Safety and effectiveness of mechanical versus hand suturing of intestinal anastomoses in an animal model of peritonitis

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Abstract:

Abstract. Mechanical stapling for colorectal anastomosis is popular, but the safety of its use for anastomosis in peritonitis is unclear. We evaluated the safety and effectiveness of mechanically stapled vs. hand-sutured anastomosis by comparing wound healing in an animal model of bacterial peritonitis. Male Sprague-Dawley (n=48) rats underwent cecal ligation and puncture. After 24 h, rats were divided into two groups: the stapler group (cecal resection with mechanical stapler, n=24) and the hand-sutured group (cecal resection and stump closure with surgical absorbable suture, n=24). Anastomotic segments were excised and as indicators of wound healing, anastomotic bursting pressure (ABP) and tissue hydroxyproline concentration were determined over time. After harvesting, anastomotic segments were analyzed by quantitative real-time polymerase chain reaction (PCR) to determine relative expression of transforming growth factor-β1 (TGF-β1) and vascular endothelial growth factor (VEGF) normalized to that of a constitutive gene. The operative time was significantly shorter in the stapler vs. the hand-sutured group. Both groups showed progressive increases in ABP over the postoperative period. ABP was significantly higher in the stapler vs. the hand-sutured group on postoperative days (PODs) 0 and 3. Tissue hydroxyproline concentration increased from POD 7 in both groups, but between-group difference was not significant. Both groups showed progressive increases in TGF-β1 and VEGF expression during the 7-day postoperative period. On POD 5, TGF-β1 gene expression was higher in the stapler vs. the hand-sutured group. VEGF gene expression was identical in both groups. In conclusion, anastomosis by stapler is safer and more effective than that by hand suturing in bacterial peritonitis, since it requires less operating time and creates stronger anastomoses in the early postoperative period.

Keywords:

wound healing, intestinal anastomosis, mechanical stapler, hand suture

Published In:

EXPERIMENTAL AND THERAPEUTIC MEDICINE , 4 , 211-215