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Role of Microporous Polysaccharide Hemosphere Technology in Wound Healing

Shijina K[1], Ravi Kumar Chittoria[2], Vinayak Chavan[3], Abhinav aggarwal[4], Saurabh Gupta[5], Chirra Likhitha Reddy[6]

Author Affiliation: [1]Senior Resident, Department of Plastic Surgery, [2]Professor & Registrar (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery & Telemedicine, [3]Senior Resident, Department of Plastic Surgery, [4]Senior Resident, Department of Plastic Surgery & Telemedicine, [5]Senior Resident, [6]Senior Resident, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education & Research, Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor & Registrar (Academic), Head of IT Wing and Telemedicine, Department of Plastic Surgery & Telemedicine, Jawaharlal Institute of Postgraduate Medical Education & Research, Pondicherry 605006, India.

E-mail: drchittoria@yahoo.com

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Abstract

Hematoma and infection are the greatest enemies of a plastic surgeon. Various hemostatic agents are used in surgery. From application of direct pressure, use of tourniquets, ligatures, electro cautery, laser coagulation medical science is now exploring the use of various topical hemostatic agents. Here we share our experience with the use of micro porous polysaccharide hemospheres for hemostasis of split thickness graft donor site in 6 patients.

Keywords: MPH technology; Wound; Healing; Hemostasis.

Introduction

Attaining good hemostasis is an integral part of surgical advancements. Various methods of attaining hemostasis have been described. Together with conventional methods of attaining hemostasis, of late a lot of absorbable hemostatic agents are used in operating room for various surgical procedures. Here we describe our experience regarding the use of microporous polysaccharide hemospheres in attaining hemostasis thereby aiding in wound healing. The commercial information states that their use is indicated in surgical procedures as an adjunctive hemostatic agent in capillary, venous and arteriolar bleeding. This hemostatic agent has been available in the last few years but its use is limited to cardiovascular, orthopedics, spleen and liver and renal surgeries.

Materials and Methods

This study was conducted in the Department of Plastic Surgery in a tertiary care hospital during the March-April 2019. Informed consent was taken from participants who were included in the study. Study was conducted by institutional support and there were no conflicts of interest. The patients undergoing split thickness skin grafting were included in the study during study period. A total of 6 patients were included. The hemostatic powder based on Microporous Polysaccharide Hemospheres (MPH) technology commercially available was sprinkled on the donor site of split thickness skin grafting. (Figs. 1-3). The container containing hemostatic

powder is available in a quantity of 1,3 or 5 grams and can be sprinkled in a liberal amount at the site of bleeding within the wound. It is important to remove excess blood so that the hemostatic powder can be applied immediately and directly to the site of active bleeding. Direct pressure can be applied quickly over the treated site. Excess hemostatic powder needs to be removed if bleeding continues and needs to be reapplied. Immediately upon contact with fluid, the microporous polysaccharide hemosphere swells to 5 times its original volume. Once hemostasis is achieved, excess powder is removed by irrigation and aspiration. The cost of the hemostatic agent in 1 gm applicator is about Rs 2700 in India.

Fig. 1: Split Thickness Graft Donor Site

Fig. 2: Application of MPH hemostatic agent

Fig. 3: After application of hemostatic agent.

Results

MPH technology was used in attaining hemostasis of split thickness graft donor site in 6 patients. Donor site was usually left or right thigh. Time of attaining hemostasis was noted. We also assessed for complications.

Serial Number	Hemostasis Time	Complications
1.	4 minutes	Nil
2.	3 minutes	Nil
3.	5 minutes	Nil
4.	4 minutes	Nil
5.	4 minutes	Nil
6.	5 minutes	Nil

Discussion

Hemostasis is fundamental part of any surgical intervention. Various hemostatic agents are used in surgical practices and use varies according to the procedure.

Mechanical measures of attaining hemostasis include manual pressure, ligature or application of a tourniquet [1]. Bleeding vessels can be sealed by using cauterization methods such as electro cautery or laser cautery but these create areas of necrosis and char which increases the likelihood of infection and impaired wound healing [2]. Some of the commonly used topical hemostatic agents include fibrin glue, cyanoacrylate gel, oxidized regenerated cellulose, microfibrillar collagen [3]. These agents exert their effect through various mechanisms such as primary hemostasis, fibrin formation or inhibiting fibrinolysis [4].

MPH technology is another method of attaining hemostasis. MPH technology is used for application to surgical wound sites as an absorbable hemostat. This technology incorporates hydrophilic, flow able, micro porous particles synthesized by crosslinking purified plant starch through a proprietary process. The powder used is a fine, dry, sterilized white powder that is biocompatible, non-pyrogenic and is typically absorbed within 24-48 hours.

The particles are hydrophilic molecular sieves that enhance natural hemostasis by concentrating blood solids such as platelets, red blood cells, and blood proteins on the particle surfaces to form a gelled matrix. The gel matrix is formed regardless of the patient's coagulation status and it enhances normal clotting reactions and creates stable hemostatic plugs.

MPH technology is relatively safe and simple because it is biologically inert, contains no human proteins, has an extended shelf life and can be easily applied in a one step process [5]. It is helpful in accelerating hemostasis time in wounds [6]. Studies show that it may be ineffective in severe external hemorrhages [7]. It should be used with caution in the presence of infection or in contaminated areas of the body. The most common reported adverse events were pain related to surgery, anemia, nausea and lab values out of normal range. It should not be injected into blood vessels as potential for embolization and death may exist.

Conclusion

In the present study we used MPH technology in split thickness graft donor site in 6 patients and and we found the hemostatic agent to be useful in attaining rapid hemostasis without any discernable adverse effects, however this study was conducted in a limited setting with few participants, hence further multicentric large randomized controlled studies are required to ascertain the hemostatic agents further uses and complete safety profiles.

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