

A novel portable upper gastrointestinal endoscopy system with complete functions of both diagnosis and treatment



Gastrointestinal (GI) disease has a high incidence in clinical practice, especially in remote areas [1] and during natural disasters. However, it is difficult to perform conventional GI endoscopy outdoors as it requires a large area, hydroelectric power, and a complex cleaning and disinfection process [2]. To overcome the above limitations, we developed a novel portable upper GI endoscopy system that is capable of performing the same functions as a conventional endoscopy system and can be packed into a suitcase.

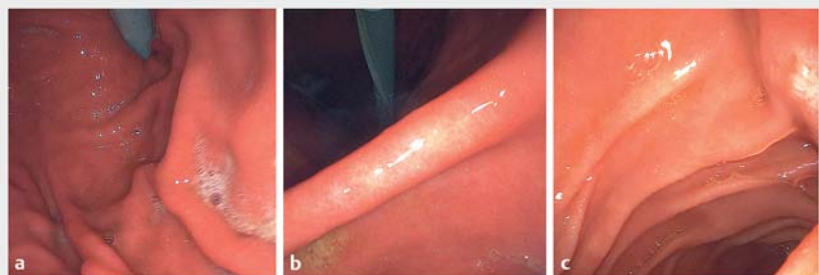
The system consists of six parts: endoscope, water and air pump, suction, power, monitor, and storage box (Ankon Technologies Co., Ltd., Wuhan, China). The system has two statuses: transportation and working. During the transportation status, the overall size of the box is 68×42×32 cm and it weighs less than 35 kg (► Fig. 1 a). When in working status, the probe of the endoscope is covered by a disposable sheathed system (► Fig. 1 b). The film covering the endoscope body, and the suction button, air-water pipe, and suction-biopsy channel are all single use [3]. After charging, the portable system is capable of running for more than 4 hours.

The doctors prepared the portable endoscopy system in working status and placed the disposable sheathed system on the endoscope. In a volunteer, the endoscope could clearly observe the gastric fundus (► Fig. 2 a) and angular incisure (► Fig. 2 b) under retroflexed view, and pass into the descending part of the duodenum (► Fig. 2 c). After examination, the endoscopist replaces the disposable sheathed system with a new one before the next case (► Video 1).

Only one portable GI endoscopy system currently exists (E.G. Scan; IntroMedic Co., Ltd., Seoul, Korea), but this is diagnostic only without any treatment function [4]. Our system has both diagnostic and treatment capabilities. Besides the portability of this system, another ad-



► Fig. 1 The portable endoscopy system. **a** In transportation status. **b** In working status, covered by a disposable sheathed system.



► Fig. 2 Endoscopic views of the portable endoscopy system. **a** The gastric fundus in the retroflexed view. **b** The angular incisure in the retroflexed view. **c** The descending part of the duodenum and papilla in the forward view.

vantage is that there is no need for routine cleaning and disinfection. It takes less than 5 minutes to apply and remove the disposable sheathed system. There-

fore, this system has potential applications in remote areas and during natural disasters when facilities are lacking. Further studies using this system in humans



The portable endoscopy system in transportation status

Video 1 The installation process and instructions for use of the portable endoscopy system.

are required to assess its performance and safety.

Endoscopy_UCTN_Code_CCL_1AB_2AC_3AH

Funding

Projects of Logistical Support
Department, China
AWS15J003,
2020-JSCGPZ-01,
21QNPY037,
2021-JCJQ-ZQ-005

Competing Interest

The authors declare that they have no conflict of interest.

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Endoscopy 2023; 55: E9–E10
DOI 10.1055/a-1919-4443
ISSN 0013-726X
published online 9.9.2022
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