DEVELOPMENT OF A ROBOTIC COLONOSCOPE EQUIPPED WITH DOUBLE-BEND AND DOUBLE-BALLOON STRUCTURE

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A prototype robotic colonoscope with double-balloon and double-bend tube design was developed and successfully inserted to the cecum of a colon training model by a non-medical operator without excessive stretching.

KEY POINTS

- The device consists of independently controlled outer and inner tubes with balloons and bending functions, manipulated electrically via servo motors and a controller, with a maximum outer diameter of 14 mm.
- The outer tube achieved approximately 90 degrees of bending and the inner tube approximately 180 degrees, with balloons inflating to approximately 7 cm diameter for intestinal fixation.
- In testing with a colon training model, the device reached from anus to cecum in approximately 440 seconds when operated by a non-medical operator alone.
- The insertion occurred without excessive stretching of the colon model, suggesting the mechanism may contribute to more comfortable colonoscopy.
- This work addresses the challenge that colonoscopy requires high skill levels and is difficult for beginners, particularly in cases with longer colons or adhesions.

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