Partial nephrectomy with fibrin glue repair: measurement of vascular and pelvicaliceal hydrodynamic bond integrity in a live and abbatoir porcine model.

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Abstract:

PURPOSE: Some of the challenges during partial nephrectomy include control of bleeding and repair of the pelvicaliceal system. Fibrin tissue sealants have recently been used to achieve hemostasis and collecting system closure in open and laparoscopic partial nephrectomy. However, there exist little data regarding the intrinsic strength of the bond, especially when applied to the vasculature and the urinary collecting system of the transected kidney. We examined the hydrodynamic bond integrity of a commercially available fibrin tissue sealant in a live porcine animal model undergoing partial nephrectomy. MATERIALS AND METHODS: Open partial nephrectomy was performed in 19 porcine renal units. Collecting system entry was confirmed by methylene blue instillation into the proximal ureter. Fibrin tissue sealant was used to repair 16 renal units, that is 8 kidneys hardened in vivo for 10 minutes and 8 hardened in vivo for 60 minutes. In an additional 3 renal units monopolar electrocautery was used to achieve hemostasis (no fibrin glue used). The strength of vasculature repair was performed by infusing saline into the renal artery (renal vein ligated) and measuring pressure at bond rupture. Similarly the integrity of pelvicaliceal repair was evaluated by retrograde infusion of saline into the collecting system via the proximal ureter and measurement of pressure at bond rupture. RESULTS: Fibrin tissue sealant was successful in achieving prompt hemostasis and it was subjectively superior to cautery alone with regard to bleeding control. Mean renal vascular and pelvicaliceal burst pressure for fibrin sealant treated kidneys was 378 (median 420) and 166 mm Hg (median 170), respectively. There was no significant

difference in 10 vs 60-minute hardening times in treated kidneys. In comparison, vascular and pelvicaliceal burst pressure for nontreated (cautery alone) kidneys was 230 (median 220) and 87 mm Hg (median 90), respectively. CONCLUSIONS: Commercially available fibrin tissue sealants can provide supraphysiological renal parenchyma and collecting system sealing pressures after partial nephrectomy. This information supports the potential use of fibrin sealants during open and laparoscopic partial nephrectomy.