Review Article

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Role of Botox Injection in Wound Bed Preparation in Diabetic Foot

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Abstract

Wound is a common problem following burn, trauma or infection. Decreased blood supply to the wound bed is an important cause for non-healing of wound. These chronic wounds are often difficult to manage. Botulinum toxin type A (Botox) improves blood flow by action on vascular smooth muscle to decrease vasoconstriction. In this article, we share our experience of using Botox for wound bed preparation in non-healing ulcer

Keywords: Botox; Diabetic foot ulcers.

INTRODUCTION

India is the world capital of diabetes. Diabetic foot ulcers are common complication of diabetic patients. If the diabetic ulcer is not managed properly, manyof the patients will undergo amputation. One of the cause of diabetic foot ulcer is microangiopathy. Unless the blood supply is improved most of the ulcers become non healing. There are various ways of improving the blood supplywhich include surgery like bypass procedures, variousdrugs which improve circulation systemically. Recently we came across in the literature the role of Botox in improving the circulation of tissue.[1]

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MATERIALS AND METHODS

This study was conducted in the department of Plastic Surgery in a tertiary care centre after the approval of departmental ethical committee. Informed consent was taken from the subject for thstudy. The details of patient was as follows, 70 yr male who is a known case of Diabetes mellitus for last 20 year on regular treatment, hypertensive for 5 year on regular medicine, dyslipidaemic for 5 year on treatment, noticed a small swelling on the left foot, spontaneous in onset. Swelling was associated with fever with chills but no pain. On examination: An ulcer was present at first web space of left wound, 5cm × 8cm, extending dorsally and on planter aspect. Pus discharge present, slough present, foul smelling discharge present. Ulcer extended about 5cm deep between metatarsal with poor granulation. Swelling of foot present. There was pale grannulation tissue present on the floor (Fig. 1).

Patient was evaluated with imaging studies, contrast MRI showed Findings s/o ulceration with inflammation involving the dorsum and the inner surface of the great toe, and the 1st web space

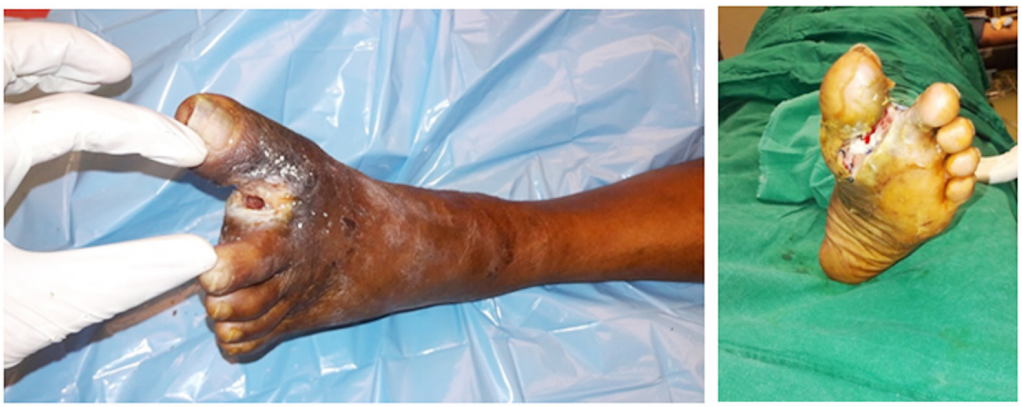

Fig. 1: Wound with unhealthy granulation

with ulceration extending till the bone surface and exposing the tendon surface at the attachment site on the proximal phalanx, Altered marrow signal noted in the proximal phalanx and distal phalanx around the interphalangeal joint of the great toe - s/o marrow edema. Ultrasound doppler of both lower limbs was done which showed Atherosclerotic wall thickening and mild luminal narrowing in bilateral PTA. Patient was treated conservatively with regular dressings. However the wound was not showing evidence of healing. it was decided to prepare the wound bed by giving trial therapy of BOTOX injection to the patient. (Fig. 2). Botox injection was given periarteriarly along the posterior tibial artery on same side. 100 units were given at injection site and a single sitting was given.

The wound was assessed weekly with regular inspection of wound. After 2 weeks post injection there was an increase in the blood supply which was shown by the change in color of the granulation

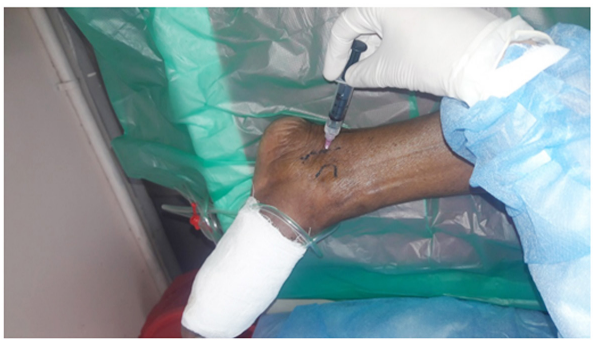

Fig. 2: Botox injection

tissue, which changed to bright red color from the pale granulation (Fig. 3). Post procedure investigation to assess the blood flow was not done on the patient because the investigations are only going to let us know about the condition of the vessel and not the tissue blood flow, but already there was improvement in the granulation tissue status.

DISCUSSION

Botulinum toxin type A (Botox) is widely

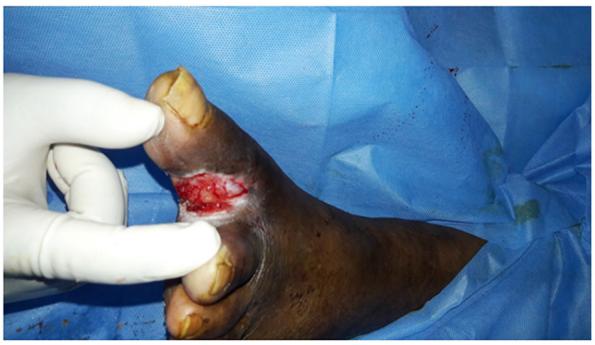

Fig. 3: Healthy granulation

used in facial aesthetics, migraine treatment, spastic muscular disorders (gastrointestinal), and hyperhidrosis of the upper extremity, oculomotor conditions in the pediatric population. Moreover, several collagen disordered skin conditions including digital ulcers and digital ischemia in Raynaud phenomenon and scleroderma. Botulinum toxin type A is produced by the *Clostridium botulinum*. Botox decreases muscular tone by inhibiting neurotransmitter response across neuromuscular endplate. Specifically, Botox affect the binding of SNARE (soluble NSF attachment protein receptor) proteins, thus stopping the release of acetylcholine, norepinephrine, substance P, calcitonin gene related peptide, and glutamate. The inhibition of these neurotransmitters has an effect on vascular tone. Botox blocks the

transmission of the norepinephrine vesicle, hence preventing sympathetic vasoconstriction of the vascularsmoothmuscle. It also blocks recruitment of specific α2-adrenoreceptor (alpha 2c), whichdecreases the activity of chronically up regulated C-fiber nociceptors. This leads to subsequent reduction in vascular smooth muscle constriction and pain. In addition, Botulinum toxin type A can decerease patients' pain by inhibiting the release of acetylcholine at the neuromuscular junction, blocking sympathetic nerves and increasing the pain perception threshold.[3] The toxin has a reversible paralytic effect that peaks around 1 to 2 weeks after injection. Neuronal activity starts to return around 3 months after injection. Factorsthat affect recovery include neuronal sprouting and molecular turnover within the neuromuscular junction.[4]

Minor complications includes pain, edema, erythema, ecchymosis, and hyperaesthesia.[5] The use of botulinum toxin is contraindicated in patients with known neuromuscular disorders such as myasthenia gravis, Lambert–Eaton syndrome, and multiple sclerosis. In these conditions, the toxin may aggravate muscle weakness.[6] The use of aminoglycosides, calcium channel blockers, cyclosporine, and cholinesterase inhibitors should be avoided because these drugs may potentiate the paralytic effect of the toxin.

Botox is commercially available and a single sitting of Botox therapy cost 22,000 rupees. It can be safely administered locally for treatment of vasospastic conditions without risk of systemic side effects. Compared with other therapies, patients only need to receive a single injection and is followed up in the clinic after discharge. Some studies have proposed using visualization techniques (ultrasound guided) with Botulinum toxin type A injection.[7] In addition, angiography and laser Doppler flowmetry can be used to assess microcirculatory blood flow changes after injection.[8,9]

CONCLUSION

This is a preliminary study to assess the usefulness of Botox injection management of non-healing ulcer. Botox injection can be used as an agent to prepare wound bed. It also speeds up healing and improves the blood supply to the area. More long-term clinical observations are needed to confirm the safety of Botulinum toxin type A injection, and broader application in different people is needed to determine whether there are individual differences in the response to Botulinum toxin type A.

LIMITATIONS

This was done on a single patient and needs large population based study to apply the finding in clinical practice.

Conflicts of interest: None

Source of funding: Nil

Authors' contributions: All authors made contributions to the article

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