Journal of Global Public Health
Volume 5 Number 1, January – June 2023

Role of APRP in Management of Electric Burns

Neljo Thomas[1], Nishad K.[2], Ravi Kumar Chittoria[3], Barath Kumar Singh P[4], Jacob Antony Chakiath[5]

How to cite this article:
Neljo Thomas, Nishad K., Ravi Kumar Chittoria et al./Role of APRP in Management of Electric Burns/J of Global Pub Health. 2023; 5(1): 37–39.

Author's Affiliation: [1,2,4,5]Senior Resident, Department of General Surgery, [3]Professor, Department of Plastic Surgery Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor, Department of Plastic Surgery & Telemedicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

E-mail: kamalakarou@gmail.com

Received on: 08.12.2022

Accepted on: 29.12.2022

Abstract

Electric burns causes severe morbidity an and is a common problem in our country despite the advancement in safety. Electric burns extend from mild blistering upto deep burns with extensive charring of tissues. Electric burns wound is known to cause difficulty in wound healing as there can be extensive necrosis and thrombosis of the vessels. Wound bed preparation may be needed in such difficult to heal wounds. Cost friendly alternatives to commercially available resources are essential in our population which can widen the acceptance of plastic surgery among the common people. In this study we have used the patient's own blood for the preparation of platelet rich plasma using materials easily available in the hospital setup.

Keywords: Platelet rich plasma; Electric burns.

Introduction

Electric burns is a common problem in our country and includes low voltage household to high voltage burns. According to statistical data, 0.8-1% of accidental deaths are caused by an electric injury, with approximately one quarter caused by natural lightning. Statistics show that prevalence is higher among men, and it most commonly affects the young population and the working classes. Fatalities due to electric burns has come down due to progress in the field of household safety. Electric burns causes loss of tissue and the plastic surgeon faces difficulty in the wound management. Wound bed preparation is a new concept and is being done using the TIME method. The Edge is a component that involves granulation tissue for better healing. Various newer methods can be used to promote Edge in the wounds and one of the methods is platelet rich plasma. Recently in literature, we have come across autologous platelet rich plasma (APRP) for the use in wound bed preparation.

Materials and methods

This study was done in the department of Plastic Surgery at a tertiary care center after obtaining the departmental ethical committee approval. Informed written consent was taken from the patient. The details of the patient are as follows: 40-year-old female with no known co morbidities with h/o Accidental electric burns from household supply who presented to our casualty and sustained

circumferential 3rd to 4th degree burns over the left little finger with loss of vascularity of the distal part and 2nd degree burns over the medial aspect of the ring finger in the proximal phalanx. Patient was taken for little finger disarticulation after[1] week when the line of demarcation was developed. Following the procedure patient was dressed regularly. She developed a raw area of about 2x1cms over the medial aspect of the ring finger which did not show any evidence of healing (fig. 1).

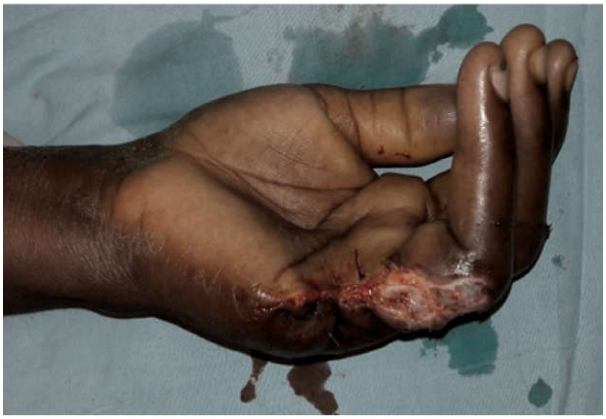
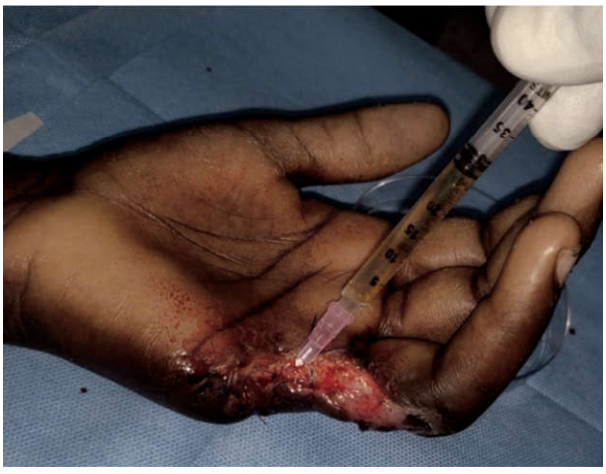


Fig 1: Electric burns raw area

Wound bed preparation was planned for the patient with platelet rich fibrin plasma harvested from the patient blood. Under all aseptic precautions the APRP was made by collecting 4.5ml of patient's venous blood and mixed with about 0.5ml of heparin. This was centrifuged at 3000rpm for 10 minutes and which provided three layers of which, the upper most layer was plasma, middle layer is buffy coat and the lower most layer is red blood cells. The upper most layer is then aspirated and centrifuged in a fresh conical tube at 4000 rpm for 10 minutes. This will yield platelet rich plasma at lower one third of the tube. The PRP was injected along the edge of the raw area and sterile dressings were applied (fig. 2).



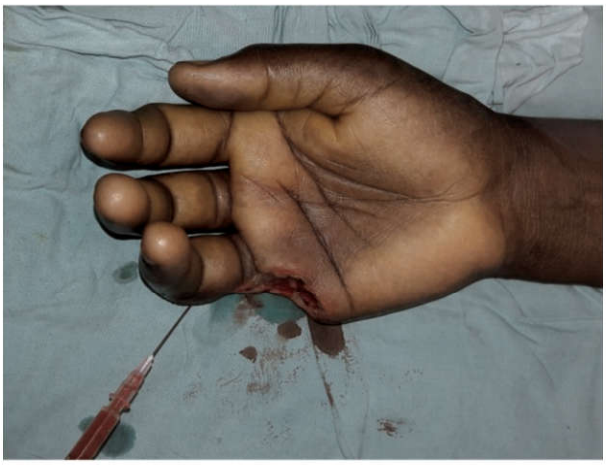
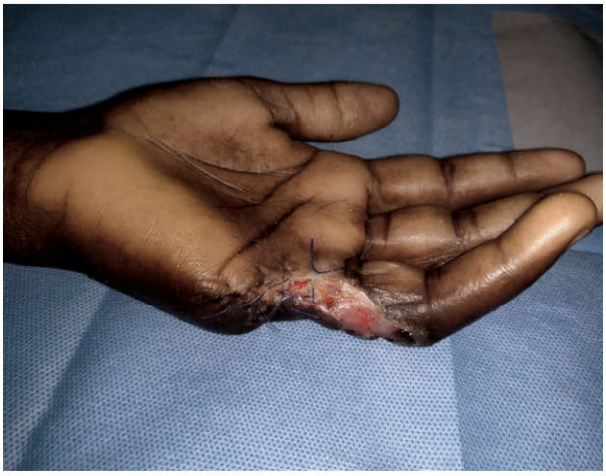


Fig. 2: Application of PRP on the raw area

The APRP was applied twice a week for 2 weeks. The wound was assessed after 2 weeks and found to have good granulation tissue.

Results

The wound showed good healing as evidenced by good granulation tissue (fig. 3).



Discussion

Burn injury is a major cause of injury to the human body, causing death and disability, with a prolonged healing period and high cost in hospital treatment. The mortality rate of burn injury has decreased with the newer treatment modalities, but secondary infections still affect the mortality rates. Early debridement with skin grafting has been successful, but lack of sufficient graft donor area and poor patient circumstances hinder skin grafting. In these circumstances, using products that increase the wound healing process may be used. For this purpose, different types of dressings

and pharmacotherapies have been developed, but most being costly, and the mechanisms underlying these therapies have not been fully studied.

Platelet Rich Plasma (PRP) is a biological product defined as a portion of the plasma fraction of autologous blood with platelet concentration above the baseline (before centrifugation).[1] PRP contains high levels of platelets and also the full complement of clotting factors, the latter remaining at their normal, physiologic levels.[2] It is comprised of a range of growth factors, chemokines, cytokines, and other plasma proteins.[3] PRP is a source of signaling molecules, and upon activation of platelets in PRP, the P-granules degranulate and release GFs and cytokines that will change the pericellular micro environment. Some of the most important GFs released by platelets in PRP include vascular endothelial GF(VEGF), fibroblast GF (FGF), platelet derived GF (PDGF), epidermal GF, hepatocyte GF, insulin like GF 1,2 (IGF-1, IGF-2), matrix metalloproteinases (MMP)2,9, and interleukin 8.[4,5]

The APRP is prepared from patient's own blood using meterials usually found in a hospital set up. A limitation is the total area to which PRP can be applied as only 10% of the blood collected can be converted to PRP. In this way, only small areas such as hands or neck can be treated, but even small benefits to these areas may represent a drastic improvement in the quality of life of the patient. Cost of commercially available PRP ranges from 13500-35000 INR.

Limitations

This was done on a single patient and needs large population based study to apply in practice. Lack of growth factor concentration analyses may have limited the investigator's ability to demonstrate the magnitude of increase in growth factor (GF) concentration in the PRP. However, it is reasonable to assume there was a higher GF level present in the PRP because the majority of the GFs are stored within the alpha and dense granules in the platelet cytoplasm.

Acknowledgment

Authors' contributions: All authors made contributions to the article

Availability of data and materials: Not applicable.

Financial support and sponsorship: None.

Conflicts of interest: None.

Consent for publication: Not applicable.

References

1. Alves R, Grimalt R: A randomized placebocontrolled, double blind, half head study to assess the efficacy of platelet rich plasma on the treatment of androgenetic alopecia. Dermatol Surg 2016;42:491–497.
2. Wroblewski AP, Melia HJ, Wright VJ: Application of platelet rich plasma to enhance tissue repair. Oper Tech Orthop 2010;20:98–105.
3. Lynch MD, Bashir S: Applications of plateletrich plasma in dermatology: a critical appraisal of the literature. J Dermatolog Treat 2016; 27:285–289.
4. Andia I, Abate M: Platelet rich plasma: underlying biology and clinical correlates. Regen Med 2013;8:645–658.
5. Ferrando J, Fernández-Sartorio C, González de Cossío AC, Navarra E: Tratamiento de la alopecia androgenetica con factores de crecimiento plaquetario. Monografías Dermatología 2016;42:491–497.