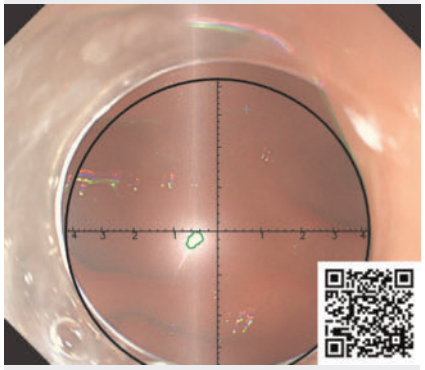
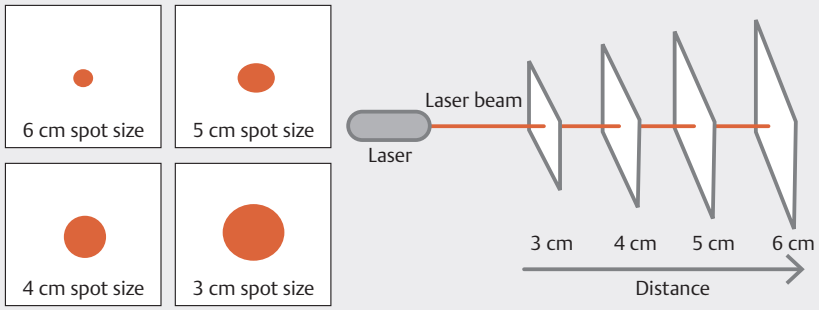
Use of an endoscopic virtual ruler based on the fiber laser principle and artificial intelligence technology

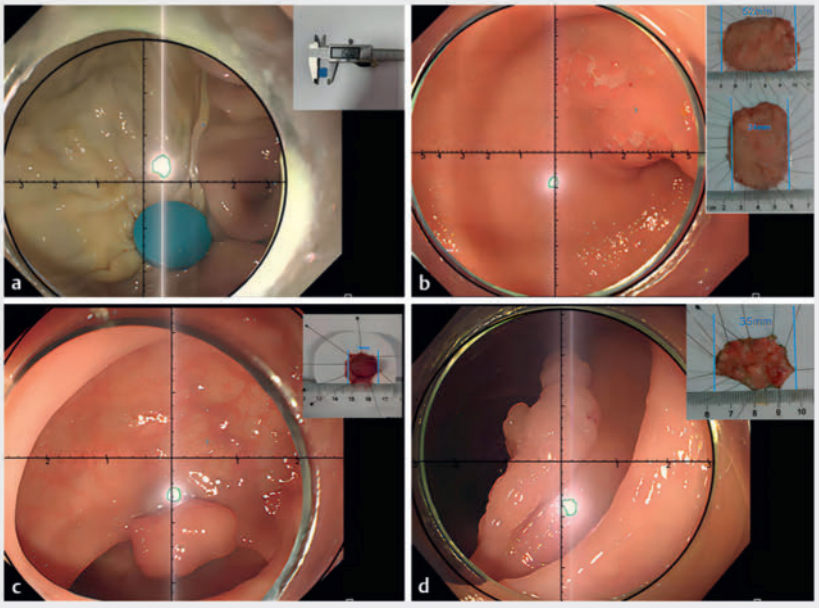
OPEN ACCESS



Video 1 An introduction to the endoscopic virtual ruler, including its demonstration on an ex vivo pig stomach and three different lesions in patients.



▶ **Fig. 1** Schematic diagram of the endoscopic virtual ruler construction.



▶ **Fig. 2** Examples of measurements made using the virtual ruler for: **a** a round foreign body in an ex vivo pig stomach; **b** an early antral cancer; **c** a sigmoid colon polyp; **d** a laterally spreading polyp in the ascending colon.

The accurate measurement of lesion size during endoscopic procedures is of paramount importance. It not only informs the assessment of disease risk, but also guides the selection of appropriate surgical interventions and provides a foundation for effective treatment monitoring [1]. Current endoscopic measurement techniques, such as visual inspection, the tension clamp method, and the implantable instrument ruler, still exhibit certain limitations [2]. To address this challenge, researchers have explored the development of an endoscopic virtual ruler based on fiber laser principles and artificial intelligence (AI) technology, which aims to enable simple and precise real-time measurement of various types of lesions.

In this innovative model, a laser-based approach is employed to precisely measure the size and distance of targets [3]. Leveraging a medical endoscope, fiber-coupled laser, laser collimator, and an advanced AI algorithm, the system generates laser spots that appear at varying size at different distances (▶ **Fig. 1**). By analyzing the spot area in the captured image and correlating it with the known scale bar, the system is able to accurately estimate the distance to the object and calculate its actual size. This end-to-end solution streamlines the measurement process during medical procedures, enabling healthcare professionals to make informed decisions based on reliable data-driven insights. The integration of cutting-edge laser technology and intelligent software algorithms underscores the continuous advancements in medical imaging and diagnostics.

▶ **Video 1** shows the novel model being used to accurately size a large raised polyp, a laterally spreading polyp, and an early gastric cancer (▶ **Fig. 2**).

Endoscopy_UCTN_Code_TTT_1AQ_2AI

Funding Information

2022 Key Research and Development Plan Project of the Science and Technology Department of Anhui Province
2022e07020048

Clinical trial

Chinese Clinical Trial Registry
ChiCTR2400085998

Conflict of Interest

The authors declare that they have no conflict of interest.

The authors

Yaxian Kuai[1], Shiwei Zhou[2], Bin Sun[1], Xu Wang[1], Youwei Xiao[3], Aijiu Wu[3], Derun Kong[1]

1 Department of Gastroenterology, The First Affiliated Hospital of Anhui Medical University, Hefei, China
2 School of Software, University of Science and Technology of China School of Software Engineering, Hefei, China
3 Research and Development Department, Hefei Zhongna Medical Instrument Co. Ltd, Hefei, China

Corresponding author

Derun Kong, MD
Department of Gastroenterology, The First Affiliated Hospital of Anhui Medical, No. 81 Jixi Road, Shushan District, Hefei City, 230031, Anhui Province, China
kongderun168@163.com

Citation Format

Endoscopy 2024; 56: E795–E796.
doi: 10.1055/a-2409-0070.

References

[1] von Renteln D, Djinbachian R, Zarandi-Nowroozi M et al. Measuring size of smaller colorectal polyps using a virtual scale function during endoscopies. Gut 2023; 72: 417–420. doi:10.1136/gutjnl-2022-328654
[2] Wang J, Li Y, Chen B et al. A real-time deep learning-based system for colorectal polyp size estimation by white-light endoscopy: development and multicenter prospective validation. Endoscopy 2024; 56: 260–270. doi:10.1055/a-2189-7036
[3] Feng H, Zhan L, Zhu R et al. Endoscopic displacement measurement based on fiber optic bundles. Opt Express 2022; 30: 14948. doi:10.1364/OE.455510

Bibliography

Endoscopy 2025; 57: 86–87
DOI 10.1055/a-2438-0202
ISSN 0013-726X

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany