Continuum of Care with Copper Oxide Dressings

Can one dressing fits all stages of wound healing?

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Introduction

Copper Oxide Dressings (COD) have a known antibacterial effect and are approved by the FDA for use as antibacterial dressings. Nevertheless, numerous basic science studies document the beneficial effects of COD on tissue healing, angiogenesis, elastin and collagen secretion and improving skin parameters and viability. The molecular mechanisms of these actions were described in a diabetic mice wound model and cell culture studies. However, so far there has not been any documentation of continuum COD effect on all phases of wound healing in clinical use.

Methods

We have studied the effect of the continuum use of COD throughout all the wound healing stages during the last three years.

Results

We have seen the positive effect of the COD along all different stages of wound healing, including protection from microbial infection, stimulation of autolytic debridement, intense granulation tissue formation, epithelization, and improved skin maturation after wound closure. We describe selected cases in which COD were used for continuum wound care in various difficult clinical conditions.

The cases are full thickness skin necrosis with eschar formation after infection in front of the ankle; large exposed bone after trans-metatarsal amputation, wound necrosis after venous harvesting for cardiac bypass surgery and big heel void man after partial calcanectomy for pressure sore.

Discussion

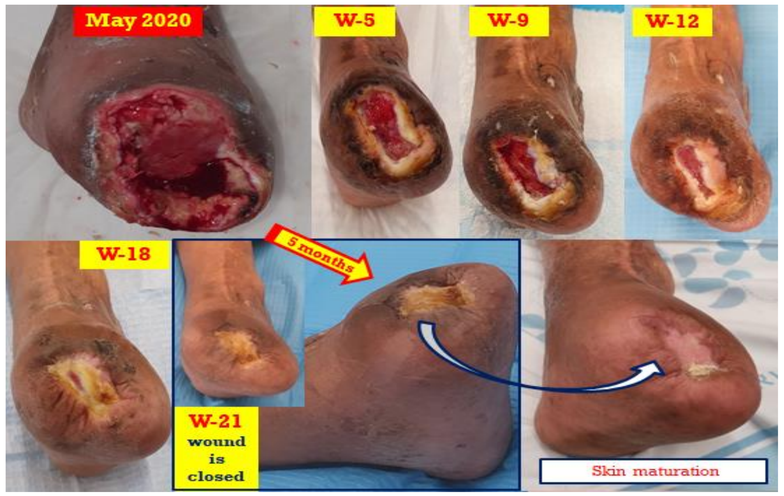
In all the cases described, the COD were applied from the onset of the wounds to the post wound closure period, substituting negative pressure wound therapy and skin grafting, with good functional outcome, good skin quality and reduced scaring and less cost. The effect of COD is in line with the basic science research. Taken together, our results indicate that the COD can fit all stages of wound healing and can be used continuously and throughout all the wound healing stages, making the wound management and treatment efficacious, facile, and comfortable to both the patients and treating staff.

Case No.1: 60 years old diabetic patient developed full thickness skin and subcutaneous tissue necrosis in front of the ankle secondary to infection from IV catheter in the ankle. CT (upper left corner) demonstrated the depth on the infection down to the extensor tendons.

The infection was eradicated with antibiotic treatment and debridement surgery was contemplated for the eschar, to be followed by skin grafting.

Home treatment with COD was without antibiotic treatment for the whole period. The eschar peeled away gradually, and the necrotic tissue underneath was auto-debrided by the growing granulation tissue. Epithelization happened almost from the beginning, with skin growth underneath the eschar first, and then over the granulation tissue.

At 5 months the wound was closed. COD was continued on the dry healed skin to promote maturation and a smaller eschar. It is noteworthy that the extensor tendons were never exposed as granulation crawled over them, thus their full function was preserved. Melamed, E., Rovitsky, A., Roth, T., Borkow, G. (2022) Archives of Clinical and Medical Case Reports 6: 501-510.



Case No.2: Trans-metatarsal amputation due to diabetic foot infection in a 46 years old woman. The patient skipped follow up visits due to the Covid pandemic. She came with stable huge non-infected wound. Debridement of skin edges and prominent bone was done leaving exposed bone. Treatment with weekly COD application was begun. Antibiotic was not prescribed, and no infectious episode occurred due to the antibacterial protection of COD. The copper also promoted granulation tissue formation and epithelization, leading to skin closure at 5 months. The thick keratotic layer was frequently observed with COD, due to its potent growing effect on the corneal layer. The corneal layer should be left to natural peeling. COD was preferably applied after skin closure to encourage maturation. Notice the pink skin at the center of the wound. Nevertheless, most of the wound regained normal looking skin that crawled from the periphery.

Case No.3: Cellulitis, dehiscence and necrosis of venous harvesting site for coronary bypass surgery in 68 years old woman with diabetes. Antibiotic was prescribed for the cellulitis. Bedside debridement was done. COD was utilized from admission until skin maturation. The continuum of care of COD included antibacterial activity, debridement, granulation tissue formation & epithelization.

Case No.4: On going case: 89 years old man developed pressure sore in the heel with necrosis while staying in bed after hip fracture. Wide debridement and partial calcanectomy was done. COD was applied at the end of surgery and replaced after 2 days. A clot was seen but the wound looked clean. Although NPWT was the usual treatment for such cases, the patient was treated with COD and discharged after 2 days. At 3.5 months the wound was nearly closed. Adhesive COD was applied 1-2 times a week and the dressing could be wet. The case demonstrates the continuum of care with COD, which affects granulation formation, epithelization and infection control. Antibiotic was prescribed for only 5 days post surgery.

Disclosure: Dr. Gadi Borkow is the co-founder and chief scientist of MedCu, the COD manufacturing company. Dr. Eyal Melamed is member of the advisory board of MedCu.