

Thermal imaging in the detection of bowel ischemia.

Brooks JP, Perry WB, Putnam AT, Karulf RE Department of Colorectal Surgery, Wilford Hall Medical Center, San Antonio, Texas, USA. **PURPOSE:** The aim of this study was to introduce thermal imaging in the intraoperative detection of bowel ischemia by comparing thermal imaging with conventional techniques in detecting acutely ischemic bowel. using histologic evidence for intestinal necrosis as the standard. **METHODS:** A prospective study was performed using a porcine model. Laparotomy was performed on four pigs under general anesthesia. A 25-cm segment of mid jejunum was tagged with proximal and distal sutures, and its mesentery was ligated and divided. Thermal imaging, visual inspection, Doppler ultrasound, and fluorescence with Wood's lamp after fluorescein were used to estimate the extent of bowel ischemia five minutes after ligation of the mesentery. Measurements were taken in reference to both the proximal and distal tags to obtain two data points per animal for each method. After two hours of warm ischemia, the jejunum was harvested and sectioned longitudinally. Comparisons were made between the estimated region of necrosis for each method and microscopic evidence of necrosis. **RESULTS:** Visual inspection was the only method unable to detect a difference between vascularized and devascularized bowel for each of the eight data points. Fluorescein dye missed 3 cm of ischemic bowel. Doppler ultrasound and thermal imaging were 100 percent sensitive for necrotic bowel, with thermal imaging overestimating necrosis to a greater extent than Doppler ultrasound. The positive predictive value of fluorescein dye, Doppler ultrasound, and thermal imaging for determining nonviable bowel was 91.8, 80.8, and 69.5 percent, respectively. **CONCLUSIONS:** Thermal imaging has the potential to be a useful adjunct in the intraoperative determination of bowel ischemia. Further studies are indicated to study this technique.