Letter

Exploring the potential: New chapter in gastrointestinal endoscopy with innovative 3D imaging technology

Three-dimensional (3D) endoscopy has shown promising developments in the gastrointestinal endoscopy field, with some notable benefits reported in existing literature.[1–4] This letter presents our experience with a prototype of a novel 3D endoscopy system. It is worth noting that previously reported 3D endoscopes were of the integrated type, characterized by increased thickness and limited maneuverability.[2] Currently, no commercially available 3D endoscopy system exists. The DARWIN 3D Endoscopic System is a software 3D conversion system (MedicalTek Co., Ltd., Taiwan, Republic of China) (Figure 1). Different from the conventional binocular 3D endoscope, this system receives two-dimensional endoscopy images, extracts depth information to build a depth map, and uses optical and computer vision methods to generate 3D vision. Therefore, this new system allows endoscopists to simply put on a lightweight pair of glasses and enable them to use any endoscope from various companies' systems. A comparison between the traditional 3D system and the new 3D system is shown in Figure 2.

The effectiveness of 3D imaging has been recognized in the field of laparoscopy.[5] The reason for this is that perception of depth is crucial because laparoscopic surgery is performed at a certain distance. In recent years, a suturing method resembling laparoscopic surgery has been introduced into the gastrointestinal endoscopy field. Accurate depth perception is beneficial for performing such procedures. Besides, with optimized depth perception and spatial awareness, 3D endoscopy holds promise in various gastrointestinal scenarios. It might accelerate trainee education, improve lesion detection and delineation, and enhance specialized procedures such as endoscopic submucosal dissection and peroral endoscopic myotomy by facilitating tunnel establishment and mucosal dissection direction recognition.

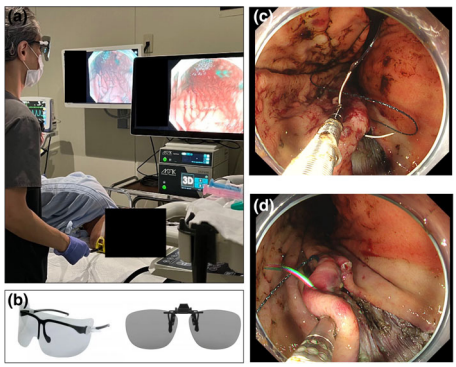

Figure 1 (a) 3D system; MedicalTek Co., Ltd. (Taiwan, Republic of China) Input images from the output terminal of the two-dimensional endoscopy video system and output to a dedicated monitor (resolution of 4K (3840 × 2160 p; size 71.148 × 40.152 cm). The endoscopist wears simple 3D eyeglasses and watches at a 3D monitor. (b) 3D eyeglasses. There are several types, including those that are eyeglass-shaped and those that simply clip on to ordinary eyeglasses. (c) SutuArt (Olympus, Tokyo, Japan) grasping a suture needle at a distance. (d) The SutuArt is being used with a suture needle to sew up the mucosa.

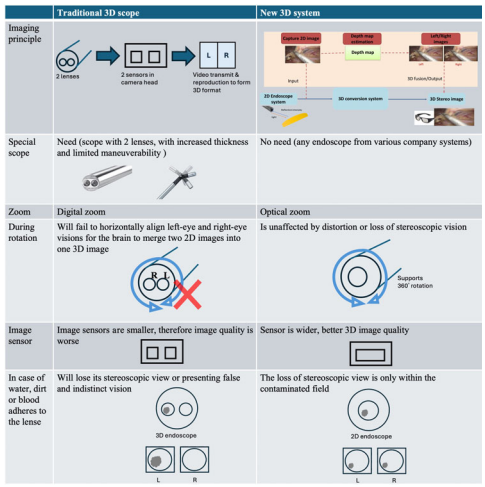

Figure 2 Comparison of traditional 3D system and new 3D system.

In conclusion, this innovative 3D endoscopic system, with its simplicity and ease of use, is expected to raise the standard of observation and treatment in this field, making it an important tool for gastrointestinal endoscopy in the future.

Authors declare no conflict of interest for this article.

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