Novel Use of Cryogens to Facilitate Sharp Debridements of **Tissues With Unfavorable Texture**

Introduction

Every wound care practitioner knows that it can be difficult to debride rubbery and elastic tissues (e.g., intact skin, adipose tissue, eschars, etc.). Utilization of cryogens, ethyl chloride (EC), or its chemical analog Pentafluoropropane and Tetrafluoroethane (P&T) can facilitate sharp debridement by temporarily stiffening tissues and taking away their pliability. Tissues then become fragile and break off easily. Cryogens (liquid nitrogen) are widely used in dermatology

to destroy or remove skin cancers. These cryogens lower skin temperature up to -50°C and are typically used for 10-40 seconds. Cryogens used for debridement are less potent. Ethyl chloride can lower skin temperatures up to -20°C. When it is used for debridement, the tissues are frozen for 2-3 seconds and then debrided.

Cryodebridement agents take the form of Ethyl Chloride (EC) and its chemical analog, a combination of Pentafluoropropane and Tetrafluoroethane (P&T). Both forms are affordable and commercially available as mist sprays. Commercial formulations do not have FDA indication for debridement.

Methodology

Steps

- 1. Follow the usual preparation steps for sharp debridement
- 2. Spray the target area from a distance of 5-6 cm until you see white icing on the tissues (Figure 1).
- 3. Continue spraying for 2-3 seconds after that (typical duration 6-8 seconds).
- 4. Use a curette in the usual fashion (Figure 2).

Notes

- Freeze-related stiffness dissipates within 5-10 seconds; debridement must be swift.
- Angulating the curette at a sharp angle of 15-20 degrees while making vertical debriding motions makes debridement easier if freezing is very superficial or when effects are wearing off (Figure 3).
- Thicker eschars may require longer application (Figure 4).

Dehiscing eschar of a foot wound (left panel). Thicker tissues may take longer to freeze (middle panel). Trimmed eschar (right panel).

Figure 1.

Cryogen Application

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Cryodebridement in Action



Figure 3. Angulating the curette to make debridement easier

Figure 2. Cryogen freezes the tissue making them more fragile and amendable to debridement. Repeated applications may be needed.



Figure 4.







Key Points

- Cryodebridement using EC or P&T provide an easy and effective adjunctive tool used to facilitate sharp debridement of tissues with increased elasticity or unfavorable texture.
- The stiffening of tissue allows for easier debridement and increased precision of debridement.
- There is an added benefit of rapid onset anesthesia for painful wounds and less blood loss due to transient vasoconstriction.
- Cryogens (EC and P&T) are available as mist sprays and are affordable with a cost of under a dollar per session.
- Caution may be needed when freezing ischemic wounds. Frostbite is a theoretical concern. Yet, the frozen tissues are resected, and no adverse effects were experienced. Ethyl chloride is flammable and should not be used with electrocautery. Its chemical analog, P&T, is not flammable and has an improved safety profile. Additional research is needed.



References

