

# Floseal

# **Comparative study of the efficacy of the common topical hemostatic agents with fibrin sealant in a rabbit aortic anastomosis model.**

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## **Abstract:**

**Objective.** The purpose of this study was to compare the hemostatic efficacy of the common surgical hemostatic agents with fibrin sealant (FS) and to assess their functional strength to secure hemostasis in lieu of placing additional sutures. **Methods.** End-to-end anastomosis of transected abdominal aorta was performed in moderately anticoagulated rabbits using 4 or 6 interrupted sutures. The suture line was covered either with gauze alone ("untreated") or with gauze plus Gelfoam, Avitene, Surgicel, FloSeal, or FS, following which blood flow was restored. Blood loss was absorbed by gauze and measured. The surviving rabbits were recovered and the repaired vessel was examined histologically 4 weeks after operation. The investigators were blinded to the treatment groups. Aortic anastomoses using 8 or 12 sutures (untreated) were also performed. **Results.** Untreated 4-suture anastomosis of aorta resulted in a profuse hemorrhage with an average  $108.0 \pm 19.2$  (mean  $\pm$  SD) ml blood loss and 100% mortality ( $n = 4$ ). FS application sealed the anastomoses, prevented blood loss ( $P < 0.01$  vs untreated) and exsanguination of the rabbits ( $n = 4$ ). Other hemostatic agents reduced the bleeding to varying degrees compared to the untreated animals (Gelfoam  $66.4 \pm 17.6$ , Avitene  $80.6 \pm 34$ , Surgicel  $66.7 \pm 16.7$ , FloSeal  $44.2 \pm 8.5$  ml blood loss,  $n = 4$ /group), but the changes were not statistically significant. One to three rabbits in each group survived the operation. Six-suture aortic anastomoses, untreated, resulted in  $67.7 \pm 21.8$  ml blood loss and 100% survival ( $n = 6$ ). Application of FS produced immediate and sustained hemostasis in all the animals ( $P < 0.01$  vs untreated). Other hemostatic agents also reduced the bleeding (Gelfoam  $42.5 \pm 10$ , Avitene  $50.9 \pm 12.4$ , Surgicel  $32.1 \pm 14$ , FloSeal  $33.9 \pm 5.4$  ml

blood loss,  $n = 6/\text{group}$ ), but the changes were not statistically significant. The 8- and 12-suture aorta repairs resulted in a moderate blood loss ( $43.9 \pm 19$  and  $21.3 \pm 14.9$  ml, respectively), followed by a stable hemostasis that precluded the need to use any hemostatic agent. The aortic cross-clamping time of the 12-suture and time to hemostasis for both the 8- and the 12-suture techniques were significantly longer than those of the 4-suture plus FS application ( $P < 0.01$ ,  $P < 0.01$  and  $P < 0.05$ , respectively). Conclusion. In a moderate coagulopathy, FS was proven to be the most efficacious hemostatic agent, producing immediate and sustained hemostasis at the arterial anastomotic site. This high efficacy is in part attributed to the strong tissue adhesive property of this agent. FS application may potentially ease the anastomosis and shorten the duration of timely critical vascular procedures. © 2002 Elsevier Science (USA).

# **A combination of hemostatic agents may safely replace deep medullary suture during laparoscopic partial nephrectomy in a pig model.**

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Publication Date: 2015

## **Abstract:**

**PURPOSE:** We assessed whether a combination of the fibrin tissue adhesive Tisseel (human fibrinogen and thrombin) plus the hemostatic matrix FloSeal (bovine derived gelatin matrix/human thrombin) could safely replace the conventional deep medullary suture without compromising outcomes.

**MATERIALS AND METHODS:** Laparoscopic mid pole and one-third partial nephrectomy was performed on the right kidney of 12 female pigs. The only difference between the 2 groups of 6 pigs each was the use of a fibrin tissue adhesive plus hemostatic matrix combination in group 2 instead of the deep medullary running suture in control group 1. Renal scans and angiograms were performed at baseline and before sacrifice at 5-week followup. Retrograde in vivo pyelogram was also done.

**RESULTS:** No significant difference was seen in operative parameters or postoperative course between the groups. Renal scans revealed a statistically insignificant trend toward greater uptake loss in group 1 and angiograms showed 3 major vessel occlusions in that group. No active bleeding was detected. Those 3 kidneys had significantly poorer postoperative uptake on renal scan than that of other kidneys (18.6% vs 39.4%,  $p = 0.013$ ). Only 1 small asymptomatic pseudoaneurysm was

noted in group 1. No urine leakage was found in either group. No major vessel occlusion, pseudoaneurysm or urinary complications developed in group 2.

**CONCLUSIONS:** Even after deep one-third partial nephrectomy FloSeal with concurrent Tisseel appeared sufficient to control major medullary vascular injuries and replace the deep medullary conventional suture without compromising operative outcomes. The potential advantages seen during functional and vascular examinations by decreasing the risk of unnecessary segmental vessel occlusion need further clinical evaluation.

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