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Role of Autologous Platelet Rich Plasma in Cross-Leg Flap

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Abstract

Cross leg flap is a conventional flap for lower limb defects for long years where the local flap and free flap is not possible in the patient. The raw area created after raising the cross-leg flap in the donor leg was grafted with split skin graft. Split skin graft is a type of graft that contains epidermis and a portion of dermis and is commonly used to cover a raw area following trauma. Split skin grafts are commonly done in India following road traffic accidents to cover the affected site and raw area of the donor site of the flap. Split thickness grafting depends upon the raw area environment for its uptake and effective procedure. Autologous platelet rich plasma is an effective way to improve the graft take and survival. It contains growth factors which improves the proliferation and also has properties to improve blood supply. Autologous platelet rich plasma was also used to inject in the flap distal site in the cross-leg flap to increase the vascularity of the flap. In this case report we highlight the role of Autologous platelet rich plasma in the cross-leg flap and application of skin graft in the donor site of the cross-leg flap.

Keywords: Autologous platelet rich plasma; Cross-leg flap; Split skin graft; Lower limb defects.

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INTRODUCTION

Cross leg flap is a conventional flap for lower limb defects for long years where the local flap and free flap is not possible in the patient. The raw area created after raising the cross-leg flap in the donor leg was grafted with split skin graft. Split skin graft is a type of graft that contains epidermis and a portion of dermis and is commonly used to cover a raw area following trauma. Split skin grafting is a common procedure done in plastic surgery to cover affected areas with extensive application in management of wounds following road traffic accidents. The success of the procedure depends on

the uptake of the graft by the affected site and its survival. The key factor determining the survival of the graft is the microenvironment of the recipient bed. Autologous Platelet Rich Plasma (APRP) is an effective way to improve the effective uptake due to its properties. APRP increases the rate of healing due to the release of growth factors such as Platelet derived growth factor (PGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EDF) and fibroblast growth factor (FGF) and proteins which in turn increases cells such as macrophages and mesenchymal stem cells in the graft area which has regenerative properties and hastens healing with combined benefit of removal of necrotic tissue and debris.[1,2] It also promotes revascularization of the recipient bed increasing the graft survival. Autologous platelet rich plasma also nourishes the distal part of the cross-leg flap to improve the vascularity the flap. In this case report we highlight the role of Autologous platelet rich plasma in the cross-leg flap and application of skin graft in the donor site of the cross-leg flap.

MATERIALS AND METHODS

The study was conducted in the department of Plastic Surgery in a tertiary care hospital. Informed consent was obtained from the patient after explaining the nature of the study. The study is a non randomised prospective study. The patient was a 57-year-old male, with no known comorbidities. He was admitted following Road traffic accident involving right lower limb with degloving injury of the skin, exposure of the muscle. Soft tissue and bone with periosteal stripping of parts of tibia with the raw area extending from just below the knee joint to the ankle region. Patient was initially admitted in the orthopaedics department for fracture of mid segment of tibia. Wound debridement and external fixation was done followed by regular dressing and wound care. Patient was referred to plastic surgery for wound and flap cover. Initially managed with regenerative therapies like low level laser therapy, autologous platelet rich plasma, Centenella extract, prolotherapy, collagen scaffold dressing and cyclical NPWT. After regenerative therapies split skin grafting was done. The raw area over the distal end of the tibia was regrafted along with regenerative therapies. Cross leg flap after maturation of graft site was done using Colarado needle for raising the flaps. After raising the flap, the Autologous platelet rich plasma (Fig. 1, 2) was injected into the distal part of the flap site to increase the vascularity.

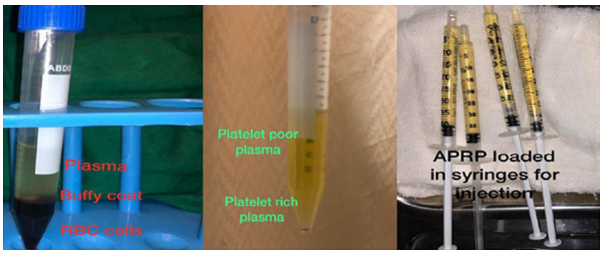

Fig. 1: Autologous Platelet Rich Plasma

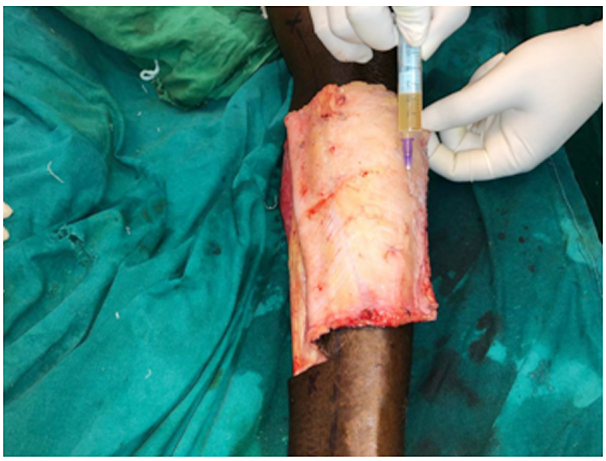

Fig. 2: Autologous platelet rich plasma injected to the distal part of Cross leg flap

To enrich theskingraft take, the donor raw area created post cross-leg flap elevation, Autologous platelet rich plasma (APRP) was sprayed and injected before applying the split skin graft was applied over the raw area. (Fig. 3)

Fig. 3: Autologous platelet rich plasma sprayed over the donor wound bed

A standard and validated technique of APRP as describedby Franco *et al.* and Li *et al.* was used.[1,2] The steps of APRP preparation were as follows: 10 mL of the patient's heparinized venous blood was taken and was centrifuged at 3000 rotation per minute for 10 min. The upper layer of the three

layers was taken and recentrifuged at 4000 rotation per minute for 10 min. After this step, the content was separated into two layers. The bottom layer of the plasma was rich in platelets and was aspirated using 18-gauge needle and was used to mix with the wound and to inject into the wound bed.

RESULTS

The graft take was well over the donor site on day 7 (Fig. 4). The cross-leg shows no signs of loss or necrosis at the distal part of the flap (Fig. 5). Furthermore, no complication noted in the post operative period. No flaplosspresents after 7days. The flap is ready for inset after flap delay.

Fig. 4: Graft take Post operative day 7.

Fig. 5: Cross leg flap after flap delay Day 7

DISCUSSION

APRP is a biological product defined as a portion of the plasma fraction of autologous blood with a plateletconcentration above the baseline. The contents of the APRP are not only platelets, but also growth factors suchas platelet derived growth factors, chemokines, clotting factors, and fibrin.[3,4] The concept and description of APRP started in thefield of hematology. It was used for patients withthrombocytopenia. In the coming days, Autologous platelet rich Plasma (APRP) has beenused in various other fields such as musculoskeletal field in sports injuries, cardiac surgery, pediatric surgery, gynecology, urology, plastic surgery, and ophthalmology.[5,6] Owing to its contents, the use of Autologous Platelet Rich Plasma (APRP) has been researched in the field of regenerative medicine in conditions such asalopecia, chronic wounds, and scar management. The mainstay management of wounds is skin grafting. The main part of the skin graft is the take of the graft, which is in three stages:

1. Stage of imbibition
2. Stage of inosculation
3. Stage of revascularization.

APRP aids in bridging the stages of skin graft take.[7] PRP functions as a tissue sealant and drug deliverysystem, with the platelets initiating wound repair byreleasing locally acting growth factors via α-granules degranulation. The application of APRP to STSG application sites has been recently described and the orized to provide immediate skin graft anchorage as well as inosculation of the Spit Thickness Skin graft with nutrient-rich bloodmedia.[8,9] Studies conducted by Gibran et al, onburnspatients, have proven that PRP is safe and effective forfixationofskin grafts due to its adhesive nature, and itsoutcomes are better than securing skin graft to wound margins or bed with sutures, staples, or glue, hence itnot only decreases the surgery time but also avoids theremoval of sutures/staplers in postoperative period. The wounds treated with APRP therapy alone healed in 4–8 weeks. Wounds treated with APRP and split skingraft/flapcover healed in 3–6 weeks.

CONCLUSION

Autologous platelet rich plasma (APRP) is a useful regenerative technology for improving the flap survival and skin graft take. This can be

easily adaptable and replicable in any centre. Large randomized control trials are required for validated results.

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