Diabetic foot ulcer treatment management with lymphatic neuromuscular taping (NMT)

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Introduction

Foot ulcers are major complications of diabetes mellitus and are estimated to affect 0.5–3% of the global population of people with diabetes. Treatment, prevention and management of foot ulcers is of paramount importance and utilisation of different preventative strategies has been described in literature. The aim of this research study is to evaluate the possible integrative role of NeuroMuscular Taping (NMT) in the treatment of diabetic foot ulcers.

Methods

This is an observational study involving patients with 3 to 5 degree of diabetic wound classification. The Bates-Jensen Wound Assessment Tool (BJWAT) was used before and after four weeks of NeuroMuscular Taping applications.

Results

The BJWAT score significantly decreased after treatment with NMT application (p<0,05) evaluated with Friedman test.

Conclusion

NMT application seems to be a useful, non invasive and low cost treatment to associate with other treatments in the management of diabetic foot ulcers. **Clin Ter 2021; 172 (2):87-90. doi: 10.7417/CT.2021.2289**

Key words: Diabetic foot, wound healing, diabetic ulcer, peripheral oxygenation, NeuroMuscular Taping

Based on a large number of retrospective and prospective studies, risk factors for ulceration are defined in a variety of risk classification systems (4). The key factors that are present in each of these include peripheral neuropathy, foot deformity, peripheral vascular disease, previous foot ulceration and history of amputation of (or part of) the foot or leg.

For prevention and treatment most studies indicate callus removal, nail trimming, patient education, prescription of therapeutic footwear and advice on how to use footwear as possible strategies but evidence based to support the use of interventions that aim to prevent first and recurring foot ulcer in the at-risk patient with diabetes is practically nonexistent (7,8).

In the last years in Europe and recently in Indonesia a new method of vascular treatment has been introduced called NeuroMuscular Taping (NMT) (9).

NMT application on the foot, also applied in other parts of the body, has been stated as improving the peripheral circulation due to the skin wrinkle effect caused by tape being applied over the skin giving a dilation stimulation effect to the tissues underneath increasing blood circulation, enhancing the lymphatic system and reducing local inflammation (10).

Starting from the hypothesis that NMT application is able to improve vascularization on and under the skin where it is applied, autors have decide to ascertain the effect of NMT on diabetic foot ulcer healing process.

Matherials and methods

This observational preliminary study has been conducted from February 2017 to January 2018. Patients inclusion criteria were diagnosis of diabetes mellitus type 2 for more than 4 years, feeling tingling sensation on feet, being aged ≥40, having controlled blood sugar, having regular medical consultation checking their health condition, and having diabetic ulcers classified with the Wagner Ulcer Classification System (11).
Exclusion criteria were paralysis on the lower extremity, other neurological or orthopaedic involvement of the lower limbs.

Patients were evaluated using the Bates-Jensen Wound Assessment Tool scale before the application of NMT and after 4 weeks of treatment.

Bates-Jensen Wound Assessment Tool (BWAT), is used internationally to assess wound healing capacity in clinical practice. The BWAT consists of 13 wound characteristics: size, visible depth, wound edges, undermining and tunneling processes, necrotic tissue type and amount, exudate type and amount, surrounding skin discoloration, peripheral tissue edema, peripheral tissue induration, granulation tissue, and epithelialization.(12,13). Nine characteristics are subjectively rated on a 1–5 scale, with a value of 1 indicating the healthiest attribute and a value of 5 indicating the least healthy attribute of the characteristic. The remaining four characteristics (size, depth, edges, and undermining) are rated from 0 to 5 with a value of 0 indicating “none present”. The 13 wound characteristic item scores can be summed (with no weighting) for a total score ranging from 9 to 65 indicating profound tissue degeneration.

Taping application methodology

NMT standard application protocol for wound used a neuromuscular tape or also called kinesiology tape (colour blue) cut into single strips with a width of 6 mm and length of 15-20 cm. The tape used has elastic characteristics of extending 40% over its original length. Even so the tape was applied without any stretch applied to the tape (zero tension) and was applied starting 2 cm from the wound edge. The tape was applied in a longitudinal direction over the dorsal aspect of the foot and shin (foot positioned in plantar flexion) and over the plantar fascia (foot positioned in dorsal flexion) with the skin in a stretched position. This NMT application method is termed decompression as it creates less pressure over the skin than the surrounding areas creating a mechanical action of dilation. The tape is applied proximal, lateral and distal (where possible) to the wound depending on the wound healing phase. In the inflammatory phase, the tape was applied only in the proximal area, while in the proliferative phase, the tape was applied in the lateral, distal, and proximal areas. The tape was replaced every 3 days (2 times weekly) and complete treatment cycle of 8 treatments over 4 weeks (See figure 1). Standard wound treatment was continued over the 4 week period using primary wrapping used hydrogel, while the secondary wrapping used gauze and sticking plaster. Wound cleaning was done with low-pressure irrigation (8 psi) and high-pressure irrigation (13 psi) in accordance with the wound’s basic condition (14). NMT was applied after wound cleaning.

Results

Five patients with diabetic foot ulcers meeting the inclusion criteria were engaged for the case trial. The diabetic lesions were located on differing areas of the foot. No control group was used to verify the differences between treated with NMT and non. All patients received standard wound care procedures during the case study treatment period. All patients have degree 3 to 5 of diabetic wound classification (WAGNER) (see table 1). Patients were evaluated before and after treatment with the Bates-Jensen Score; a non parametric test has been used (Friedman) and results showed statistically significance (p<0,05) between pre-test (median 46, min 44, max 46) and post-test (median 15, min 13, max 16) as showed in Figure 2. A clinical example of diabetic foot ulcer progression is visible in Figure 3.

<table>
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<tr>
<td>(Wagner)</td>
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<td>Combination of</td>
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<td>the three areas</td>
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Fig. 1. NMT Application in Diabetic Foot Ulcers
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Discussion

Management of diabetes related foot and ankle problems is still debated. The International Working Group on the Diabetic Foot has created “Summary Guidance for Daily Practice” which summarises the essentials of prevention and management of foot problems in persons with diabetes; for example using appropriate footwear and other important interventions to restore foot perfusion to enhance healing of chronic ulcers of the foot (4). In this context NMT application may play an interesting role as showed in this study; it has already been hypothesized that NMT application may induce an increase in micro vascular circulation, results already described in Systemic sclerosis patients with a reduced Raynaud’s phenomenon (15), while in another study NMT vascular modification has been indicated in reduction of blood pressure in systemic arterial hypertension (16,17). A further case study indicated that dilation NMT applications modulates microRNAs involved in multiple sclerosis through possible improved vascularization (18). NMT has been used in recent years in different pathological conditions (19,20,21) with the aim to give a tactile and proprioceptive stimulation associated to microvascular function.

To our knowledge this is the first study evaluating this new, non invasive and low cost treatment as a supporting therapy in diabetic foot ulcer treatment. NMT application
methodology is probably able to improve the venous circulation and reduce edema encouraging increased lymphatic drainage from the wound area while improving ameliorate arterial circulation.

To corroborate these preliminary data it is desirable a randomized study using a larger cohort of patients also instrumentaly evaluating these clinical promising results observed in our patients.

All authors declare have no conflict of interest except for David Blow who is the Founder of the NeuroMuscular Taping Institute.

References