

Role of Autologous Platelet-Rich Plasma in Z-plasty

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ABSTRACT

Aim: Z-plasty is a commonly done procedure in plastic surgery. One of the complications that the surgeon is worried about is flap necrosis. Various precautions have been described to prevent this complication. We would like to discuss the role of autologous platelet-rich plasma in Z-plasty. **Methods:** Multiple Z-plasty incision given over the left ring finger post burn contracture. Intra-operatively, single injection of 2ml APRP given to the Z-plasty flaps. **Result:** The Z-plasty flaps were healthy, with well healed scars. **Conclusions:** We proposed that APRP can be used in Z-plasty. However, large randomized control trials are required for establishing its role.

Key words: APRP, Flap necrosis, Z-plasty

INTRODUCTION

Z-plasty, a technique introduced by Denonvilliers in 1856, is a common procedure done by plastic and reconstructive surgeons.^[1] It is the transposition of two interdigitating triangular flaps.^[1]

One of the most common complications is tip necrosis. This could be due to angle of flaps, the thickness of the flap, the location where it is being done, tissue handling, and the surrounding skin laxity. Tension in the flaps can invariably lead to tip necrosis. There have been various modifications described and various precautions explained to prevent this complication.

We have used autologous platelet-rich plasma (APRP) during the Z-plasty to prevent this complication. On the literature review, we have not found any similar reports and we wanted to share our experience.

METHODOLOGY

This study was conducted in the department of plastic surgery in a tertiary care center. Our patient was a 24 year female with

post-burn band contracture over the distal interphalangeal joint region of the left ring finger with apparent defect of 0.5 cm and true defect of 0.75 cm. Multiple Z-plasty was planned as the limb length required would be less compared to a single Z-plasty [Figure 1]. The little finger was treated by soft tissue distraction using Joshi's external stabilizing system fixator.

Intraoperatively, APRP was prepared using 10 ml of patient's blood, which was mixed with 1000 U heparin and centrifuged at 3000 rpm for 10 min in a centrifugation machine. The supernatant buffy coat is taken into a conical test tube and centrifuged at 4000 rpm for 10 min. The bottom 2 ml of the clear fluid obtained is APRP.

APRP was injected into the base of the flaps [Figure 2]. Regular dressing of the suture line done. Check dressing done on post-operative day 7 [Figure 3]. Suture removal done on POD-10. Flaps re-checked at 3 weeks.

2 ml of APRP obtained after centrifugation was injected into the base of the flaps intra operatively. Regular dressing of the suture line was done to check for status of the flaps.

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Figure 1: Pre-operative marking for contracture release of the left middle finger



Figure 2: Autologous platelet-rich plasma injected onto the transposition flaps



Figure 3: Postoperatively at 3 weeks with well-healed scar

On post-operative day (POD) 7 no flap necrosis was noted. Suture removal was done on POD-10. Flaps were rechecked at 3 weeks. The flaps were noticed to have settled well.

RESULTS

All the flaps healed with well. No complications noted at 3 weeks.

DISCUSSION

Z-plasty is a procedure that involves the transposition of two interdigitating triangular flaps. Z-plasty leads to gain in length along the direction of the common limb of the Z and there is a change in direction of scar.^[2] It is used to correct contractures of the oral commissure, axillary burn synechiae, and in joint mobility hindered by cicatricial bands. The flaps are typically designed with angles ranging from 30 to 90°. Angles of <30° may incur tip necrosis, and angles of over 75° create flaps that are difficult to rotate, creating dog-ears as well as increased tension. Variations in the traditional Z-plasty that involves unequal flap angles may be needed in the reconstruction of certain defects.

One of the known complications of Z-plasty is tip necrosis. This leads to healing by secondary healing and further scarring. There are various methods of prevention including meticulous handling, proper planning, and surrounding tissue laxity.

Our patient has scarred skin surrounding area due to burns for which we planned multiple Z-plasty. As the scar tissue might cause reduced transposition of flaps and the suture line will be in tension and hence, we have decided to use APRP as an adjunctive procedure to help prevent flap tip necrosis.

APRP contains several growth factors (e.g., platelet-derived growth factor [PDGF], vascular endothelial growth factor (EGF)) that are capable to stimulate angiogenesis and increase fibroblast cell differentiation, promote soft tissue healing.^[3] PDGF and EGF are the main growth factors involved in fibroblast migration, proliferation, and collagen synthesis. Increased concentrations of these growth factors are likely the reason for the accelerated soft tissue wound healing, which are suggested to be at least 2–3 times faster than that of normal.^[4]

These growth factors in APRP might have helped in angiogenesis and helped in the prevention of flap tip necrosis in our patients.

CONCLUSION

We proposed that APRP can be used in Z-plasty. However, large randomized control trials are required for establishing its role.

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