

DEVELOPMENT OF BENDING TRANSFORMATIVE ENDOSCOPE FOR MULTIFUNCTIONALIZATION

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Outer diameter of the endoscope is limited because of small incision or a natural body opening for insertion of the endoscope, and it is difficult to install several functions. In this research, bending transformative endoscope with small diameter for insertion and multifunctionality has been developed. The tip of the bending transformative endoscope is divided into plural folding back sections and each section has a function. The endoscope can be transformed by pulling the wires from outside the body. When the endoscope is inserted into the human body or removed from the human body, the sections located serially and can be go through a small opening or incision. After insertion of the endoscope, the several functions are available by transformation by pulling wires. In this study, the bending transformative endoscopes have been applied to intra-abdominal procedure, colonoscopy, and percutaneous endoscopic gastrostomy (PEG).

First, the model of the bending type laparoscope which has two CCD imagers for 3D vision is fabricated and its transformation was confirmed. Insertion of a forceps through its working channel and 3D inspection were also demonstrated.

Because the conventional colonoscopy only has field of front vision, a polyp or a cancer located on the proximal side of haustral folds and flexures can be missed^[1]. In this research, to eliminate these blind spots, a bending transformative endoscope has been developed. The folding back sections enable backside inspection.

PEG is one of parenteral nutrition administration and nutrition is delivered into stomach directly through the gastric fistula. Backside inspection by the bending transformative endoscope enables confirmation of appropriate position of the gastronomy tube, and shape of balloon or plug for fixation of the gastronomy tube in the case of establishment of a fissure or exchange of the tube. The installation part of a balloon is checked by securing a back view using the fabricated bending type endoscope using PEG model.

REFERENCES

[1]G. Triadafilopoulos, J. Li, “A pilot study to assess the safety and efficacy of the Third Eye retrograde auxiliary imaging system during colonoscopy”, *Endoscopy*, vol. 40, pp. 478-482, 2008.