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Role of Application of Topical Nitroglycerine in Management of Flap Surgery

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Abstract

Flaps have been used for a long time for closure of soft tissue defects by plastic surgeons and form an important part of the surgeon's armoury, however 2% −22% of flap procedures led to necrosis in an observational study.[1] The search for an ideal intervention for ensuring flap survival still continues. Topical nitroglycerine has been found effective in prevention of flap necrosis in few studies.[2-4] In this article we share our experience with prevention of flap necrosis using topical nitroglycerine.

Keywords: Topical nitroglycerine; Flap necrosis.

INTRODUCTION

Flap surgery has been an important part of the plastic surgery practice but an important complication is flap necrosis. Interventions have been used in various forms to prevent the flap necrosis by improving the blood supply to the area by producing vasodilatation. The ideal method is to do a delayed flap surgery so that the choke vessels open up. However, most often patients don't prefer a second surgery. Nitroglycerinis a vasodilator and acts by releasing nitric oxide and thus relaxes the vascular smooth muscle.[5] Another known advantage is its antithrombotic capabilities. By increasing the calibre of the vasculature and ensuring the patency of the vasculature it increases blood flow to the area of application.[2]

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METHODOLOGY

This study was conducted in a tertiary care centre in the department of plastic surgery during the period of April to July 2020. There were two patients who underwentflap cover and we used topical nitroglycerine for prevention of flap necrosis. The cost of topical preparation of nitroglycerine was 34 rupees for 30gm.

Case 1

50 year female with h/o trauma and suffered injury to left distal forearm with loss of soft tissue over the lateral aspect, underwent hypogastric flap cover. (Fig. 1), topical NTG (Fig. 2) was applied at a low dose (4.5 mg) with repeated application (3 times daily) for 3 days 4 and continued till 7th post-operative day.

Fig. 1: Hypogastric flap

Fig. 2: Nitroglycerine ointment for local application

RESULT

There was no areas of flap necrosis seen at the end of flap division (Fig. 3a, b).

Fig. 3a: Flap after division

Fig. 3b: Flap after division

DISCUSSION

Successful use of topical NTG application to prevent flap necrosis was first reported in an animal model by Rohrich in 1984[6] and then in the human subjects by Schauer in 1986.[7] Nitroglycerine, or glyceryl nitrate, is an organic nitrate.[6] It is a direct vasodilator when applied topically, with solution, ointment, and transdermal patch available. It releases nitric oxide (NO) and activates intracellular cyclic guanosine monophosphate (cGMP) and inhibition of myosin light chain kinase, and therefore causes relaxation of vascular smooth muscle.[5] The increase in calibre of arteries and veins increases blood flow to the area of application[2] and has various results in reducing flap necrosis rates in animal models.[3,8,9]

It causes improvement in flap survival by releasing prostacyclin, which decreases thrombosis in cultured human endothelial cells.[6] Neovascularization was found to be the highest on day 7 after surgery in the rat model by Aral et al.[8] Therefore, repeated NTG application daily may be needed for at least 7 days and may also be needed due to its short half-life, which is less than a day.[10] It is detected 30 min after adequate plasma levels are attained and sustained for 4–6 h, with the therapeutic range in humans being greater than 1mg/ml6. Repeated application can be used as an alternative to an occlusive dressing.[10]

The possible complications that can arise are of hypotension, headache, and dizziness. However, in our study no patients developed any side effects. The advantage of topical nitroglycerine is that it is easy to apply and use.

CONCLUSION

In our study we have come to the conclusion that topical nitroglycerine is useful in prevention of flap necrosis, however ours is a small study and needs large scale RCT to bring the intervention to practice.

DECLARATIONS

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