

Use of Radiochemically Sterilized, Absorbable Tissue Adhesive for Cat and Dog Lung Repair

S.W. Shalaby^a, D.Nickelson^b, M.A. Vaughn^a, T. Kennedy^b, P.L.Tate^a

^aPoly-Med Inc., Anderson, S.C.

^bVeterinary Products Laboratories, Phoenix, AZ

Statement of Purpose: Radiochemically sterilized (RCS) absorbable tissue adhesive was developed by Poly-Med, Inc. for internal tissue repair¹⁻³ and is currently marketed by Veterinary Products Laboratories for veterinarian applications as Tissumend II Sterile. In a recent study the RCS sterilized tissue adhesive was successfully applied in the repair of corneal abrasions and kidney lacerations using a rabbit model³. To explore the applicability of the adhesive in repairing soft tissue as an alternative to suturing or stapling, exceptionally soft lung tissue of dogs and cats were used in this study.

Methods: Surgical incisions were made in the ventral half of the right lung lobes of 6 dogs and 6 cats. Doyen clamps were used to reduce hemorrhage. **Cats:** The lacerated lung tissue was apposed and Tissumend II Sterile was applied at the wound edges. The bonding time and set up was 3-20 sec. Total application median time was 4.5 min. Suturing the lungs was more difficult and took 1.5 – 2 min. Two cats each were euthanized at day 7, 14 and 21 following the operations. Lung tissue samples were preserved in neutral buffered formalin, sectioned and hematoxylin and eosin stained.

Dogs: Tissumend II Sterile was applied as in the cats. Total application time ranged from 3-5 min. Suturing was easier on the dog lung due to the thickness of the lung and the median time for closure was 70 sec. At day 7, 14 and 21 following surgery two dogs were euthanized and tissue samples prepared as in the cats.

Results / Discussion: **Cats:** Two hours post-surgery all cats recovered and no leakage was observed. Two days after surgery all cats returned to normal pre-operative behavior. Necropsy at Day 7 post-op showed that both cats had minimal adhesions of the lung to the thoracic wall. On day 14 the lobe of one cat sealed with Tissumend II Sterile adhered to the thoracotomy site. On day 21 the lung lobes of both cats were adhered to the site. Histological evaluation of the tissue from both closure methods showed typical wound healing. No difference between adhesive and suture groups was detected (Fig. 1).

Dogs: No complications following surgery were noted in the dogs. Necropsy at Day 7 indicated the lobe lacerations repaired with the adhesive in both dogs were adhered to the thoracotomy site. On day 14 the sutured and adhesive sites of one dog were adhered to the chest wall. In the second dog, the sutured site was adhered to the chest wall and the adhesive site was adhered to the other lung lobe. On day 21 both adhesive and sutured lobes were of one dog adhered to the pericardium. In the second dog the middle and caudal lobes repaired with the adhesive were adhered together and the sutured lobe was adhered to the thoracotomy site.

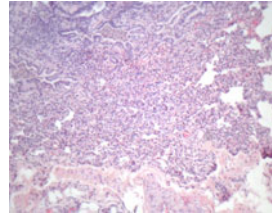


Fig. 1A Adhesive Day 14

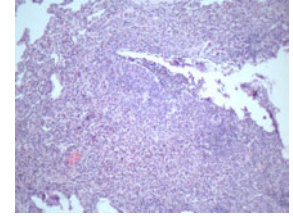


Fig. 1B Suture Day 14

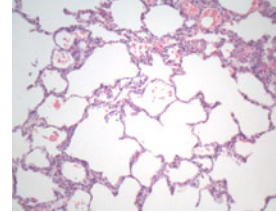


Fig. 1C Control

Figure. 1 Histological slides of cat lung tissue 14 days post-surgery. A. Adhesive, B. Suture, C. Control

Histological changes for each closure method were consistent with wound healing. Early tissue response was more marked in the wounds closed with tissue adhesive than in those closed with suture (Fig. 2).

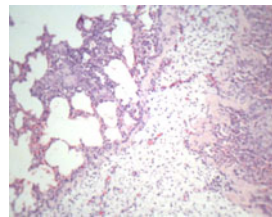


Fig 2A. Adhesive Day 7

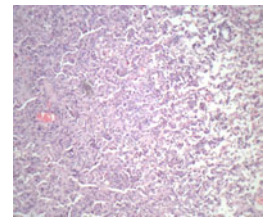


Fig. 2B. Suture Day 7

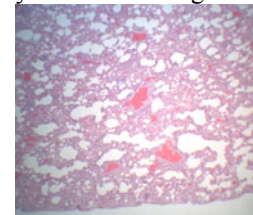


Fig. 2C Control

Figure 2. Histological slides of dog lung tissue 7 days post-surgery. A. Adhesive, B. Suture, C. Control

Conclusions: Tissumend II Sterile worked well on distal lung lobe laceration in both the cat and dog lung tissue and was easier than suturing lung lacerations in the cats. Post-operative leakage was minimal and tissue reaction to the wound was similar for both closure methods.

References:

1. Shalaby SW. U.S. Pat., 2001; 6, 299,631.
2. Vaughn MA et al. 7th World Biomat Congr, Trans Soc. Biomater, 2004; 27:1044
3. Vaughn MA et al. Trans Soc Biomater, 2005; 28:213.