

Evaluation of hydrogel tissue sealant in porcine laparoscopic partial-nephrectomy model.

Authors: Bernie JE, Ng J, Bargman V, Gardner T, Cheng L, Sundaram CP

Publication Date: 2005

Abstract:

BACKGROUND AND PURPOSE: Laparoscopic partial nephrectomy (LPN) is technically challenging with a steep learning curve, primarily because techniques used to control bleeding on the cut surface of the kidney can be ineffective, inconsistent, or challenging. Hemostatic techniques can include intracorporeal suturing, vascular coagulation (argon-beam coagulator, bipolar cautery, laser), and application of various tissue sealants. There is no uniformity of opinion regarding which hemostatic technique is optimal for this application. CoSeal, a hydrogel (Baxter Healthcare Corp, Deerfield, IL), has been effective following vascular surgery but has not been applied to a partial-nephrectomy model. We evaluated the effectiveness of this hydrogel in controlling bleeding and sealing the collecting system by comparing it with intracorporeal suturing and fibrin sealant (Tisseel; Baxter) in a porcine laparoscopic partial-nephrectomy model.

MATERIALS AND METHODS: Bilateral synchronous upper-pole partial nephrectomies were performed in two groups of 18 farm pigs, and the three hemostatic techniques (suturing, Tisseel, CoSeal) were applied. In the first group, partial nephrectomies were performed and the pigs sacrificed 3 days postoperatively (acute group). In the second group, the pigs were euthanized 6 weeks postoperatively (chronic group). In both groups, weight, blood pressure, estimated blood loss, weight of the partial and completion nephrectomy specimen, presence/ absence of urinary leak on retrograde study, histopathologic findings, and complications were recorded.

RESULTS: The mean weight, blood pressure, estimated blood loss, histopathology findings, and weight of the partial and completion nephrectomy specimens were similar in the three groups. CoSeal did not adhere well to the renal parenchyma compared with Tisseel. All three animals in the acute CoSeal group and three of the six pigs in the sutured group had small urinary leaks during retrograde ureteral study, whereas none of the pigs in the fibrin-glue cohort had urinary leaks. There was one complication (urinary leak) in the CoSeal group, necessitating sacrifice of the animal on postoperative day 8 because of sepsis.

CONCLUSIONS: CoSeal is not as effective as fibrin glue in adhering to the cut renal surface and sealing the collecting system during laparoscopic partial nephrectomy.