International Surgery Journal
Gopalan G et al. Int Surg J. 2019 Jun;6(6):2041-2045
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20192363

Original Research Article

An analysis of post traumatic leg and foot defects

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Received: 15 February 2019
Revised: 22 April 2019
Accepted: 30 April 2019

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ABSTRACT

Background: Management of lower extremity trauma with bone and soft tissue injury is a challenging task with the aim of giving early recovery and durable good quality skin cover according to the skin defect and analyze various reconstructive options at various levels of injury. Our aim of the study is to analyze various reconstructive options for traumatic skin loss involving lower limbs especially knee and below knee, and analyze the incidence of age, sex and etiology of traumatic defects.
Methods: Prospective study in our plastic surgery department in the period of 24 months, with all the cases of traumatic defects of leg and foot where included. All age and sex patients were included.
Results: Most common cause for traumatic leg and foot defects are road traffic accidents followed by accidental fall and others, most commonly in males amounting 73%, children 10% and females 17%, among the skin and soft tissue defects upper and lower 1/3 leg defects are predominant. Among the soft tissue coverage split thickness skin graft dominating about 60% of cases, flaps 30% of cases, among the flaps 70% are fasciocutaneous flaps predominantly inferiorly based and 30% are muscle and musculocutaneous flaps, among the muscle predominantly soleus muscle flap was used to cover the defect.
Conclusions: Road traffic accidents dominating the cause for leg and foot defects , males are more commonly affected and upper one third leg defects are predominant for soft tissue coverage split thickness skin graft are commonest procedures followed that cutaneous and muscle flaps.

Keywords: Age, Fasciocutaneous flaps, Trauma, Sex

INTRODUCTION

Because of the improving road conditions and increasing vehicle movements increases the number of trauma victims especially younger age persons also have more complex injuries. So management of lower extremity trauma with bone and soft tissue injury remains a formidable problem.[1]

Treatment of lower extremity trauma has evolved over the last two decades to the point that many extremities that would have required amputation are now routinely salvaged.[2] Treatment requires a team approach with the orthopedic, vascular and plastic surgeon. Soft tissue management has improved over the recent years with a better understanding of anatomy by angiosome concept and use of local fasciocutaneous flaps, local muscle flaps and micro vascular free tissue transfers.

The goal of the reconstructive surgeon must be to salvage an extremity that is more functional than an amputated leg with prosthesis

Aim of study was to analyze various reconstructive options for traumatic defects of leg and foot, to analyze the incidence, age, sex and etiology of the traumatic

defects of leg and foot and to study the versatility of various flaps used in the reconstruction of traumatic defects of leg and foot.

METHODS

The study was conducted in the Department of Plastic Surgery, Govt. Mohan Kumaramangalam medical college Hospital over a period of 24 month (July 2016- June 2018). All the cases with traumatic defects of leg and foot were included in this study. No specific selection criterion was used. A total no of 294 patients were included in this study.

Uniqueness of leg and foot anatomy

Human's, being a bipedal anima, full weight bearing in the erect posture is on the two lower extremities. Muscles of the leg predominantly provide ankle function like dorsi flexion, plantar flexion, inversion and eversion.

So a significant functional muscle loss of the leg can be tolerated and bipedal ambulation with be still maintained. Therefore loss of leg muscles is not a contraindication for reconstruction and salvage of lower extremity. The bones of leg are tibia and fibula. Tibia provides 85% of the weight bearing of leg whereas fibula serves only as a structure for muscle and fascial attachments.

Normal sensation of foot is required for tactile sense, position sense and protection of vulnerable pressure bearing regions. So loss of the posterior tibial nerve with loss of sensation of the plantar aspect of the foot is a relative contraindication for lower extremity salvage.

Soft tissue reconstruction

Soft tissue reconstruction of leg and foot includes split skin grafts, local flaps, fascio cutaneous, muscle flaps, myocutaneous flaps, cross leg flaps and microvascular free flaps. Classification and reconstruction of leg and foot defects includes, knee defects, upper third leg defects, middle third leg defects, lower third leg defects, ankle defects, foot defects.

Knee defects-reconstruction

Skin grafts, local flaps (fascio cutaneous flaps, perforator flap, gastronemius muscle and musculocutaneous flaps), cross leg flap and free flaps.[3]

Upper third leg defects-reconstruction

Upper third leg defects Figure 1 covered by skin grafts**,** fasciocutaneous flaps as in Figure 2**,** gastrocnemius muscle and myocutaneous flap for large defects, soleus muscle flap**,** cross leg and free flap.[4]

Figure 1: Upper third defect.

Figure 2: Fasciocutaneous flap.

Middle third leg defects-reconstruction

Skin grafts**,** fasciocutaneous flaps**,** soleus muscle flap, gastrocnemius myocutaneous flap or gastrocnemius muscle and fasciocutaneous flap as in Figure 3 and Figure 4. Tibialis anterior muscle with split skin graft for small lateral defects-rarely used. Distant flaps like cross leg flap and free flap.[5]

Figure 3: Medial gastrocnemius muscle and superiorly based fasciocutaneous flap.

Figure 4: Medial gastrocnemius muscle and cutaneous flap.

Lower third leg defects-reconstructions

Lower third leg defects Figure 5 can be managed by skin grafts, fasciocutaneous flaps that includes inferiorly Figure 6 or superiorly based and either proximally or distally based (reverse sural).[6] Soleus muscle flap-either superiorly or inferiorly based are used to cover the defects. Distant flaps like cross leg flap.[7] Free flap, perforator flaps and propeller flaps gives more reliable soft tissue reconstruction.[8]

Figure 5: Lower third defect.

Figure 6: Inferiorly based fasciocutaneous flap.

Ankle defects-reconstruction

Skin grafts, local flaps, axial skin flap, lateral calcaneal artery flap, reverse sural fasciocutaneous flap, dorsalis pedis fasciocutaneous flap, reverse soleus muscle flap, extensor digitorum brevis muscle flap distant flap like cross leg flap and free flap.

Foot defects-reconstruction

Skin grafts, local fasciocutaneous flap, axial skin flap like lateral calcaneal artery flap, dorsalis pedis fasciocutaneous flap, reverse sural fasciocutaneous flap, medial plantar artery flap, toe fillet flap.[9] Muscle flaps like flexor digitorum brevis, abductor hallucis and abducator digiti minimi.[10] Distant flaps like cross leg flap and free flap.

RESULTS

A total number of 294 patients were included in this study from June 2016 to June 2018 and treated Table 1 shows year wise cases of leg and foot defects. The Table 2 shows age wise and sex wise distribution of traumatic defects of leg and foot.

Table 1: Incidence-year wise.

Year	No. of cases
June 2016-December 2016	71
January 2017-December 2017	153
January 2018- June 2018	70
Total	294

Table 2 also shows children account for only 10% of cases, most of the cases with traumatic defects of leg and foot area seen in males who account for 73% of cases, females present less frequently and account for only 17% of cases.

Table 2: Age and sex incidence.

Age group (in years)	Male	Female	Total
<12	19	10	29
>12	216	49	265
		Total	294

Table 3: Etiological incidence.

Etiology	No. of cases
RTA	244
Fall form height	30
Sport injuries	10
Gunshot injuries	Nil
Others	10
Total	294

Table 3 shows varies causes of traumatic injury involving the lower extremities, road traffic accidents area the commonest cause for traumatic defects of leg and foot followed by fall form height and others.

Table 4: Site wise incidence.

Site	No. of cases
Knee	29
Upper 1/3 leg	74
Middle 1/3 leg	30
Lower 1/3 leg	68
Ankle	64
Foot	29
Total	294

Table 4 shows middle third defects area less common when compared to upper third and lower third leg defects, lower third defects and ankle defects are almost equal in occurrence, foot defects are half that of lower third leg and ankle defects, ankle defects have presented in variety of ways; anterior, posterior, medial and lateral defects. Toilet injuries are almost equal in occurrence to traumatic

defects in ankle. Foot defects have presented as dorsal defect, plantar defect or heel pad avulsions.

Table 5: Type of surgery.

Procedure	No. of cases
SSG	176
Flap	88
Other	30
Total	294

Table 5 shows SSG was done for 60% of the case, 30% of the cases was treated with various flaps, among flaps local fasciocutaneous flap was done in 70% of cases. Local muscle and musculocutaneous flap was done in 30% of cases, cross leg flap was done in 2 cases and toe fillet flap was done in 2 cases with plantar defects. Vacuum assisted closure system was used in 2 cases and ultimately treated with a skin graft in one patient and a local fasciocutaneous flap in the other. Three free flaps were done.

Complications

Complications include total grafts loss was seen in 6% of cases, partial graft loss was seen in 17% of cases, most of the graft loss was salvaged by a re-graft. Remaining cases healed by secondary intention. Partial flap loss in 7 patients, total loss in 3 patients, flap loss in fasciocutaneous flaps was circumvented with split skin graft, total flap loss in a soleus muscle flap was salvaged by a fasciocutaneous flap, partixial flap loss in another soleus muscle flap was managed by advancing the remaining muscle.

DISCUSSION

Lower extremity injuries are increasing because of improved road conditions and increased number of vehicles and poorly following the road safety rules. More complex injuries are present nowadays needs more complex reconstructions.[11] Based on recent development in angiosome concepts and better understanding of flaps most of the injuries are managed very well.[12] Among the injuries road traffic accidents are more common and males are predominantly affected in our study group as mentioned in previous studies. Upper and lower third defects are more common than middle third defects. Children account for only 10% of cases. Most of the cases are seen in males who account for 73% of cases, females only 17% of cases. Lower third defects and ankle defects are almost equal in occurrence, foot defects are half that of lower third leg and ankle defects, ankle defects have presented in variety of ways; anterior, posterior, medial and lateral defects. SSG was done for 60% of the cases, 30% of the cases were treated with various flaps, among flaps local fasciocutaneous flap was done in 70% of cases, local muscle flap was done in 30% of cases, cross leg flap was done in 2 cases, cross leg flap is a life boat for failed reconstructions and toe fillet flap was done in 2 cases with plantar defects.[13]

CONCLUSION

Total of 294 patients with traumatic defects of leg and foot were treated during the period of July 2016-June 2018, males account for majority of the patients and RTA was the commonest cause, upper third and lower third defects of the leg and ankle defects account for most of the cases. Among the soft tissue coverage split thickness skin graft dominating about 60% of cases, flaps 30% of cases, among the flaps 70% are fasciocutaneous flaps predominantly inferiorly based and 30% are muscle and musculocutaneous flaps, among the muscle predominantly soleus muscle flap was used to cover the defect. Problems in reconstruction are mainly encountered in the ankle and lower third leg defects because, local tissue availability is very minimal in these areas. Perforator flaps (i.e.) Island fascio cutaneous flaps have negated the need for cross leg and free flaps. Of course there is a necessity for cross leg flap in some extreme situations, but their numbers have been drastically reduced.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Gopalan G, Dhanaraju S. An analysis of post traumatic leg and foot defects. Int Surg J 2019;6:2041-5.