

# Coverage of open Tibial Fractures: what to Do?

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## **Introduction:**

Standards for management of open tibial fractures have been set and practiced around the globe<sup>1</sup>. Our trauma burden is one of the highest in the world. According to W.H.O report on road safety published in 2013 there are 30,131 deaths per year due to RTA in Pakistan<sup>2</sup> and for every death there are 20 people injured. It means approximately 602,640 injuries per year due to road traffic accidents only. We have an array of other accidents like collapsed buildings, electrocution, machine injuries, agricultural injuries and last but not the least blasts due to the wave of terrorism in addition to RTA, that makes the number more formidable. Although no reliable national figures are available but we can get some estimate from Rescue 1122(rescue service of Punjab) data<sup>3</sup>. They transferred 75,265 injured persons per year to different hospitals.

**Key Words:** Tibial Fractures, Fasciocutaneous, Sural art hap.

Being a plastic surgeon of a society with massive trauma burden, every one of us is faced with patients requiring soft tissue coverage of open tibial fracture. Despite being such a common problem, still there is no consensus regarding treatment options.

There are certain management issues that are settled i.e. timing of surgery but there are two major queries regarding flap selection for tibial coverage.

1. Whether to use a local or free flap?
2. Which one is more suitable, fasciocutaneous or muscle flap?

We have tried to find answers for these questions keeping in mind our circumstances. In literature both local and free flaps have their advocates. Arguments in favor of local flaps include: shorter operating time, technical ease and usually replacement of like with like. The arguments against the use of local flaps include: zone of trauma extending into the tissue to be used, hence not very reliable, usually compromise the secondary

surgery needed for bony problems. Also donor site is usually cosmetically unsightly. Distal necrosis rate is approximately 15- 20% in local flaps<sup>4,5,6</sup> that is unacceptably high compared to the free flap surgery. These figures reflect that flap is compromised at the end where it is most needed hence should equate the total flap failure.

Another argument against the local flaps is that if patient ends up with below knee amputation due to any reason then stump formation will be compromised. This is particularly true in case of distal 3rd fractures. Local Fasciocutaneous flaps used to cover distal 3rd of tibia borrow the skin which is normally used for stump closure in case of Below Knee Amputation BKA. This means using skin graft or another flap (usually free flap) for stump coverage Free flaps proponents claim free flap success rate of more than 95%<sup>7,8</sup>, a clear winner over local flaps. It imports tissue to the injured leg thus not compromising already injured leg. Donor site is usually distant and hidden so cosmetic result is usually acceptable.

In our special circumstances of massive work load versus minimum manpower and resources, we should keep our options open. Local flaps should be used for coverage of small wounds and that too of low energy type.

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For large and high energy trauma we should go for free flaps because local tissue is usually injured and not suitable for fracture coverage. Our dictum is when in doubt go for free flap. For difficult defects, free flap can be an easy option.

Now we come to the second question of muscle vs. fasciocutaneous flaps. Generally it was agreed that muscle flaps contribute greater vascularity than fasciocutaneous counterparts<sup>9-13</sup>. Based on this fact muscle flaps were considered a better option for wound healing (bone union) and control of infection<sup>14</sup>. This concept has been challenged in recent years. <sup>15</sup> A recent study by James K.-K. Chan, Jagdeep Nanchahal and Lorraine Harry stats that fasciocutaneous flaps have even better blood supply per unit area than muscle flaps once transferred. But Muscle provides a bone anabolic environment through the expression of members of the transforming growth factor - $\beta$  super family of growth and differentiation factors, including the bone morphogenetic proteins. This results in better bone healing<sup>16</sup>.

Another factor to be kept in mind while deciding the flap for tibial coverage is the dead space. We feel that if there is dead space it should be obliterated and muscle flap is the better choice in this situation. Fasciocutaneous flap is usually tented over the dead space not obliterating it. This leads to the accumulation of exudate under the flap which ends up in infection in most of the cases.

As we have already mentioned that revisional surgery is relatively easier in case of fasciocutaneous flap than the muscle flaps. Also muscle flaps have high metabolic rate than fasciocutaneous ones and thus need more blood supply for survival than their counterparts. It means that fasciocutaneous flaps tolerate ischemia better than muscle flaps resulting in higher survival rate of fasciocutaneous flaps than muscle flaps. So fasciocutaneous flap is preferred choice if it

can serve the purpose.

We tend to ignore cosmesis and take it as non issue in lower limb but this is an issue and once healing is achieved, patients do complain about appearance of the limb. There is consensus that fasciocutaneous flaps have better cosmetic outcome compared to muscle flaps. However local fasciocutaneous flaps do create unsightly donor sites. Usually there are dog ears and persistent edema resulting in poor cosmesis.

When we consider our circumstances following are the facts.

Most of the plastic surgery units in the country have skills to perform microsurgical procedures so facilities are not an excuse any more. We believe in this time and age every trained plastic surgeon should be capable of microsurgery.

Workload is main problem in our set up. It's not always possible to do free flaps for every case. Sometimes despite all your intentions you find it hard to perform microsurgery because of heavy workload and you go for alternative options. This should be decided on merit because a failed local flap done inappropriately will land the patient in more trouble. However Local flaps cannot be condemned. They have their place and require more technical skill and knowledge to achieve good results. Also Adhoc perforator flaps are coming forward and sometimes a local perforator flap gives as good reconstruction as free flap.

Most of the patients present late with infection already there so eradication of infection is almost always an issue in our set up.

Our recommendations are

- In case of small defects due to low energy trauma, local flaps are the preferred choice.
- Large defects and high energy trauma wounds usually need free tissue transfer.
- If there is no dead space and fracture has no adverse features then fasciocutaneous flaps are the preferred choice.

In case of dead space or the fracture itself has difficult configuration, muscle flaps should be considered as the first choice.

**Here are few representative cases:**

FIG. 1 (A through C) Coverage of exposed ankle joint with Pedicled fasciocutaneous flap (reverse flow sural artery flap).



**FIG. 1(A)**

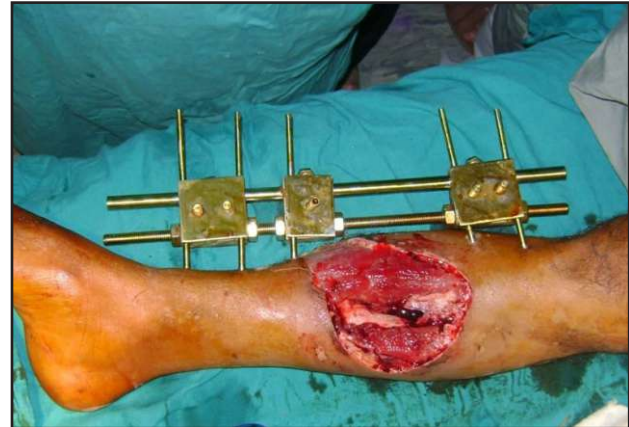


**FIG. 1(B)**



**FIG. 1(C)**

**FIGURE 2 (A Through C):** Coverage of open tibial fracture with free Anterolateral Thigh Flap.



**FIG. 2 (A)**



**FIG. 2 (B)**



**FIG. 2 (C)**

**FIG. 3 (A through C):**

Coverage of open tibial fracture of lower 1/3rd with distally based hemisoleus muscle flap.

**FIG. 3(A)****FIG. 3(B)****FIG. 3(C)****References**

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