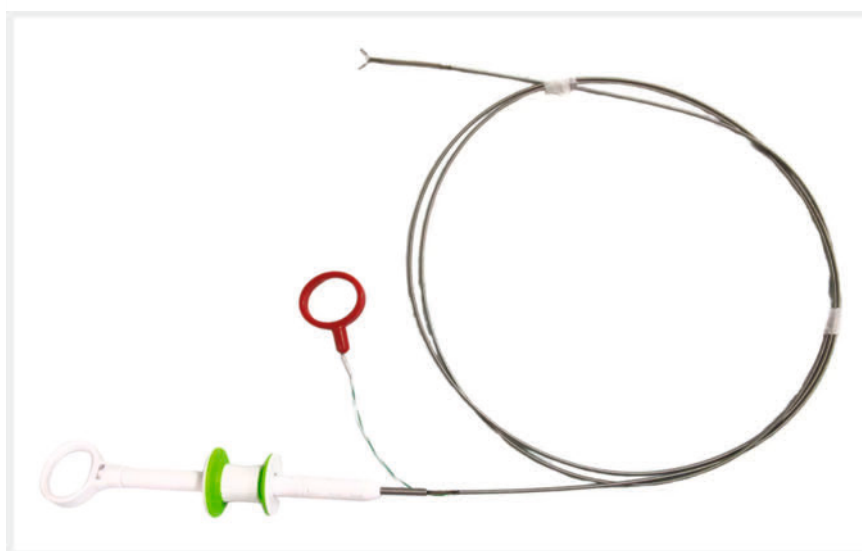


A modified variable flip angle release device for endoscopic titanium clips

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Titanium clips are widely used in gastrointestinal endoscopy, especially during endoscopic surgical procedures. Their principal role is to efficiently close defects within the gastrointestinal tract, thereby mitigating the risk of postoperative complications [1–4]. During clinical procedures, the alignment of the endoscope with the gastrointestinal lumen, coupled with the ongoing peristaltic movements of the stomach and intestinal cavities, frequently leads to suboptimal angulation for conventional titanium clip applicators when deploying clips via the endoscope's channel, impeding the precise release of clips. Furthermore, the restricted opening angle of traditional titanium clips complicates their accurate placement on the wound surface, presenting considerable operational challenges.

Considering this, we have developed an innovative adjustable-angle endoscopic titanium clip release device. This device is composed of a clamp head assembly, a spring tube, a handle assembly, and an angle adjustment mechanism (► Fig. 1). The clamp head assembly is welded to the spring tube, while the angle adjustment mechanism incorporates a side-pulling steel wire and an end pull ring, which is also welded to the tail of the titanium clip. In its static configuration, the side-pulling steel wire remains linear. Upon activation of the pull ring at the terminus of the angle adjustment mechanism, the side-pulling steel wire contracts, reducing the distance between the titanium clip and the junction of the spring tube and handle assembly, thereby bending the titanium clip to the desired angle (► Fig. 2). The titanium clip is comprised of a tail end and a clip section. The tail end provides leverage during deployment to facilitate smooth clamping. The fully extended length of the titanium clip is approximately 10–15 mm, with an opening angle range of 90–135° (► Video 1).



► **Fig. 1** The modified release device requires a clamp head assembly, a spring tube, a handle assembly, and an angle adjustment mechanism.



► **Fig. 2** Pulling the ring tightens the wire, bending the clip to the desired angle.



► **Video 1** A modified variable flip angle release device for endoscopic titanium clips.

In summary, this modified variable-angle titanium clip-release device adapts to wounds throughout the digestive tract for more precise treatment.

Endoscopy_UCTN_Code_TTT_1AO_2AD

Funding Information

Xiamen High-quality Development Medical Innovation Fund
2024GZL-CX58

Conflict of Interest

The authors declare that they have no conflict of interest.

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Endoscopy 2025; 57: E396–E397

DOI 10.1055/a-2584-1271

ISSN 0013-726X

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