

Consideration of ergonomic problems in the gastrointestinal endoscopy

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Background and Objectives

Gastrointestinal endoscopy has made great advances not only in diagnosis but also in endoscopic treatment such as submucosal endoscopic dissection (ESD). While advances in imaging have been particularly remarkable, no consideration has been given to physician fatigue or musculoskeletal disorders. Ergonomic progress and challenges of equipment for gastrointestinal endoscopy were investigated in this study.

Materials and Methods

This study conducted a historical survey of products and published literature regarding ergonomic issues of medical technology and equipment in gastrointestinal endoscopy and analyzed the achievements and problems of medical equipment from ergonomic perspective.



Results

The progress in endoscopic imaging has been particularly remarkable. The development of electronic endoscopes using CCD cameras, rather than classical endoscopes using imaging glass fiber, has not only brought about significant advances in imaging, but also significantly reduced the burden on doctors, including eye strain. Advances in image processing and Computer-Aided Detection and Diagnosis have not only improved diagnostic capabilities but also contributed to reducing the cognitive load on doctors. On the other hand, ergonomic considerations regarding the weight, size, and switch placement of endoscopes are still insufficient. The size and placement of the angulation knob, buttons for feeding air and/or suction and Image recording switches still lack consideration for gender and racial differences. With the recent advances in therapeutic endoscopy such as ESD, endoscopic biliary stenting and endosonography-guided-cholangio-pancreatic drainage, their operation time of the endoscope has been significantly extended, which has further increased the physical burden on doctors.

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Ergonomic problems in the gastrointestinal endoscopy



Development & application of robotics technology for endoscopy



Archelis FX -exoskeleton used by surgeons
<https://www.archelis.com/product/product-archelis/archelis-for-medical/>

Development of an Inner-type Assist Device to Reduce the Burden of Wearing Radiation Protective Clothing, by Hayato YAMADA, Yasuki HORI, Takeshi EBARA et al Japanese Journal of Ergonomics Vol.61, 2025



Development of Flexible Endoscopic Surgical System (FESS) Enabling Safer, More Minimally Invasive and High-Complexity Interventions AMED project (Japan)
https://fessproject.jp/index_EN.html

Conclusion

Forty years have passed since the start of electronic endoscopy, and the burden on physicians has been steadily reduced through the development of various imaging technology. However, further ergonomic improvement are required not only in the basic design of endoscope regarding the weight, size, and switch placement but also peripheral equipments through the workload of through careful analysis of the workflow of the endoscopy staff. The development and application of robotics technology in the field of gastrointestinal endoscopy is also important.