

Novel intracorporeal knot applier for ligation of big vessels in laparoscopic surgery

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摘要

Abstract

BACKGROUND AND PURPOSE: We designed an intracorporeal knot applier for the ligation of large vessels laparoscopically. The aim of this study was to assess the efficacy and efficiency of this method to control large vessels in pigs. **MATERIALS AND METHODS:** Six pigs with mean body weight of 28 kg (range 26-30 kg) were enrolled. The standard transperitoneal laparoscopic set-up was established with 15 mm Hg of pneumoperitoneum. The right renal hilum was mobilized, and the renal artery and renal vein were separated. A 5-cm segment of inferior vena cava with the right renal vein was skeletonized laparoscopically. Assisted by the novel knot applier, 3-0 silk was used to ligate the renal artery, renal vein, and inferior vena cava. The time required to accomplish these ligatures was recorded. Two intracorporeal knots were applied 5 mm apart, and the vessels were divided between the knots. The knot strength was assessed by measuring the maximal intraluminal pressure required to blast out the knot using gas insufflation. **RESULTS:** The diameters (mean \pm SD) of the porcine inferior vena cava, renal artery, and renal vein were 11.1 \pm 0.7, 2.9 \pm 0.3, and 4.9 \pm 0.3 mm, respectively. The knotting time was 58.9 \pm 8.6, 57.5 \pm 6.6, and 59.1 \pm 6.3 seconds for these vessels, respectively. No bleeding occurred when the vessels were divided. The average pressure needed to withstand the blast out of the ligature on the inferior vena cava, renal artery, and renal vein was 213.3 \pm 32.7 (range 165-250), 227.5 \pm 14.7 (range 210-250), and 210.8 \pm 21.5 (range 180-240) mm Hg, respectively. **CONCLUSIONS:** The novel intracorporeal knot applier was easy to use when making a ligature on vessels of different sizes and different wall thicknesses. The time required for making a ligature was short, and the knot was secure enough to withstand a vascular pressure higher than ordinary blood pressure. The laparoscopic device is inexpensive with great potential of being used as a secure vascular ligature provider.