

Efficacy of Denervated Gastrocnemius Muscle Flap for Leg and Knee Defects

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I. Aim

To compare the efficacy of denervated gastrocnemius muscle flap to gastrocnemius muscle flap for leg and knee defects

II. Materials And Methods

In a prospective study for a period of 24 months from jan 2017 to dec 2018, 25 patients with upper third leg and knee defects exposing bone and tendons were managed with gastrocnemius muscle flaps.Reconstruction was done for 15 patients with gastrocnemius muscle flap and 10 patients with denervated gastrocnemius muscle flaps as elective procedure . Among these 20 patients were associated fractures involving both tibia and fibula for which 12 patients underwent IMIL nailing and 8 patients had external fixation .

III. Observation And Results

Age group was between 20 yrs to 65 yrs.Out of which 18 were male and 7 were female.Leg defects were around knee and upper third of leg either medial or lateral or central defects exposing fractured bony segment or tendons. Follow up period was around 24 months with a minimum of 12 months. Among the 15 patients with routine gastrocnemius muscle flaps, wound as well as underlying fracture fragments healed well for 7 patients ,8 patients developed muscle retraction exposing bone within 15 to 30 days in 4 to 6 months follow up ,commonly seen in younger age groups.Among denervated gastrocnemius muscle groups, in 9 cases there were no retraction of gastrocnemius muscle in the immediate postoperative period and settled well in 4-6 weeks,In one case there was flap failure due to infected IMIL nailing

IV. Discussion

Anatomy

The gastrocnemius is the most superficial muscle within the posterior compartment of the leg .It has two heads which arise separately from lower femoral condyles . The anterior edge of medial head lies along medial border of tibia, while lateral head is separated from tibia by muscles of anterior and lateral compartments.

Posteriorly the muscle bellies converge in midline of calf and its tendons join with that of the soleus to form tendoachilles.

Action - plantar flexion of foot and flexion of knee

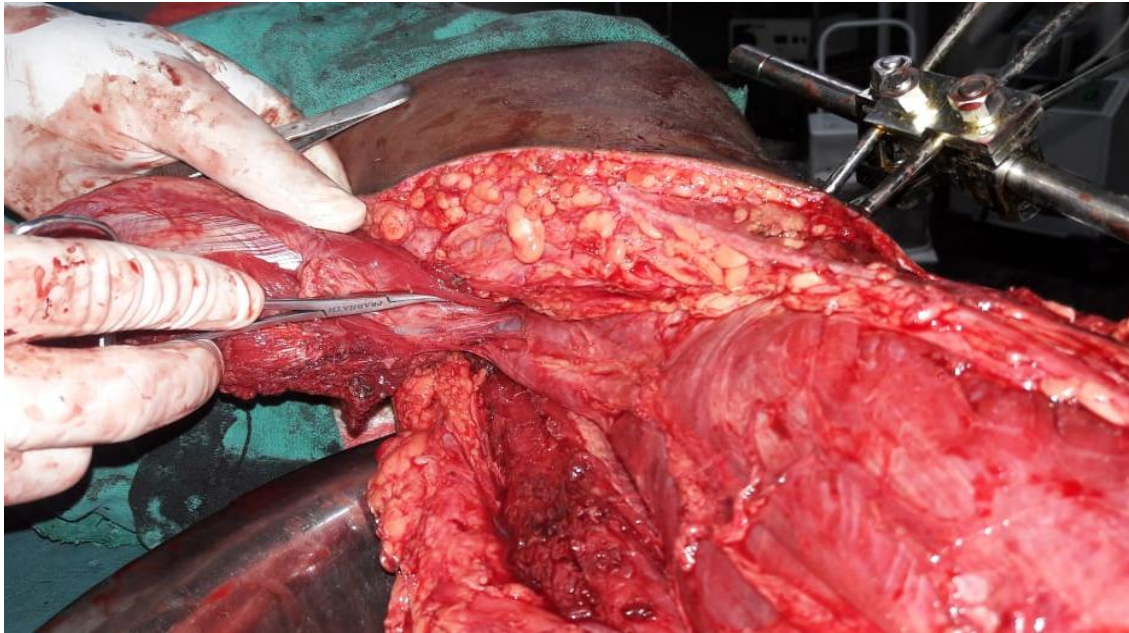
Blood supply - by independent medial and lateral sural arteries [Mathes and Nahai type 1] from the popliteal artery above the level of knee joint. Each courses a few centimetres with its venae comitantes before entering the anterior aspect of the proximal muscle belly with innervating branches of the tibial nerve and pass down the longitudinal axis of the muscle bellies.

Technique

The position of the muscle in the leg is determined by inspection and palpation .Dissection is generally done through posterior midline incision or incision extended proximally and distally from the leg defect depending on the side either medial or lateral .The sural nerve and short saphenous vein are two key landmarks which are seen in the midline and help to locate the natural cleavage between the upper two muscle bellies, and preserved.

The muscle fascia is split and junction of two heads is incised. Gentle blunt finger dissection is used to seek the plane between the gastrocnemius and the underlying soleus muscle and plantaris tendon.The loose

avascular areolar issue progressively swept through down to tendinous insertion junction of muscle with soleus. The muscle is transected distally with a cuff of tendon attached for use in fixation to the wound edge. In denervated muscle flaps, branch from tibial nerve is divided which will be *close to the pedicle of flap*. Sometimes to increase the length of muscle paddle, either tendinous origin of muscle or even a portion of muscle origin is released



Nerve close to the pedicle of flap



denervation procedure

V. Conclusion

In patients who underwent routine gastrocnemius muscle flaps, secondary wound breakdown due to muscle retraction was present in 7 cases which resulted in exposure of bone and ended up in further flap procedures. Among those cases, 5 patients we did ponten flap and 2 cases we did local transposition flaps. But in denervated muscle flaps,

- retraction is almost nil,
- muscle bulk at recipient site cosmetically good
- extra length also achieved
- Though denervated gastrocnemius muscle flap procedure takes extra time compared to regular gastrocnemius muscle flaps, but postoperative complications like muscle retraction, fracture site exposure and further secondary flap procedures can be avoided in patients which needs extra time and cost.



**Routine gastrocnemius muscle flap
preop-postop-delayed postop with muscle retraction**



**denervated gastrocnemius muscle flap
preop and postop**



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