Zulfiqar Soomro, Zamir Soomro. Use of Distally Based Sural Artery Flap to Manage the Soft Tissue Defects of Lower Tibia and Ankle. Journal of Basic & Applied Sciences 2012;8: 625-628.

14. Pirwani MA, Samo S, Soomro YH, Distally Based Sural Artery Flap: A workhorse to cover the soft tissue defects of lower 1/3 Tibia and Foot. Pak J Med Sci. 2007; 23(1): 103-7.

15. K. Schmidt, M. Jakubietz and R. Meffert et al. The reverse sural artery flap–How do modifications boost its reliability? A systematic analysis of the literature. JPRAS Open 26 (2020) 1–7

16. Bhushan R. Patil, Chandrashekhar Wahegaonkar*, Nikhil Agarkhedkar, Bharat Bhushan Dogra. Extended reverse sural artery pedicle flap: a versatile and reproducible option for coverage of ankle and foot defects. International Journal of Research in Medical Sciences 2019 Mar;7(3):866-870.

17. Almeida MF, da Costa PR, Okawa RY. Reverse-flow island sural flap. Plast Reconstr Surg. 2002;109:583–591.

18. Nakajima H, Imanishi N, Minabe T. Neuro and/or Venoadipofascial Pedicled Flap. Presented at the 36th Congress of Japan Society of Plastic and Reconstructive Surgery, Morioka (1993).

19. Dhamangaonkar A C, Patankar H S. Reverse sural fasciocutaneous flap with a cutaneous pedicle to cover distal lower limb soft tissue defects: experience of 109 clinical cases. J Orthop Traumatol. 2014;15(03):225–229.

20. Price MF, Capizzi PJ, Watterson PA, Lettieri S. Reverse sural artery flap: caveats for success. Ann Plast Surg 2002;48:496–504.

21. Mohamed A, Wael S, Ashraf R, Hassan N. Modified Sural Flap To Cover Distal Lower Limb Soft Tissue Defects. Egyptian Journal of Orthopaedic Research 2020; 1(2): 91-101.

22. Kristoffer B. Sugg, Timothy A. Schaub, Matthew J Concannon, Paul S. Cederna, David L. Brown, MD. The Reverse Superficial Sural Artery Flap Revisited for Complex Lower Extremity and Foot Reconstruction. Plast Reconstr Surg Glob Open 2015;3:e519; doi: 10.1097/GOX.0000000000000500; Published online 22 September 2015.

23. Mark P. Foran, Jeff Schreiber, Michael R. Christy, Nelson H. Goldberg. The Modified Reverse Sural Artery Flap Lower Extremity Reconstruction. J Trauma. 2008;64:139 –143.

24. E Esezobor, Osita C Nwokike, S Aranmolate, John E Onuminya, Folake O Abikoye. Sural nerve preservation in reverse sural artery fasciocutaneous flap-a case report. Annals of Surgical Innovation and Research 2012,6:10. http://www.asir-journal.com/content/6/1/10

25. Osman E. Aydin, Onder Tan, Selma D. Kuduban, Ensar Z. Barin. Nerve Sparing-Distally Based Sural Flap. Wiley Online Library (wileyonlinelibrary.com) 26 April 2011: 276-280 . DOI 10.1002/micr.20868