A Novel Technique utilizing Bioresorbable Matrix with Antimicrobial Silver to prevent Surgical Site Infections: Technical description and early experience

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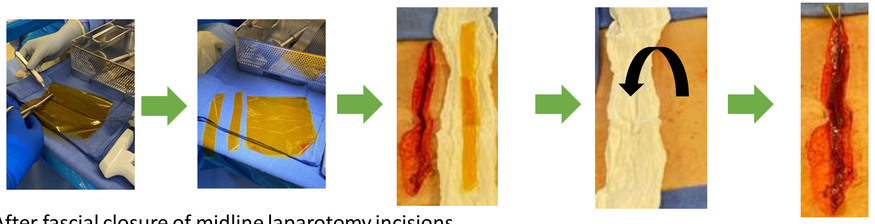
Background

- This **case series** describes the use of a **patented, synthetic, bioresorbable antimicrobial surgical matrix** that provides sustained release of antimicrobial silver ions for > 3 days to efficiently kill bacteria residing in surgical incisions.
- The material is bioresorbable and can be enclosed into a surgical incision, thus it is particularly suited to clearing microbial contamination in the surgical incision field and preventing superficial and deep tissue Surgical Site Infections (SSIs).
- Here we propose a **novel technique for the use of this matrix in the subcutaneous tissue during abdominal wound closure to prevent SSI.**
- We hypothesize that this technique could be a safe and effective strategy for further reducing the risk of SSIs in high-risk patients.

Methods

- Patients who were deemed to be at **high risk for SSI were candidates for treatment**.
    - This included contaminated and dirty cases, current smokers, obese patients or diabetics.
- Patients were excluded due to loss of follow-up, lack of high risk for SSI (defined above), use of this matrix in an open wound that was not subsequently closed, or its use in non-surgical/incisional wounds or not placed in an OR setting.
- The **bioresorbable matrix was placed in the subcutaneous space of surgical incisions and the skin was closed overtop**; full application technique discussed/shown above right.
- The **primary outcome was superficial or deep SSIs (as defined by the CDC) within 30 days of the index operation**.

Application Technique



1. After fascial closure of midline laparotomy incisions, antimicrobial matrix was placed in the subcutaneous tissue.
2. Using a 6x6 inch sheet, the nanofilm was cut into strips where the width roughly matched the depth of the wound, and then placed in the wound.
3. The wound was then closed using a subcutaneous and deep dermal layer of absorbable suture to obliterate the space.
4. Skin was then closed with either absorbable suture and adhesive bandage or staples.
5. The most **efficacious technique developed during the course of this mini-series** involved using a dry laparotomy pad to first lay out the matrix and then place it within the wound (images above)
    1. In this method, **the nanofilm was first cut into strips** using clean, dry scissors and then **placed on a clean, dry lap pad**.
    2. It was **then placed next the incision wound and the lap pad flipped** to place the antimicrobial matrix down into the wound.

Results

- Overall, there **were no major complications, no mortalities, and no adverse reactions** due to this antimicrobial matrix
- Of all 13 patients:
    - 2 patients suffered some minor wound cellulitis treated with antibiotics alone
    - 1 patient had superficial SSI treated with antibiotics and not requiring further intervention
    - 1 patient had deep SSI requiring I&D

n = 13 patients	
Female (n)	6 (46%)
Age (mean, years old)	61.9
Obese (n)	5 (38%)
Diabetic (n)	3 (23%)
Current Smoker (n)	4 (31%)
Clean contaminated case (n)	6 (46%)
Contaminated case (n)	2 (15%)

Conclusions

- Our **early experience** with this novel utilization of this bioresorbable matrix with antimicrobial silver **has been positive**, and we perceive several benefits to this technique over other topical treatments during wound closure.
- The film is completely bioabsorbable and easily contours to any moist surface making allowing the silver to penetrate the entire subcutaneous surface.
- The **greatest advantage is its prolonged antimicrobial effect**, allowing sustained treatment of the wound bed for at least 3 days after closure.
- We feel that **this technique could allow primary closure of wounds that otherwise would be left open** by providing sustained topical antimicrobial treatment to the subcutaneous tissue.
- The utilization of silver impregnated biofilms for prevention of SSIs is a novel concept and in our case series there were no major complications or adverse reactions.
- **Further study of this technique in a prospective, randomized controlled fashion is needed** to establish its safety and efficacy.

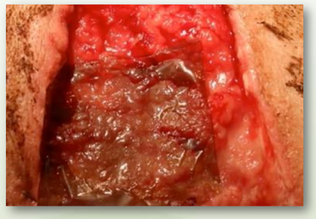


Figure: Bioresorbable matrix (2"x2") conformably adhered to the contours of a moist full-thickness porcine wound bed. (Unpublished image from Imbed Biosciences, used with permission).

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