Evaluation of a Novel Collagen Dressing Used with a Peel and Place Dressing

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Introduction

- Negative Pressure Wound Therapy (NPWT) with reticulated open cell foam (ROCF) has advanced wound care by promoting healing.
- Oxidized regenerated cellulose (ORC), a plant-derived material, combined with collagen, forms a dressing that stabilizes growth factors by inhibiting matrix metalloproteinases in the wound environment.

Purpose

- This study assessed the efficacy of a novel collagen/ORC antimicrobial dressing (COA) used with an integrated peel and place NPWT system (PnP) in enhancing wound healing and granulation tissue development in a porcine model.

Methods

- Three domestic swine with full-thickness surgical wounds were treated over seven days with either a standard collagen dressing* or COA.
- Treatments were paired with either traditional NPWT using ROCF dressing† with a dressing change on Day 3, or a single-application integrated peel and place dressing‡.
- The dressing was connected to a negative pressure therapy unit§ and continuous negative pressure at -125 mmHg was applied to all wounds.
- The study was approved by the Institutional Animal Care and Use Committee (IACUC) and conducted in compliance with applicable regulations.
- At study conclusion, tissue samples were collected for histopathological and morphometric analysis to evaluate granulation tissue quality and thickness.
- Wound volume and area were measured on Days 0, 3, and 7 using 3D photographic imaging.

Results

- No significant differences were found in re-epithelialization percent, bacteria, edema, or serocellular crust thickness between the Collagen/ORC + ROCF with a dressing change at Day 3 and the Collagen/ORC + PnP with a single 7-day dressing placement
- Total wounds treated included: COA + PnP = 6; COA = 4; Collagen/ORC + PnP = 12; Collagen/ORC + ROCF = 6; and PnP = 2.
- Treatments were paired with either traditional NPWT using ROCF† with a dressing change on Day 3, or a single-application integrated peel and place dressing‡.
- 3D photographic imaging for area and volume were not significantly different between all treatment groups (**Figures 1-2**).

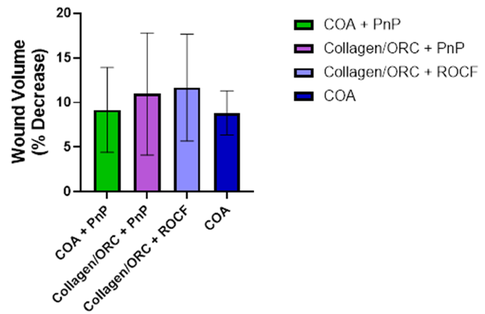

Figure 1. Wound volume (% decrease) from Day 0. Note PnP alone not graphed due to small sample size (n=2).

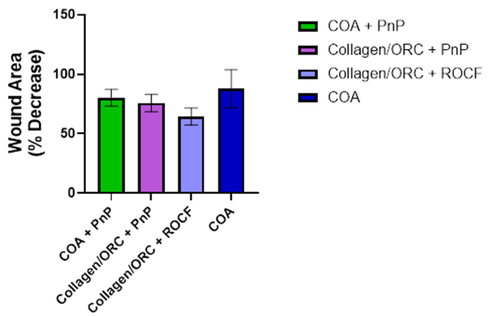

Figure 2. Wound area (cm^2) from Day 0. Note PnP alone not graphed due to small sample size (n=2).

Results (Cont'd)

- Tissues were trimmed per instructions, photographed, processed for paraffin infiltration, embedded, sectioned, mounted on slides, routinely stained with Hematoxylin & Eosin (H&E).
- Granulation tissue maturation was consistent across all treatment groups, with notable collagen deposition for collagen/ORC and COA treated wound sites (**Figures 3-5**).
- Histopathological findings were similar across treatments, including granulation bed maturity, inflammation, fibrosis, neovascularization, and hemorrhage. Inflammatory markers were not elevated, and no edema or seroma was detected.
- Although major histological differences were not observed, wounds treated with COA + PnP showed a significant difference ($p<0.05$) in wound area as compared to other treatment groups.
- Wounds treated with PnP had slightly more re-epithelialization than other treatment groups, however, not significant (**Figures 6-7**).

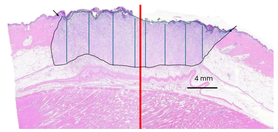

Figure 3. Peel and Place (PnP). Red line denotes the junction of two combined slides.

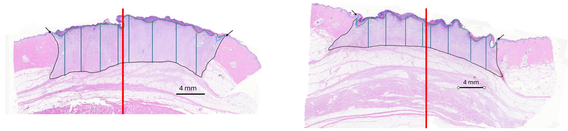

Figure 4. L to R: COA, COA + PnP. Red line denotes the junction of two combined slides.

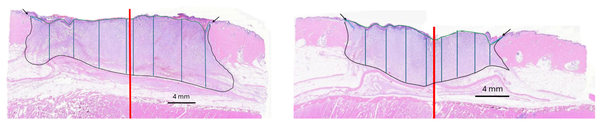

Figure 5. L to R: Collagen/ORC + ROCF, Collagen/ORC + PnP. Red line denotes the junction of two combined slides.

Results (Cont'd)

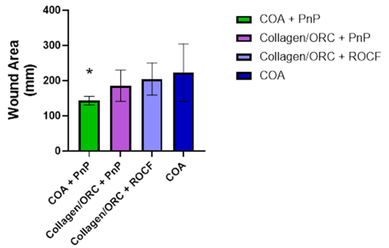

Figure 6. Wound area (mm) measured by histology (*p<0.05). Note PnP alone not graphed due to small sample size (n=2).

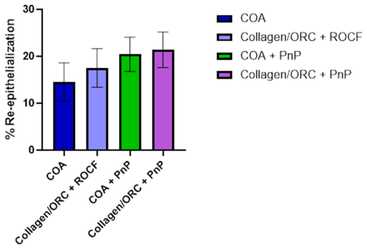

Figure 7. Percent re-epithelialization by histology. Note PnP alone not graphed due to small sample size (n=2).

Conclusions

- No significant differences were found in re-epithelialization percent, bacteria, edema, or serocellular crust thickness between the Collagen/ORC + ROCF with a dressing change at Day 3 and the Collagen/ORC + PnP with a single 7-day dressing placement
- Wounds treated with COA + PnP had significantly smaller histologic area measurement than those in the other treatment groups.
- No adverse effects were observed during the seven-day study period with either collagen dressing (Collagen/ORC and COA) used in conjunction with NPWT at -125 mmHg, whether paired with ROCF and a dressing change or with a single-application PnP dressing.

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***Solventum™ Promogran Prisma™ Collagen Matrix with ORC and Silver; †Solventum™ V.A.C.® Therapy with Solventum™ V.A.C.® Granufoam™ Dressing; ‡Solventum™ V.A.C.® Therapy with Solventum™ V.A.C.® Peel and Place Dressing, §Solventum™ ActiV.A.C.™ Therapy Unit (Solventum Corporation, Maplewood, MN); ** inSight®, (eKare Inc., Fairfax, VA).**

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