

# THREE YEARS EXPERIENCE OF TREATING 46 PAINFUL DIABETIC FOOT ULCERS WITH POLYMERIC MEMBRANE DRESSINGS\*



Charalambos Agathangelou, MD. PhD. Gerontology,  
ARITI Center of Assisted Living, Rehabilitation and Wound Care, Nicosia, Cyprus

## INTRODUCTION

The term "diabetic foot disease" (DFD) refers to a number of diseases that might involve any part of the tissues of a diabetic foot, including the skin, the soft tissues, and the osseous structures of the foot. The major causes of diabetic foot disease are peripheral arterial disease, diabetic neuropathy, biomechanical alterations in the structure of the foot, lower limb edema, hyperglycemias.

Early recognition and proper wound care are crucial to a good outcome for most diabetic foot ulcers. Otherwise foot ulcers may lead to serious infection, gangrene and lower extremity amputation.

Another major problem face by the diabetic patients with DFD and Ulcers is pain, an issue which has not been given a lot of significance in the practice arena. Bengtsson et al, 2008, point out that pain is a crucial problem in patients with diabetic foot ulcers.

In our Clinic we manage diabetic foot ulcers on the following universal principles; cleansing, debridement, control of exudate, preventing wound trauma and infection and also controlling pain. Even more we take into account changes in the skin such as appearance, structure, mechanical properties and barrier function due to ageing.

## AIM

Based on our clinical observations we came to the conclusion that we need to use a dressing that preserves the integrity of the ageing skin, is atraumatic, pain free, controls exudate and prevent infection, and suitable to the local clinical conditions of the diabetic foot. Therefore we decide to use a polymeric membrane dressing\* (PMD) which has all these characteristics and works in a unique way promoting healing.

We had treated 46 patients since 2009 with diabetic foot ulcers and mean age of 83. Two patient died due to other complications but their foot ulcers were nearly healed. All other patients were successfully treated.

## METHOD

We have treated 46 patients since 2009 with painful Diabetic Foot Ulcers.

15 were infected prior to treatment and initially treated with i.v. antibiotics, 6 were referrals after partial or below knee amputation. The rest were treated in their homes or at our nursing home. Exudate levels determined which type of PMD to be used.

## RESULTS

Within weeks pain levels dropped from an average of 8 to pain-free. The below knee amputations suffered from phantom pain but were helped by medication. Two patients died due to complications and 13 patients were treated at the rehabilitation center until full recovery, the rest were treated in their homes. The average healing time was between 4-6 months and we saw no infections during this period.

## DISCUSSION

At our Clinic we focus on continuous debridement, exudate control, preventing wound trauma and infection and pain control. We also take into account changes in the skin such as appearance, structure, mechanical properties and barrier function due to ageing. PMDs help us achieve our goals, as a single treatment modality it's effective for all phases of wound healing and doesn't require additional treatments or additives. As it is impossible to show all cases here I am presenting a representative selection of cases to show how the PMD works and supports our initial decision of using it as a single modality treatment.



A 66 year old woman with diabetes, poor circulation and retinopathy.

In spite of a powerful combination of prescription pain medication including oxycontin 40 mg several times a day she was in constant pain. Her medication made her tired and she kept drowsing off, unable to take care of her daily activities.



The wound had been open for 8 months prior to her first visit to our wound clinic. Previous dressings included:

- 1) hyaluronic acid with silver
- 2) calcium alginate cream,
- 3) iodine ointment
- 4) laser therapy.

The wound was covered with dry yellow slough; we could not touch her toe as she experienced severe pain in the surrounding area.



We started to use PMD moistened with 2 ml normal saline solution in order to instigate autolytic debridement.

PMD was moistened since the wound was dry. The color of the toe indicated poor circulation which was probably the cause of her severe pain.

Two weeks later we managed reduce the oxycontin to 20mg daily and 4 weeks later she discontinue completely the oxycontin and she was more alert and able to do her daily activities.



This is 88 year old paraplegic diabetic woman, mainly bedridden for the past 40 years. She developed a pressure ulcer on her foot and was recommended daily iodine foot soaks by her GP. Pain score 10 out of 10. A week later she was admitted to hospital for a partial amputation due to osteomyelitis. Due to poor circulation, hypertension, heart problems, elevated cholesterol and creatine indicating early renal failure, the operation was done under epidural as general anesthesia would have been too risky. The woman was discharged and referred to our wound center the day after the partial amputation. PMD was used on the wound, the aim was to alleviate pain, and instigate the healing process. Her pain level dropped to 3 during the first week of treatment and she did not require any analgesics. It only took 2 months to close this wound.



88 year old diabetic gentleman was referred to our clinic by his angio-surgeon for conservative treatment. He suffered from hypertension, renal and heart failure, overweight, and a heavy smoker, about 2 packets a day. 8 years ago the he had angioplasty of the superficial femoral, popliteal and tibial arteries. He came to us with an excruciatingly painful wound on his swollen first toe. He was taking oxycontin 20mg b.d. in order to alleviated pain. A new angiogram was done and it showed occlusion of the above arteries. However due to his multiple pathology, angioplasty could not be done again.

The wound had a moderate exudate level, and a pain score of 9 (on a scale from 1-10). We decided to use PMDs due to their unique properties in alleviating pain, and promoting healing. PMDs usually cause an increase of wound fluid so the patient was instructed to change the dressing on a daily basis; however the patient didn't always follow our instructions so there were episodes of maceration.

During the end of the second week of treatment, his pain levels dropped to 6 and oxycontin was reduced to 10mg b.d. By the end of the month, the patient did not complain of any pain and oxycontin was gradually discontinued.



## References

1. Beitz AJ, Newman A, Kahn AR, Ruggles T, Eikmeier L. A polymeric membrane dressing with antinociceptive properties: analysis with a rodent model of stab wound secondary hyperalgesia. The Journal of Pain. Feb 2004;5(1):38-47
2. Frykberg RG (2002), Diabetic foot ulcer: pathogenesis and management. American Family Physician, vol: 66, no.9 pp 1655-62
3. Waller JM, Maibach HI (2006), Age and Skin structure and function, a quantitative approach (ii): protein, glycosaminoglycans, water and lipid content and structure. Skin Research Technology, 12(3) pp 145-154
4. Cutting KF (2008) Impact of adhesive surgical tape and wound dressings on the skin with particular reference to skin stripping. Journal of Wound Care 17(4), pp 157-162
5. Boyko EJ, Ahroni J.H. Sensel V. Forsberg RG, Davigno DR., Smith DG (1999), A prospective study of risk factors for diabetic foot ulcers. Diabetes Care, 22, 1036-1042

79 old woman, insulin dependent the past 45 years. Bypass surgery 5 years ago. A duplex scan shows femoral artery/popliteal stenosis extending to the ankle, surgical intervention not possible due to her heart condition.

She came to me with an ulcer on her toe which has been opened for the last 16 months. Previous wound treatments were alginates, iodine solutions and she had recently undergone 25 sessions of hyperbaric oxygen therapy. She complained of an increasing burning/ stabbing pain in her wound. Her toe was red and hot and showed clinical signs of infection in spite of a negative swab. The wound was covered with yellow slough with exposed bone. The bone was extremely dry and porous but not loose. A silver cavity PMD was inserted into the cavity and covered by a moistened PMD to help speed up autolytic debridement. Her pains scores dropped from 9 to 6 the first week and then down to 3 after 2 weeks.

