

Role of transgastric natural orifice transluminal endoscopic surgery in the diagnosis of ascites of unknown origin (with videos)

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Background: Natural orifice transluminal endoscopic surgery (NOTES) has been established in animal models and human studies.

Objective: The aim of this study was to assess the feasibility and efficacy of applying transgastric NOTES to diagnose patients with ascites of unknown origin.

Design: Prospective study.

Setting: Two university and teaching hospitals.

Patients: Patients with ascites of unknown origin.

Interventions: Diagnostic transgastric NOTES.

Main Outcome Measurements: Characteristic of ascites cases, conditions of the abdominal cavity, diagnostic accuracy, adverse events, and follow-up time.

Results: Transgastric NOTES was performed successfully in 78 patients with ascites of unknown origin, and 72 cases (92.3%) were clearly diagnosed. They included malignant tumors (39 cases), tuberculous peritonitis (28 cases), chronic hepatic inflammation (3 cases), necrotizing lymphadenitis (1 case), and eosinophilic serositis of the small intestine (1 case). In addition, there were 6 nondiagnostic cases, and no severe adverse events were found.

Limitations: Nonrandomized control analysis.

Conclusion: Transgastric NOTES in combination with biopsy can elucidate the causes of ascites of unknown origin in the majority of cases. Therefore, it is a feasible and effective approach to access the peritoneal cavity and also a valuable modality to detect the cause of diseases with ascites of unknown origin. (*Gastrointest Endosc* 2014;80:807-16.)

Abbreviations: CA, cancer antigen; NOTES, natural orifice transluminal endoscopic surgery.

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Natural orifice transluminal endoscopic surgery (NOTES) is a minimally invasive surgical procedure after laparoscopy for investigation of the body cavities and perhaps is also the latest significant innovation in surgery.¹ The natural orifice provides a port of entry via different lumens to the human cavities, unlike traditional surgery and laparoscopy. This scar-free “minisurgery” offers decreased postoperative pain and reduced wound infections or other postoperative adverse events.² Combined with flexible endoscopy, available endoscopic portals such as transoral, transanal, or transvaginal routes are selected based on different requirements and management.

Currently, the NOTES technique has been established successfully in different animal models³⁻⁶ and in human studies^{7,8} to evaluate its safety and efficacy, varying from the abdominal cavity to the thoracic cavity.^{9,10} Furthermore, this technique has been performed to explore different cavities, conduct biopsy, and remove lesions and the like. Published literature indicates that this modality is a feasible and safe method for investigation and therapeutic management and does not show high risks of microbial contamination or severe adverse events.¹¹⁻¹³ A systematic review for evaluating the efficacy of cholecystectomy comparing the NOTES procedure with single-incision surgery reported by Pollard et al¹³ revealed that the incidences of adverse events were similar within the 2 groups. Results of omental repair by using NOTES appears comparable to those of laparoscopy.¹⁴

Ascites is a common sign in clinical practice and is presented in different kinds of disorders, including infectious and noninfectious diseases.¹⁵ It is most frequently detected in patients with hepatocirrhosis.^{16,17} The cause of ascites is frequently identified by using abdominal US^{18,19} and laboratory tests for ascites such as biochemical and cytology examinations. However, the origin of ascites remains unknown in some patients in spite of comprehensive examinations, and it is difficult to make a correct diagnosis before etiological treatment. With the development of medical technology, advanced imaging techniques such as CT and positron emission tomography-CT are performed to examine patients with ascites of unknown origin. These tools also play a certain role in distinguishing malignant ascites from benign ascites.

Nevertheless, not all ascites cases can be correctly diagnosed through current diagnostic work-ups. Presently, there are few available reports on NOTES for diagnosis of patients with ascites of unknown origin. The aim of our study was to evaluate the role of transgastric NOTES in diagnosing patients with ascites of unknown origin.

METHODS

Study design

This was a prospective, cross-sectional study. The principal investigator and the steering committee designed the study

Take-home Message

- Transgastric natural orifice transluminal endoscopic surgery (NOTES) in combination with biopsy can elucidate the causes of ascites of unknown origin in the majority of cases.
- It is possible that NOTES could serve as a valuable modality to detect the cause of diseases with ascites of unknown origin.

and wrote the article. The study protocol was approved by the institutional review boards of Nanfang Hospital, Southern Medical University, Guangzhou and Shenzhen People's Hospital, Shenzhen, China. Written informed consent was obtained from all patients before the procedure. The date of registration was July 15, 2008. A study period of 4 years was chosen for recruitment, and 1.5 years was chosen for follow-up investigation. Men or women aged > 18 years were eligible for inclusion if they had ascites with unknown origin in spite of comprehensive examinations at the 2 endoscopic units. Data collection and analysis were conducted in 2012 and 2013.

Patients

From December 2008 to September 2011 there were 3308 patients with ascites registered in our units, including 1701 patients from Shenzhen People's Hospital in Shenzhen and 1607 patients from Nanfang Hospital in Guangzhou. Patients identified at 2 endoscopy units underwent the transgastric NOTES diagnostic procedure because of ascites of unknown origin. A brief diagnostic work-up is detailed in [Figure 1](#).

Patients were eligible for NOTES when they met the following inclusion criteria: (1) ascites was confirmed by physical examination and/or US; (2) blood tests including inflammatory markers, bacterial culture, and tumor markers did not reveal a clear diagnosis; (3) an unclear diagnosis was obtained by examination of ascitic fluid; (4) a suspected or indefinite diagnosis was concluded by radiologic imaging, involving an abdominal radiograph, conventional CT, MRI, and other techniques; (5) routine endoscopic procedures (including gastroscopy and colonoscopy) and/or tissue sampling did not allow a positive diagnosis in patients with ascites.

Patients with contraindications to NOTES were excluded as follows: (1) severe cardiopulmonary disorder, sepsis, serious renal failure; (2) pregnancy or menstrual period; (3) recent abdominal and/or pelvic surgery; (4) history of anticoagulant or nonsteroidal anti-inflammatory drug therapy in the preceding week; and (5) blood coagulation disorders.

NOTES procedure

No absolute contraindications were detected in any cases. All patients had water deprivation and fasting at least

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