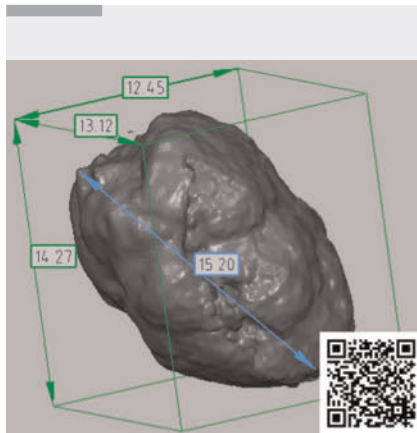
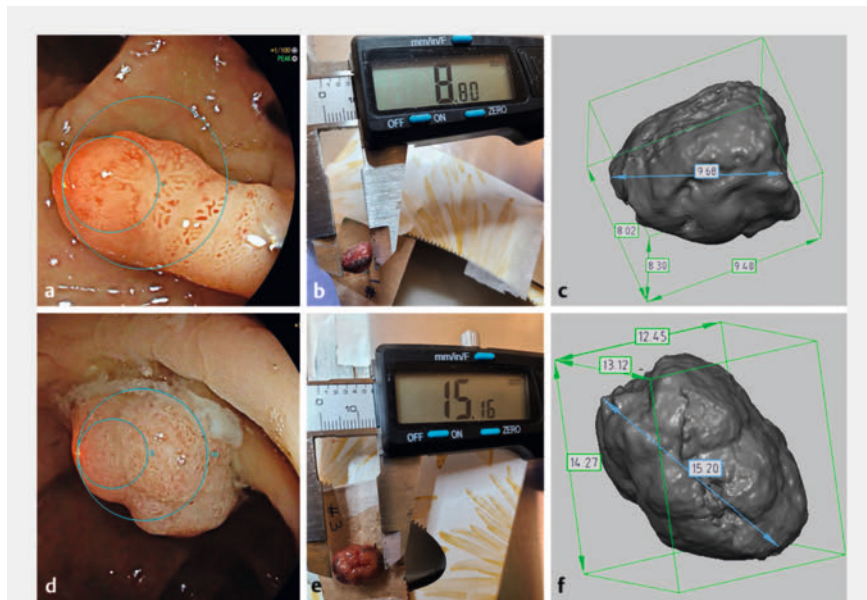


## Establishing ground truth of polyp size, morphology, and volume using three-dimensional scanning



**▶ Video 1** Two polyps are measured using a virtual scale endoscope (VSE) and then by subsequent 3D rendering after their resection.



**▶ Fig. 1** Images showing the measurement of two polyps using: **a, d** the virtual scale endoscope; **b, e** a vernier caliper; **c, f** 3D rendering after the polyps' resection.

Establishing ground truth of polyp size, morphology, and volume using three-dimensional scanning Comprehensive artificial intelligence (AI) solutions that should cover detecting polyp morphology, size, and volume are being developed. To train such AI solutions, it is essential to obtain high quality reference (ground truth data) on polyp morphology, size, and volume.

We explored the feasibility of three-dimensional (3D) scanning of colorectal polyps to obtain computer-aided design (CAD) 3D rendering information on polyp morphology, size, and volume. During the colonoscopy, a novel virtual scale endoscope (VSE; Scale eye, EW10-VM01; Fujifilm, Tokyo, Japan) with an integrated virtual scale function was used, which allows for polyp size measurement [1–3] (▶ **Video 1**). Two detected polyps had their size measured during the colonoscopy using VSE (▶ **Fig. 1 a, d**), then were removed from the colon as intact en bloc specimens with a healthy resection margin. The polyps were measured using a digital Vernier caliper (eSync with

32 feeler gauge with 0.01-mm intervals) directly after resection (▶ **Fig. 1 b, e**). The polyps were then 3D scanned for volumetric information (Artec Space Spider; Artec 3D, Luxembourg) [4] (▶ **Fig. 1 c, f**). The 3D scanner processes up to 1 million individual points per second at 7.5 frames per second with a resolution of 0.1 mm. Polyp 1 was measured as being 8 mm using the VSE, 8.88 mm using the caliper, and 9.68 mm in the 3D model. The total polyp volume was 291.8 mm<sup>3</sup>. Polyp 2 was measured as being 14 mm using the VSE, 15.16 mm using the caliper, and 15.20 mm in the 3D model. The total polyp volume was 968.1 mm<sup>3</sup>.

We found that it is possible to obtain spatial polyp information through 3D scanning. 3D scanning of polyps can capture their shape, geometries, and textures, translating them into data files in which size, volume, and shape becomes measurable. These 3D models can then be used in the context of AI development

to provide ground truth data to train models to automatically recognize size, volume, and Paris classification.

Endoscopy\_UCTN\_Code\_CPL\_1A)\_2AB

### Conflict of Interest

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## References

- [1] Haumesser C, Zarandi-Nowroozi M, Taghiakbari M et al. Comparing size measurements of simulated colorectal polyps size and morphology groups when using a virtual scale endoscope or visual size estimation: A blinded randomized controlled trial. *Dig Endosc* 2023; 35: 638–644. doi:10.1111/den.14498
- [2] Djinbanchian R, Taghiakbari M, Haumesser C et al. Comparing size measurement of colorectal polyps using a novel virtual scale endoscope, endoscopic ruler or forceps: A preclinical randomized trial. *Endosc Int Open* 2023; 11: E128–E135. doi:10.1055/a-2005-7548
- [3] von Renteln D, Djinbanchian R, Zarandi-Nowroozi M et al. Measuring size of smaller colorectal polyps using a virtual scale function during endoscopies. *Gut* 2023; 72: 417–420
- [4] [Anonym]. Artec Space Spider. <https://www.artec3d.com/portable-3d-scanners/artec-spider>

## Bibliography

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