NOVEL MAGNETIC MARKER LOCALIZATION-ASSISTED REAL-TIME NAVIGATION SYSTEM IN LAPAROSCOPIC PRECISION RESECTION OF INTESTINAL NEOPLASMS: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

Nan Zhang

UEG Week Barcelona 2026 | Poster

Oesophagus

October 20, 2026

A prospective randomized trial of 120 to 240 patients compared a magnetic marker navigation system to carbon nanoparticle labeling and unmarked controls for laparoscopic resection of intestinal neoplasms, finding significantly faster tumor localization and reduced operative time with the magnetic system.

KEY POINTS

- The magnetic marker group achieved 100% R0 resection in early-stage tumors and 97.5% in advanced-stage tumors, compared to 17.5% positive margins requiring re-excision in unmarked controls.
- Tumor localization time with magnetic markers was 0.45 ± 0.56 minutes versus 5.42 ± 2.28 minutes with carbon nanoparticle labeling in both early and advanced tumors ($P < 0.001$).
- Total operative duration was reduced by 32.6% in the magnetic marker group compared to unmarked controls ($P < 0.01$).
- The technique involved preoperative endoscopic implantation of three ferromagnetic markers in an inverted triangular configuration 1 cm from tumor margins, 24 to 48 hours before surgery, with intraoperative dual-modality guidance using endoscopic light and magnetic sensor detection.
- Both marked groups showed significantly lower rates of positive surgical margins and postoperative complications compared to unmarked controls; the investigators characterize the magnetic system as a technically superior alternative to traditional methods.

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