A NEW TREATMENT MODALITY TO EXPEDITE HEALING IN THE CASE OF A TRANSMETATARSAL BREAKDOWN

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Introduction

Transmetatarsal amputation (TMA) is a durable procedure for the management of gangrene or infection confined to several toes, or if the disease process extends only a short distance past the metatarsalphalangeal crease. The main disadvantage of this amputation is the risk of nonhealing secondary to ischemia, infection, hematoma or a combination of these. The main advantage of a well-healed transmetatarsal amputation is excellent function. Open transmetatarsal amputation may be successful in the presence of infection and if no significant ischemia exists.

Many patients frequently have comorbidities such as diabetes mellitus, smoking history, end stage renal disease, and infrapopliteal arterial disease. Failure rates are associated with more proximal amputation and perioperative hospital mortality.[1-3] Strategies for success include adjunctive soft tissue procedures, revascularization procedures, reduction of wound pressure, and longer hospital stays to avoid early non-compliance.[3-4]

Purpose

This case report describes a 65 year-old male who sustained a gangrenous transmetatarsal breakdown, which was expeditiously salvaged with a new treatment modality, known as adaptive self- assembling peptide barrier scaffold (aSABS)*.

References

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Case Report

The patient is a 65 year-old male with a medical history of hypertension, dialysis dependent renal failure, coronary artery bypass, status post in December 2019 left below knee amputation and a recent right failing transmetatarsal amputation. Patient underwent a closed right transmetatarsal amputation for gangrenous toes in May 2020. This slowly began to fail and by November had extensive dry and wet gangrene present. The patient was referred to a vascular surgeon who recommended a right below knee amputation (BKA). The family sought a second opinion. He was seen by a second vascular surgeon December 2020 and was found to have extensive wet and dry gangrene present; however, by Doppler he had biphasic signals in both the dorsalis pedis and posterior tibial arteries. He was advised that there might be a chance to salvage the transmetatarsal amputation with vigorous weekly debridement coupled with daily wet to dry dressing changes but even that might not be successful.

The regime of weekly debridement by the surgeon and daily wet to dry dressing changes by health care workers produced a slow steady improvement. One month later, the wound appeared salvageable with only some peripheral dry gangrene and a 40% base of granulation tissue. In early February, the surgeon initiated treatment with aSABS with the hope that it might shorten the healing time and expedite the growth of a base of granulation tissue. This base is necessary for epithelial cells to grow over and lead to skin closure.

After 3 weekly treatments with aSABS as well as weekly debridements and daily dressing changes, there was a remarkable improvement in the wound. The wound shrank from 4 x 3 inches to 3 x 1.5 inches with a near 90% coverage of healthy pink granulation tissue. The serosanguinous drainage initially present nearly abated and peripheral dry gangrene considerably diminished.

The wound images prior to the start of the surgeon's treatment regimen and the subsequent chronology of healing shown in Figures 1-4.

Figure 1 Nov. 2020
Failing wound with wet to dry gangrene

Figure 2 Early Feb 2021
1st application of aSABS

Figure 3

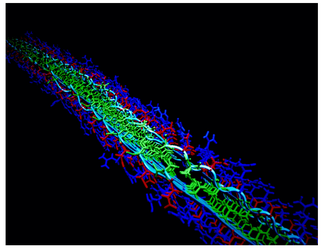
Figure 4

Wound healing progression over the course of 3 weeks after the 1st application of aSABS

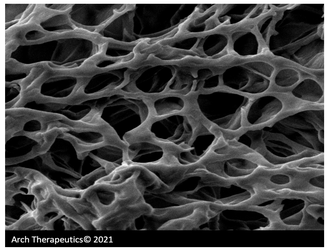
Discussion

Wound healing of transmetatarsal breakdown was significantly expedited with aSABS, a new wound management system. aSABS has been shown in prior clinical experience to promote healing of chronic, recalcitrant wounds, to provide a barrier of protection from biocontamination, to help reduce inflammation, and to provide a network for adhesion, migration, and proliferation of cytotypes fundamental to the cascade of wound healing.[5-7] aSABS mechanism of action derives from the physiochemical properties of its synthetic peptide. Upon exposure to ions in wounds, peptide units self-assemble into higher ordered nanofibrils and nanofibers before culminating in an entangled network. An extracellular matrix-like structure that contours to the macro and micro architecture of the wound milieu is formed. The network resembles that of collagen and provides a scaffold, enabling cell migration and proliferation as well as repair of damaged tissue

aSABS Nanofibril[8]



Electron Micrograph of aSABS[8]



Conclusion

The acceleration of wound healing as a result of the surgeon's treatment strategy played a crucial role in avoiding a BKA. As this is a single case study design, the conclusions drawn are limited to this particular case. Treatment of other patients with this new wound system may provide better understanding and outcomes for diverse wounds prone to failure and breakdown.

*AC5® Advanced Wound System, Arch Therapeutics, Inc., Framingham, MA