

CONTENTS

| | |
|----------------------|-------------|
| Foreword | xiii |
| Charles J. Lightdale | |

| | |
|-------------------|-----------|
| Preface | xv |
| Anthony N. Kalloo | |

| | |
|---|------------|
| Evolution of Laparoscopic Surgery: Lessons for NOTES | 225 |
| Yoav Mintz, Mark A. Talamini, and John Cullen | |

Natural orifice transluminal endoscopic surgery (NOTES) is considered by some to be the next revolution in surgery. To advance into clinical NOTES safely and responsibly, the lessons learned from laparoscopic surgery should be applied to the development of NOTES as much as possible. This novel technique is still in evolution and newly designed instruments and devices should be developed. Industry has a considerable role in research and development and collaboration between clinicians and engineers for this matter is crucial.

| | |
|--|------------|
| Techniques for Transgastric Access to the Peritoneal Cavity | 235 |
| Kazuki Sumiyama and Christopher J. Gostout | |

Natural orifice transluminal endoscopic surgery (NOTES) is a unique emerging surgical concept expanding flexible endoscopy beyond the gut wall. The methods and technology growing from this concept may minimize trauma from surgical access to the peritoneal cavity by completely eliminating body surface incisions. So far, NOTES surgeries have been reported by modifying laparoscopic surgery. The peroral transgastric route was chosen to access the peritoneal cavity in initial trials because of a potentially lower risk for surrounding organ injury using the anterior wall percutaneous

endoscopic gastrostomy–style gastrotomy. This article reviews and describes techniques of transgastric access to the peritoneal cavity used in published animal studies.

Techniques for Transanal Access to the Peritoneal Cavity

245

Marvin Ryou and Christopher C. Thompson

Natural orifice transluminal endoscopic surgery (NOTES) represents a burgeoning but still largely experimental field. For surgeries involving the upper abdominal organs, the transanal approach promises to provide a more direct route in contrast to the often cumbersome retroflexion typically required with the transgastric approach. The potential disadvantages of the transanal route are also significant and include issues of sterility, the risk of inadvertent trauma to adjacent organs during transmural puncture, and the risk of colonic wall shearing. This article reviews the evolution of transanal access to the peritoneal cavity, highlights the various techniques that have been used for transanal access and closure, and discusses in further detail the relative advantages and disadvantages of this approach.

NOTES and Anastomosis

261

Paul Swain

The history and development for forming anastomoses using natural orifice transluminal endoscopic surgery (NOTES) techniques is described. Sutured gastrojejunostomy, enteroenteral anastomosis, and ileocolonic anastomoses using rigid and circular staplers passed through the rectum and vaginal wall using a transgastric supervising endoscope using a natural orifice transluminal endoscopic surgery hybrid approach. The staplers for this type of approach have to change. They need to be longer, more flexible, and able to change shape (eg, becoming smaller for introduction and then expanding in the peritoneal cavity). Different methods of introduction over guidewires or in combination with flexible gastroscopes are also needed. There is still a requirement for more ingenuity, persistence, and research if the goal of safer effective formation of anastomoses by less invasive means is to be realized.

The Eagle or the Snake: Platforms for NOTES and Radical Endoscopic Therapy

279

Rajasekhara R. Mummadi and Pankaj J. Pasricha

It has only been about 3 years since natural orifice transluminal endoscopic surgery (NOTES) first began to gather the attention of the medical and surgical community at large. The concepts behind NOTES, however, have been under development for almost a decade. It is important to revisit some basic concepts regarding therapeutic flexible endoscopy and in the process understand the fundamental premises on which a sound technology development

program for NOTES should be built. This article provides such a review and emphasizes general principles rather than specific embodiments, which are very much at a nascent stage.

Infection Prevention in NOTES

291

Sergey V. Kantsevov

Prevention of infection during natural orifice transluminal endoscopic surgery (NOTES) was identified as one of the most important challenges for transluminal surgery. Does infection prevention during NOTES warrant such attention? This article summarizes the accumulated data about septic complications during transluminal surgery.

EUS-Guided NOTES Interventions

297

Annette Fritscher-Ravens

Entering the peritoneal cavity with the echoendoscope has been avoided because this endoscope is rather rigid and difficult to handle and maneuver in a limited space. Endoscopic ultrasound may be of help, however, to guide natural orifice transluminal endoscopic surgery (NOTES) procedures. This article provides an overview of the potential benefit and the few endoscopic ultrasound-based natural NOTES procedures performed to date.

Spatial Orientation and Off-Axis Challenges for NOTES

315

Lee Swanstrom and Bin Zheng

Issues of spatial orientation and off-axis visualization must be addressed to make natural orifice transluminal endoscopic surgery (NOTES) more than a clinical oddity practiced by a highly skilled minority. The issue is the degree of mental work needed to operate with this new modality, with issues of depth perception and anatomy recognition currently making these procedures extremely difficult and unlikely to be practically applied or taught. New instrument designs and clinical tricks combined can dramatically decrease the mental work needed and make this closer to a widely learnable access method. In the long run, computer interfaces may be necessary to resolve some of these human factor issues and make a true universal platform.

Hybrid Surgery: Combined Laparoscopy and Natural Orifice Surgery

325

Jonathan P. Pearl, Jeffrey M. Marks, and Jeffrey L. Ponsky

Hybrid procedures combine laparoscopy and natural orifice surgery techniques. Some groups are currently using hybrid procedures to investigate the concepts of pure natural orifice surgery. Thus far, hybrid procedures have validated the safety of transgastric peritoneoscopy, although improved instrumentation is

imperative before widespread clinical applications. As technical improvements develop from hybrid surgery, gastrointestinal endoscopy and abdominal surgery could be revolutionized.

Transition from Laboratory to Clinical Practice in NOTES:

Role of NOSCAR

333

Robert H. Hawes

The way to move natural orifice transluminal endoscopic surgery (NOTES) from the laboratory to the clinical arena is to do high-quality research in the areas recommended by the NOSCAR working group representing barriers to NOTES procedures. Additionally, good experimental work needs to be done to determine whether the theorized advantages of the NOTES approach actually represent reality. It is anticipated that monies will continue to flow to sponsor the necessary research in NOTES. It is clear that momentum continues to build in this exciting new potential paradigm shift in minimally invasive surgery, but one of the keys is to produce good science to validate the NOTES approach.

Training for NOTES

343

L. Campbell Levy, Gina Adrales, and Richard I. Rothstein

The foundation of skills for the performance of natural orifice transluminal endoscopic surgery (NOTES) lies in the training for general surgery (especially laparoscopy) and flexible gastrointestinal endoscopy. Physicians wishing to practice NOTES need to acquire or have both skill sets, or need to partner together to blend complementary capabilities with colleagues. In the future, however, a new cadre of NOTES specialists may emerge who will have developed individual expertise in the full spectrum of NOTES knowledge base requirements. This article highlights a body of knowledge and skills needed to become a NOTES proceduralist and review the current training paradigms for gastrointestinal endoscopists and surgeons.

NOTES: Human Experience

361

G.V. Rao, D. Nageshwar Reddy, and Rupa Banerjee

Human natural orifice transluminal endoscopic surgery (NOTES) is already being reported from numerous centers, and the results seem promising. There are key issues to be addressed and benefits over traditional safe procedures need to be demonstrated. Interestingly, however, human NOTES seem to be progressing at a fast pace compared with the evolution of surgical procedures or techniques described previously. This article examines the current status of NOTES in humans, the challenges, and the implications on the future of minimal access surgery.

Designing Clinical Trials for NOTES

371

Joseph Romagnuolo and Peter Cotton

This article breaks down the elements of designing clinical trials, with an emphasis on randomized controlled trials, as applied to advancing natural orifice transluminal endoscopic surgery research. It discusses research ethics, feasibility, design elements (such as randomization, blinding, and choosing a primary outcome), and issues regarding presentation of results. The pros and cons of subjective quality of life outcomes are debated, and the role of the patient/consumer in driving the direction and interpretation of clinical trials is discussed.

NOTES: The Future

387

Samuel A. Giday, Priscilla Magno, and Anthony N. Kalloo

The concept of natural orifice transluminal endoscopic surgery (NOTES) has grown in acceptance since the time of its introduction in 2000. Developments in techniques of peritoneal access and closure, surgical techniques, and equipment modification have already been published and intensive research is ongoing. Current and future endoscopists will reap the benefit of this research because many techniques and devices that are developed for NOTES will enhance the ability to perform luminal intervention, including polypectomy, endoluminal hemostasis, and submucosal resection. The authors attempt to predict the future of NOTES by describing potential applications for certain clinical scenarios and conditions.

Index

397