

Polyhexamethylene Biguanide (PHMB) Impregnated Gauze for Use in Treating a Gunshot Wound

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Introduction

Prevalence of self-inflicted firearm injuries is not accurately known¹. The inaccuracy of the information is thought to stem from reasons such as the victim fearing the stigma that may come from the accidental injury, insurance concerns, or embarrassment¹. This case study profiles once such instance, along with the creative and subsequent treatment of the resultant wound.

Case Study

A 66 year old generally healthy male (ZZ) shot himself in the left quadriceps with a gun. This was an accidental injury, which ZZ reported to be a product of accidental firearm discharge. The entry wound was on the top of the left quadricep, and the exit wound was on the lateral lower quadrant of the quadricep. At the time of initial injury, he drove himself to a local emergency department (ED), where the wound was cleaned and packed with plain packing gauze. As a part of the routine discharge instructions from the ED, ZZ was asked to follow up with the Wound Healing Center (WHC) for continuing wound care.

When ZZ presented to the WHC, the packing was removed, and the wound was examined by the Nurse Practitioner (NP). After gathering the history and evaluating the wound, wound care options were discussed with ZZ. However, the patient imposed strict limitations on the treatment plan. It was extremely important to him to keep these wounds a secret. ZZ did not want anyone to know that he had shot himself in the leg. He expressed deep embarrassment, and would not discuss any wound treatment option that was visible to others. To confound matters further, ZZ was not willing to participate in his wound care. He would not change the dressing, and did not like to even look at the wound. He would not consent to home care and refused to ask any family member to assist him. He also did not want to have daily dressing changes. He also wanted to have the wound closed as quickly as possible. Therefore, the goals of ZZ's treatment plan were to close the wound as soon as possible, and for the wound to not develop a secondary infection.

Problem

Man with a gunshot wound (GSW) on thigh will not participate in wound care treatment, nor allow anyone to know about the GSW. Wound dressing needs to last at least 2-3 days, and needs to accommodate packing a large dead space with connecting wounds. Wound treatment needs to address potential for infection, and must be discreet.

Solution

WHC staff had just been introduced to products that were impregnated with Polyhexamethylene Biguanide (PHMB), including packing strip, gauze and roll-type gauze. The nurse who admitted ZZ suggested that this product might meet all the needs of this patient, while adhering to the limitations imposed.

PHMB Information

PHMB is part of the Biguanide family, which are cationic antimicrobial agents. While there have been extensive reports of bacterial resistance to antibiotic agents, there has been limited study about resistance to antimicrobials^{2,3}. However, PHMB is known to be efficacious against several organisms, including gram positive and gram negative bacteria, as well as fungi and yeast⁴. PHMB has been found to be efficacious against bacteria for up to 72 hours.⁵ Also, in practically applicable research, it has been found that wounds treated with the antimicrobial gauze demonstrated a greater reduction in the total number of microorganisms, polymicrobial counts, when compared to plain gauze³.

Clinical Effects of Wound Treatment

Initial Visit: Entrance wound on dorsal thigh
Measurements: 1.2 cm l x 2.5 cm w with 8.4 cm to exit wound which measured 1.8 cm diameter
Lots of bruising and periwound discoloration.
No bone damage noted by clinician.
No odor present, and no exudate present.

Treatment Plan

Initial treatment was saline gauze packing—plain—patient returned to WHC next day, when treatment with PHMB impregnated gauze was begun. Cover dressing included PHMB impregnated gauze as well. Dressings were changed every Monday, Wednesday and Friday. The PHMB packing was moistened with saline. ZZ did NOT receive systemic antibiotic agents.

Conclusion

PHMB impregnated products allowed closure of this GSW in 88 days. The patient did not require systemic antibiotics at any time during the course of the treatment. ZZ also maintained a body temperature within normal limits for the entire treatment. We never deviated from the original treatment plan, and this dressing option allowed us to treat a patient's wound on his own terms. PHMB impregnated dressings may be a great option to decrease dressing change times, control/eliminate bioburden, decrease/eliminate the need for systemic antibiotics in many wound care cases. They should be considered as a viable treatment option in the wound care tool box.



Day 8 of treatment:
Periwound erythema resolved, and wound base is clean and 100% beefy red.



Day 30 of treatment:
Dead space between exit and entrance has decreased by 32%.



Day 70 of treatment:
Dead space between entrance and exit has decreased by 64%. Epibolyed wound margin, sharply debrided by Nurse Practitioner.



On Day 74 of treatment:
Exit wound closed, leaving entrance wound. Wound very superficial, and antimicrobial dressing treatment continued. The patient called the WHC two weeks later to tell us the wound was entirely healed, but did not come in to allow a photograph. PHMB products used with this patient included bulky gauze, roll gauze, packing strip, and 4"x4" gauze.

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