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RESEARCH ARTICLE

FLAP COVER OPTIONS FOR KNEE SOFT TISSUE DEFECTS – AN INSTITUTIONAL EXPERIENCE.

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Key words:-
Knee reconstruction, Gastrocnemius flap, Vastus lateralis muscle flap, Lateral superior genicular artery perforator flap.

Abstract

Aim: To analyze the demography, presentation, surgical reconstructive options of soft tissue defects over knee and evaluate the complications thereby formulating working protocol for flap options.

Materials and methods: Among fifteen patients treated from August 2016 to November 2017, taken into the retrospective study , sixteen knee defects were reconstructed with various flaps. Demography, presentation, flap options ,Outcomes and complications were analysed to formulate the protocol for knee reconstruction.

Results: A total of 15 patients with age ranging from 27 – 65 years (median 42 years) with male dominance (ratio 14:1) who had treated with flaps for knee defects were included in the retrospective study. Trauma was the commonest causative factor of knee defects in 14 cases. Exposed implant[3] was the second most common etiology. We have reconstructed the knee defects with the gastrocnemius [2,6] and vastus lateralis muscle flaps [4], lateral superior genicular artery perforator flap [1], reverse anterolateral thigh flap [5,6] and saphenous flap. We encountered complications in two patients; 1. Wound dehiscence in Gastrocnemius muscle flap which was conservatively managed subsequently. 2. flap failure in Vastus lateralis muscle which was covered with saphenous flap.

Conclusion: With proper preoperative planning and by identifying the problems and requirements, we can do excellent durable coverage of the knee defects with high success rate.

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Introduction:-

Lower extremity trauma is common and often needs multidisciplinary approach involving Orthopedician, Vascular Surgeon and Plastic Surgeon. But management of soft tissue defects over the knee remains a challenge for both Plastic Surgeon and Orthopedician. There is always controversy in literature regarding the optimal management of knee defects. Muscle flap remains the standard of care especially in infected wound and wound with implant exposure. Perforator flap is the next option for knee defects. In case of free flap the recipient vessel is the key point to the reconstruction due to the deeper location.

So it is better to formulate the working protocol for the knee reconstruction with available data and facilities of the individual institute.

Materials And Methods:-

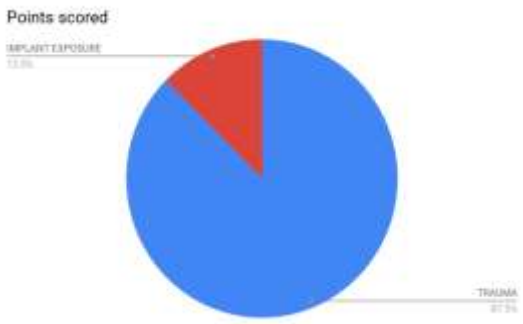
This is a retrospective study based on fifteen patients with knee defects of various origin who were treated surgically with flaps in SRM Medical College Hospital and Research Centre, Kattankulathur, Chennai from August 2016 to November 2017. The parameters analysed were demography, causative factor for the knee defects, flaps done and the postoperative complications.

Results:-

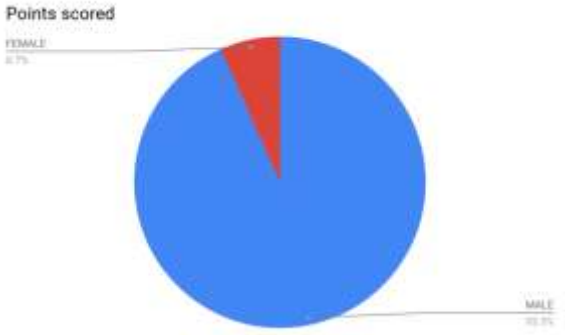
A total of 15 patients with age ranging from 27 – 65 years (median 42 years) with male dominance (ratio M:F 14:1) who had treated with various flaps for the knee defects were taken for the retrospective study. Trauma (n=14) was the commonest causative factor of knee defects. Exposed implant (n=2) was the second most common etiology. We have reconstructed the knee defects with the GASTROCNEMIUS MUSCLE FLAP (n=6) , VASTUS LATERALIS MUSCLE FLAPS (n=4), LATERAL SUPERIOR GENICULAR ARTERY PERFORATOR FLAP (n=3), REVERSE ANTEROLATERAL THIGH FLAP (n=2) and SAPHENOUS FLAP (n=1). We encountered complications in two patients; 1. Wound dehiscence in Gastrocnemius muscle flap which was conservatively managed subsequently. 2. flap failure in Vastus lateralis muscle which was covered with saphenous flap. All other flaps were survived without any complications except the two cases mentioned.

On analysing the complications, following reasons were found. In the first case, denervation of the Gastrocnemius could be done to avoid the wound dehiscence if the contraction of the muscle was the reason. Denervation of the muscle may take extra half an hour maximum which could be done routinely if feasible. In the second case, the failure of Vastus Lateralis muscle was due to primary bad degloving injury which was not known to us as he was primarily treated somewhere else.

Causative factors



sex distribution



Left knee defect

lsga perforator flap

Right knee defect

medial gm muscle flap

Well-settled gm flap

Failed vastus lateralis flap

failed vl flap- covered with saphenous flap

Discussion:-

The treatment of choice depends on the the wound dimentions and geometry, presence of gross contamination or infection and bone, tendon and implant exposure. The main stay of initial management of knee defects is thorough wound debridement excising the devitalized tissue.

Commonest cause for knee defect is post traumatic. Other listed reasons may be oncological resection, chronic infection, post surgical radiation, surgical release of post burn flexion contracture and wound complications following total knee arthroplasty with exposed implants.

Risk factors for problematic knee wound usually related to the patient's general condition, local wound status. Diabetes is associated with infection and wound dehiscence. Obesity may cause wound dehiscence and deep vein thrombosis. Local factors can be previous scars, major vessel trauma, local infection, tension at wound closure, surrounding skin degloving or previous irradiated skin.

In case of small defects, early grafting is preferable to secondary healing in order to avoid hypertrophic or contracted scars.

Pedicled muscle and musculocutaneous flaps are the work horse for the knee defects reconstruction and are specifically indicated for joint and prosthesis exposure and infected wounds. Muscle flaps obliterate the dead space and provide rich blood supply that facilitates the local antibiotic delivery and humoral immunity. Options available are GASTROCNEMIUS[2,6,10], VASTUS LATERALIS, VASTUS MEDIALIS, GRACILIS AND SARTORIUS. Among them, Gastrocnemius and Vastus Lateralis muscle flaps are commonly used.

Fascio cutaneous flaps are reverse Antero Lateral Thigh flap [13], pedicled or islanded lateral superior genicular artery perforator flap [11,12], saphenous flap, sural flap, Antero Medial Thigh flap etc.

Free flaps [8] are useful for extensive soft tissue defects and complex three dimentional defect. Free flap has the advantage of avoiding further scarring and trauma to the already injured limb. It needs surgical expertise and microvascular setup. Donor vessel dissection is really time consuming due to deeper plane and cost is a concern.

Treatment Protocol:-

On analyzing the results of our cases and the literature, the following protocol is formulated.

Size of the defect	No bone or implant exposure	Bone/tendon/implant exposed	Infected/ wound with dead space
<4 cms	SSG	Fasciocutaneous flap	Muscle flap
4-8cms	Fc flap	Fasciocutaneous flap	Muscle/ mc flap
>8cms	Musculocutaneous flap	Musculocutaneous flap [5,7]	Musculocutaneous flap
Extensive defect	FREE FLAP		

Conclusion:-

With proper preoperative planning and by identifying the problems & requirements, we can do excellent coverage of the knee defects with high success rate.

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