

Reverse Sural Artery Adipofascial Flap, A Reliable Variant

Dr. Aaqil Shah, Dr. Rida Shahid

ABSTRACT

Spoke wheel injury is frequently seen case and more than usual seen mismanaged. The general awareness regarding this injury and the depth of injury is lacking in most emergency care setup which leads to unnecessary delay and complication in management. We encounter spoke wheel injuries frequently and as faced by many plastic surgeons find its reconstruction difficult as no option is the best option. We recently did reconstruction of spoke wheel with reverse sural artery flap which is well known reasonably reliable option but with a variation; converting it to adipofascial variant we believe improves aesthetics, decrease its bulkiness and better patient satisfaction.

Introduction

One of the most commonly seen foot injuries by plastic surgeons is spoke wheel injury, especially in our country where motorcycles is a large source for travel for most population. Spoke wheel injuries occur when the feet of passengers get trapped in the rotating spokes of the wheels of a bi-wheeler. First time these injuries were reported in 1948.^[1] Children's are most commonly effected as their smaller feet get more easily trapped in the moving wheels.^[2] Most injuries are seen on right foot most probably due to left sided chain guard placement. Overloading, inappropriate footwear, and absence of spoke guards and foot rests is most common cause of these injuries.^[3] Appropriate initial treatment and timely reconstruction is associated with lesser morbidity and higher patient satisfaction.^[4] Spoke wheel injuries are classified in four grades, grade 1 being skin loss with no

exposure of bone or tendon. Grade 2 injuries are when with skin loss there is exposure or rupture of Achilles tendon. Grade 3 injuries are when there is skin loss with TA defect associated with exposed calcaneum either intact or fractured. Grade 4 injuries are mangled foot with damage to neurovascular bundle. Each grade has different management and reconstructive plan. Reverse sural artery flap is reliable option for reconstruction of these injuries but is associated with significant donor site morbidity and patient dissatisfaction due to its bulkiness.^[5]

Case

We had two young boys with grade two spoke wheel injuries with defect involving posterior heel. Both had presented to us 3-4 days after injury, initially wound wash with debridement was done later on the defects were covered with adipofascial reverse sural artery perforator flap according to the defect size. A straight vertical incision was given on posterior calf in midline. Skin flap were raise away from calf fat and transverse incision was given at proximal limit of the flap

*Department of Plastic Surgery
Patel Hospital Multan.
Corresponding author: Aqil Shah
Email: a4aqil@gmail.com*

ligating sural artery, saphenous vein and sural nerve. Flap raised taking the calf fascia with it. Peroneal artery perforator was identified septas broken around the perforator and flap transposed over the defect loosely. Donor site was closed primarily and

split thickness skin graft was placed over the flap and secured with absorbable sutures and dorsal back slab applied with nursing in lateral position. Graft check was done on day 4 with opd follow up at day 7 and 14.

Case 1:



Fig 1: left, Necrotic skin over the Tendo-achilles area, Markings made for an adipo-fascial flap, middle; Adipo-fascial flap has been raised after making a midline incision in the calf, right; skin flaps sutured in the midline and Split thickness skin graft applied over the adipo-fascial flap.



Fig. 2: Upper left; picture after wheel spoke injury, Upper middle; After debridement of dead & necrotic tissues, upper right; Adipofascial flap raised after the skin flaps were retracted, lower left; Adipofascial flap about to be folded on itself is shown, Lower middle Adipo-fascial flap has been folded on itself to cover the exposed Tendo-achilles tendon & Calcaneus bone. Lower right; skin flaps sutured in the midline and Split thickness skin graft applied over the adipofascial flap,

Discussion

Spoke wheel injuries has been dealt by every plastic surgeon over course of their career but there is no consensus on best reconstructive options. Reverse Sural artery flap has been described for lower leg and heel reconstruction considerably in literature but it is associated with significant donor side morbidity especially donor site graft loss, high incidence of flap failure and large size leading to difficulty in walking and wearing shoes.^[6] Fasciocutaneous sural flap are bulky and is difficult to inset with thin skin around the ankle causing flap dehiscence and multiple debulking surgery with suboptimal results.^[7] Adipofascial variant of reverse sural artery flap is reliable form of very commonly performed flap requiring minimal learning curve and aesthetically pleasing results.^[8] There is just a vertical scar in posterior calf, the child can wear shorts, and the flap graft site is easily hidden in shoes. There is no need for change of shoe size as associated with its fasciocutaneous variant. Patient satisfaction is high as there is no need of flap thinning and readjustments. Other options for lower leg and ankle reconstruction and limited by size, unreliable blood supply, difficult inset or transposition and significant donor site morbidity with little added benefit to the patient.^[9] This flap is advantageous because there is short learning curve and almost every plastic surgeon has done these flaps in their residency, there is no sacrifice of any of the foot major blood vessels.^[10] Graft at posterior calf is unsightly, associated with higher incidence of graft loss especially over the tendoaponeurotic part of the gastronemius.

Conclusion

In the end we like to summarise by saying that as motorcycles remains a common mean of transport for most of our population we all see spoke wheel injuries in our clinical practice, timely management and reconstruction save times, undue complications and financial strain on the family and medical setup due to prolonged treatments.^[11] Adipofascial reverse sural artery flap is a reliable, easy, fast and aesthetically pleasing variation to mainstay fasciocutaneous reverse sural artery flap

Reference

1. Riess J. Verletzung endurch Fahrradspeichen. *Klin Med.* 1948;3:797.
2. Ahmed M. Motorcycle spoke injury. *British medical journal.* 1978 Aug 5;2(6134):401.
3. Suri MP, Naik NR, Raibagkar SC, Mehta DR. Heel flap injuries in spoke wheel accidents. *Injury.* 2007 May 1;38(5):619-24.
4. Farooq HU, Ishtiaq R, Mehr S, Ayub S, Chaudhry UH, Ashraf A. Effectiveness of reverse sural artery flap in the management of wheel spoke injuries of the heel. *Cureus.* 2017 Jun;9(6).
5. Gupta HK, Shrestha R. Bicycle-spoke injuries of the foot and ankle: A prospective study. *Journal of College of Medical Sciences-Nepal.* 2013;9(4):36-9.
6. Korompilias A, Gkiatas I, Korompilia M, Kosmas D, Kostas-Agnantis I. Reverse sural artery flap: a reliable alternative for foot and ankle soft tissue reconstruction. *European Journal of Orthopaedic Surgery & Traumatology.* 2019 Feb 4;29(2):367-72.
7. Kim KJ, Ahn JT, Yoon KT, Lee JH. A comparison of fasciocutaneous and adipofascial methods in the reverse sural artery flap for treatment of diabetic infected lateral malleolar bursitis. *Journal of Orthopaedic Surgery.* 2019 Feb 18;27(1):2309499019828546.

8. Saaiq M, Zimri FU. Reverse Flow Superficial Sural Artery Fasciocutaneous Flap: A Comparison of Outcome between Interpolated Flap Design versus Islanded Flap Design. *World Journal of Plastic Surgery*. 2019 Sep;8(3):316.
9. Crowe CS, Cho DY, Kneib CJ, Morrison SD, Friedrich JB, Keys KA. Strategies for reconstruction of the plantar surface of the foot: A systematic review of the literature. *Plastic and reconstructive surgery*. 2019 Apr 1;143(4):1223-44.
10. Sankhala SS, Gupta SP. Spoke-wheel injuries. *The Indian Journal of Pediatrics*. 1987 Mar 1;54(2):251-6.
11. Segers MJ, Wink D, Clevers GJ. Bicycle-spoke injuries: a prospective study. *Injury*. 1997 May 1;28(4):267-9.