

An Ultrathin Bioresorbable Matrix With Antimicrobial Silver in the Treatment of Chronic Contaminated Wounds

Thea Price, MD¹

(1) Assistant Professor of Surgery and Director of Wound Care, Department of Surgery, Rush University Medical Center, Chicago

Contact: Thea_P_Price@Rush.edu



Introduction

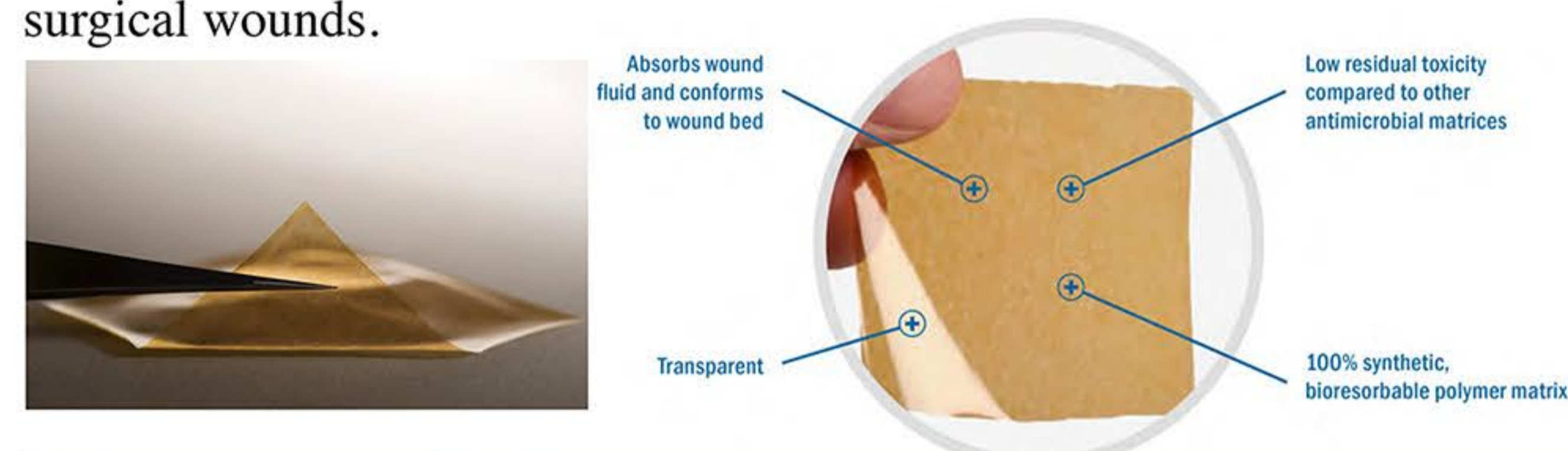
Chronic wounds reach a plateau of healing due to multiple factors which ultimately lead to a dysfunctional, stalled inflammatory response. Tenants of kickstarting the healing process rely on destruction of biofilm, control of wound moisture level, neovascularization, and resetting the inflammatory cascade with promotion of growth factors.

Methods

A single surgeon gives their experience with a bioresorbable silver matrix in a variety of wounds which have reached a plateau in healing due to surgical site infection, radiation, diabetes, pressure or poor vascularization. The use of an ultrathin polymeric matrix (only 20 μm thick) with antimicrobial silver creates a unique method of bactericidal action for 72 hours, accelerating wound healing while being fully resorbable giving the practitioner the ability to fully enclose it in wounds without the need for removal.

Bioresorbable Silver Matrix

A novel patented FDA-cleared class II (K153756) synthetic bioresorbable antimicrobial surgical matrix. It is indicated for the management of partial and full thickness wounds including pressure ulcers, venous stasis ulcers, diabetic foot ulcers, first and second-degree burns, abrasions and lacerations, donor sites and surgical wounds.



| Feature | Benefit |
|--|---|
| Synthetic and ultra lightweight (0.01 g/in ²) | Long shelf-life, can be stored in ambient conditions of battlefield, and can be easily carried by medic |
| Transparent and easy to use | Simply peel the pouch and place on the wound. No hydration or spreading required |
| Ultrathin (20 μm thick) | Self-conforms to wound bed with complex topography in < 10s. Ideal for combat wounds |
| Biocompatible and bioresorbable | Does not need to be removed, thus causes no pain on dressing reapplication. Supports cell growth and neovascularization. Suitable for implantation to reduce the risk of SSIs |
| Contains ionic and metallic silver | Ionic silver provides initial burst release of antimicrobial silver ions and silver nanoparticles dissolve gradually to provide sustained release of silver ions |
| Kills 99.99% bacteria | Prevents microbial colonization of surface and surgical wounds; broad spectrum antimicrobial activity including against drug-resistant MRSA and VRE |
| 10-15 $\mu\text{g}/\text{cm}^2$ silver (100x less than Acticoat [®]) | No toxicity, staining or irritation. Does not inhibit re-epithelialization |

Results

A fully bioresorbable silver matrix has widespread applications in promoting wound healing including a dehisced surgical site infection closed in a delayed primary fashion over the matrix with full closure in 2 weeks, breast wounds from radiation which are poorly vascularized and resistant to oral and topical antibiotics, and a range of diabetic, pressure and vascular wounds. It has also been utilized in grafts and donor site dressings.

| N.E. | J.B. | | L.W. |
|--|--|---------------------------------|---|
| 59 y/o F after total thyroidectomy for cancer 5.18.18 with tracheal perforation 5.27.2018 after failed repair. <u>Wedding in 27 days!!</u> | 65 y/o M after pneumonectomy for chondrosarcoma after Eloesser flap for empyema 3.14.2018 presents draining fistula in left axilla | | 68 y/o F after total mastectomy with reconstruction with chronic wound after radiation referred for chronic wound 8.15.2018 |
| 6.25.2018 - 1.5x1.5x0.5 cm* | 6.25.2018 left fistula - 0.4 x 0.4 x 4.5 cm* | 6.25.2018 Eloesser - 12x7x4 cm* | 4.4.2018 - Before radiation |
| | | | |
| 7.2.2018 - 0.7x0.8x0.2 cm* | CLOSED | 7.2.2018 - 11x5x3 cm* | 4.20.2018 - Before radiation |
| | | | |
| 7.11.2018 - 0.5x0.5x0.1 cm* | | 7.16.2018 - 7x5.5x3 cm* | 6.8.1208 Post radiation |
| | | | |
| 7.23.2018 - CLOSED | | 7.30.1028 6x5.5x3 cm* | 8.15.2018 1x2 cm* |
| | | | |
| 9.20.2018 | | 9.10.2018 4x3x2 cm* | 8.22.2018 0.5x1 cm* |
| | | | |
| | | | 9.5.2018 CLOSED |

Figure I. Accelerated wound healing in infected, malignant, and radiated chronic plateaued wounds. All secondary dressings standard per clinician preference and wound characteristics. JB was on chronic antibiotics due to ongoing treatment for malignancy. *Bioresorbable silver applied in clinic.

Conclusion

Bioresorbable matrix with antimicrobial silver has widespread applications from contaminated surgical incisions, allowing the wound to be closed instead of healing by secondary intention, to accelerated healing in grafts, to removal of biofilms and kickstarting stalled wounds from a variety of causes. Future directions include enclosure in surgical incisions, mesh, or hardware.