



Noncontact endoscopy for infection-free gastric examination during the COVID-19 pandemic

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During the COVID-19 pandemic, direct contact between medical staff and patients in clinical practice (eg, endoscopy procedures) bears potential risk of infection. Telemedicine, or noncontact medicine, in this circumstance offers an ideal solution.^{1,2} Here, we report the first clinical experience of remote controlling capsule endoscopy for gastric examination.

The novel noncontact, magnetically controlled capsule endoscopy (MCE) system (Ankon Technologies, Shanghai, China) (Fig. 1) added a remote-control workstation and an audiovisual exchange system to the original well-established MCE system, which consisted of a robotic magnetic arm, a workstation (currently bypassed), and a capsule endoscope³ and boasted a 90% sensitivity and 94% specificity for diagnosing gastric focal lesions.⁴⁻⁶

Study participants were consecutively enrolled from March 16 to March 26, 2020. After an overnight fasting and drinking 800 to 1000 mL water and simethicone for gastric dilatation and preparation, participants positioned themselves on the examination bed in Room A (Fig. 1A),

while the operating doctor sat in Room B at the remote-control workstation (Fig. 1B). The doctor instructed patients to swallow the capsule via the audiovisual exchange system. After the capsule entered the stomach, the doctor manipulated the 2 joysticks on the remote-control workstation, mobilizing the robotic magnetic arm and simultaneously driving the precise movement and rotation of the capsule (Video 1, available online at www.VideoGIE.org).

Five participants (2 male and 3 female), with a median age of 75 years (range, 23-80 years), were enrolled for noncontact MCE examination (Supplementary Table 1). The maneuverability of the remote-control MCE system was rated as excellent by the doctor (5/5, 100%), and the capsule completely observed the gastric cardia, fundus, body, angulus, antrum, and pylorus in all of the patients, revealing cardia gastric cancer (n = 1), gastric polyps (n = 1), gastric erosion (n = 1), and normal gastric mucosa (n = 2) (Fig. 2). Study participants experienced no discomfort during or after the examination.



Figure 1. Noncontact magnetically controlled capsule endoscopy system. The system consists of a robotic magnetic arm (A), a workstation (A, currently bypassed), a capsule endoscope, a remote-control workstation (B), and an audiovisual exchange system (A, B).

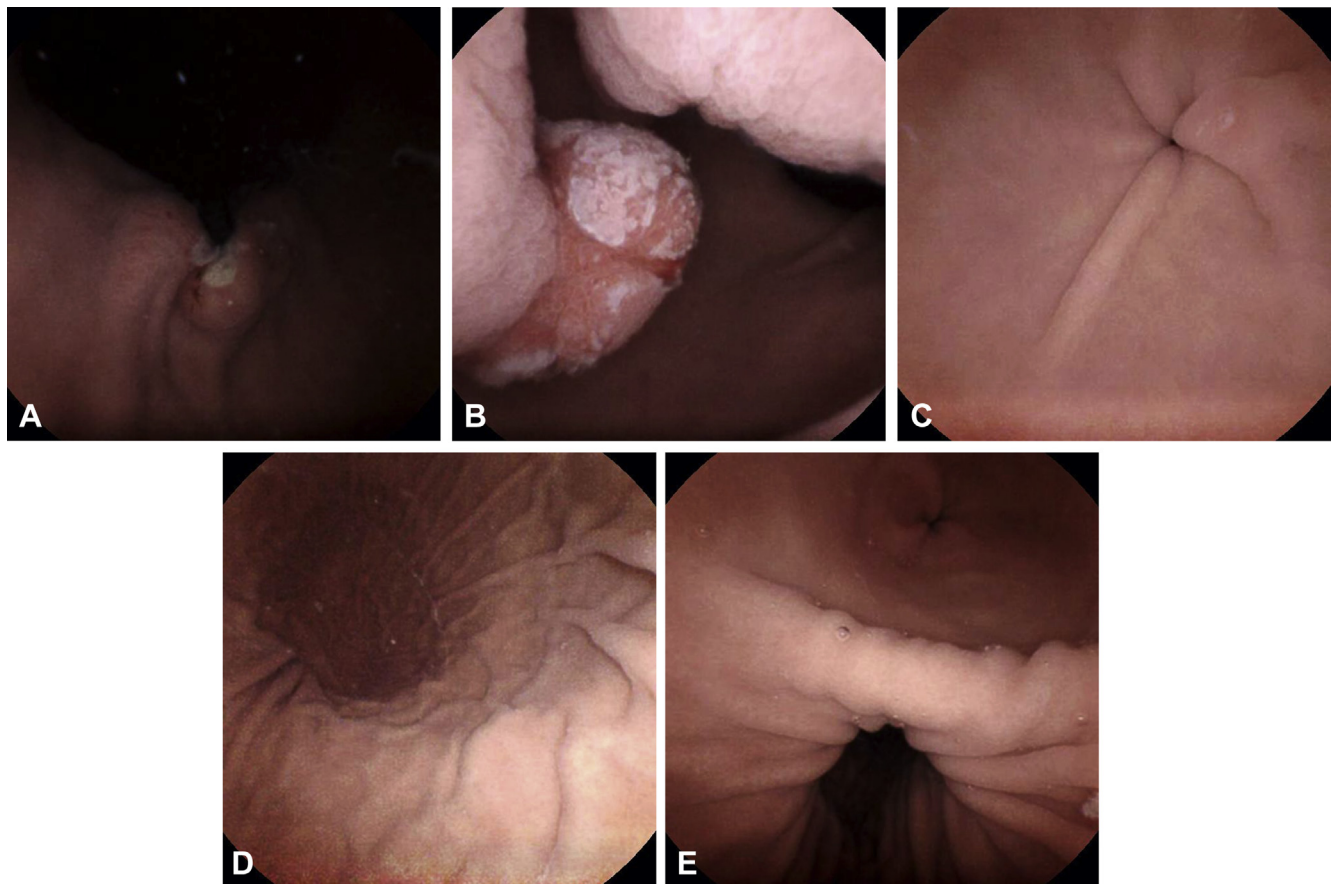


Figure 2. Findings of noncontact magnetically controlled capsule endoscopy. **A**, Cardia gastric cancer. **B**, Gastric polyp. **C**, Gastric erosion. **D**, Normal gastric fundus. **E**, Normal gastric angulus.

This provides a novel noncontact (infection-free) diagnostic modality for GI diseases (eg, GI bleeding and gastric cancer) during the COVID-19 pandemic to protect both medical staff (remote controlling, reading, and reporting) and patients (disposable capsule). Of note, signal transmission between rooms could be realized via either cable or fifth-generation communications. The remote-control endoscopy system could be more generalized to public health emergencies and even disasters where noncontact medicine is warranted.

DISCLOSURE

All authors disclosed no financial relationships.

Abbreviation: MCE, magnetically controlled capsule endoscopy.

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SUPPLEMENTARY TABLE 1. Demographics and outcomes of the study subjects

No.	Age/sex	Indications	Maneuvarability	Completeness of gastric examination	noncontact MCE diagnosis	Discomfort
1	23/F	Healthy volunteer	Excellent	Complete	Normal	No
2	75/M	Dysphagia	Excellent	Complete	Cardia gastric cancer	No
3	46/F	Health checkup	Excellent	Complete	Gastric erosion	No
4	75/M	Abdominal distension	Excellent	Complete	Gastric polyps	No
5	80/F	Abdominal pain	Excellent	Complete	Normal	No

MCE, Magnetically controlled capsule endoscopy.