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ТРАНСЛЮМИНАЛЬНАЯ ЭНДОСКОПИЧЕСКАЯ ХИРУРГИЯ ЧЕРЕЗ ЕСТЕСТВЕННОЕ ОТВЕРСТИЕ: ПЕРЕДОВОЙ ПОДХОД В МАЛОИНВАЗИВНОЙ ОБЩЕЙ ХИРУРГИИ

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NATURAL ORIFICE TRANSLUMINAL ENDOSCOPIC SURGERY: AN ADVANCED APPROACH IN MINIMALLY INVASIVE GENERAL SURGERY

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Резюме. NOTES использует естественные отверстия для доступа к брюшинной полости, исключая внешние разрезы и потенциально снижая послеоперационные осложнения. Этот минимально инвазивный метод минимизирует хирургическую травму, улучшает косметические результаты и ускоряет восстановление пациента. В исследовании рассматриваются испытания на животных и людях для оценки технической осуществимости, безопасности и клинического применения NOTES. Результаты свидетельствуют об успешных результатах применения NOTES, однако остаются такие проблемы, как оптимальный доступ, контроль кровотечения и надежное закрытие. Система NOTES может стать дополнительным подходом к лапароскопической хирургии, но ее успех в будущем будет зависеть от технологических достижений и стандартизированных протоколов.

Ключевые слова: NOTES, минимально инвазивная хирургия, техническая осуществимость, клинические результаты, хирургические инновации.

Resume. NOTES uses natural orifices to access the peritoneal cavity, eliminating external incisions and potentially reducing postoperative complications. This minimally invasive method minimizes surgical trauma, enhances cosmetic outcomes, and accelerates patient recovery. The study reviews both animal and human trials to assess the technical feasibility, safety, and clinical applications of NOTES. Findings indicate successful outcomes with NOTES; however, challenges such as optimal access, bleeding control, and reliable closure remain. It shows promise as a complementary approach to laparoscopic surgery, with future success hinging on technological advances and standardized protocols.

Keywords: NOTES, Minimally Invasive Surgery, Technical Feasibility, Clinical Outcomes, Surgical Innovation.

Relevance. Natural Orifice Transluminal Endoscopic Surgery (NOTES) represents a groundbreaking advancement in minimally invasive surgical techniques that fundamentally transforms the approach to abdominal surgery. By utilizing natural body orifices to access the peritoneal cavity, NOTES eliminates the need for external incisions, therefore potentially reducing postoperative complications. Its significance lies in the ability to minimize surgical trauma, enhance cosmetic outcomes, and accelerate patient recovery compared to conventional procedures – factors that are especially valuable given the increasing demand for less invasive surgical methods.

Aim: the aim of this study is to evaluate the feasibility, safety, and clinical applications of NOTES in general surgery. The study focuses on technical aspects and

surgical outcomes while also assessing the potential patient benefits of this innovative approach. Furthermore, the investigation seeks to identify current challenges and examine future implications for advancing surgical practice.

Objectives:

1. Review recent developments and innovations in NOTES.
2. Assess technical feasibility through both animal and human studies.
3. Examine clinical trial data with a focus on safety parameters and complications.
4. Determine the potential advantages of NOTES, such as reduced postoperative pain, lower risk of wound infections, and improved cosmetic outcomes.
5. Explore the impact of various access routes and advanced endoscopic equipment on surgical outcomes.
6. Identify areas requiring further research and technological refinement.

Material and methods. The investigation adopts a comprehensive review approach by synthesizing data from both animal studies and initial human applications. Early feasibility studies were primarily conducted in porcine models, where procedures such as transgastric peritoneoscopy, liver biopsy, oophorectomy, partial hysterectomy, gastrojejunostomy, cholecystectomy, and splenectomy were performed. Access routes included both transoral/transgastric and transanal/transcolonic approaches, utilizing advanced endoscopic equipment coupled with specialized closure techniques. The methodology centered on evaluating technical feasibility, safety parameters, and the incidence of potential complications associated with NOTES.

Results and their discussion. Animal studies demonstrated the feasibility of performing complex abdominal and pelvic procedures using NOTES techniques. Notably, the initial study by Kalloo et al. revealed successful survival outcomes in animal models, with subjects surviving for 14 days post-procedure without adverse effects. Furthermore, the first human NOTES procedure–a transgastric appendectomy performed in India on a patient with severe abdominal wall burns–proved successful. The analysis identified several technical challenges, such as optimal site selection for visceral puncture, preventing injury to adjacent organs, achieving effective tissue retraction, controlling bleeding, and ensuring reliable closure. The theoretical advantages of NOTES over conventional laparoscopic surgery were also discussed, including reduced postoperative pain and lower risks of wound infections, hernia formation, and adhesions, although concerns about the risk of life-threatening complications from incomplete gastric closure persist.

Conclusion.

1. NOTES is a promising frontier in minimally invasive surgery with the potential to revolutionize abdominal procedures.
2. Although unlikely to completely replace laparoscopic surgery, NOTES can serve as a valuable complementary approach, especially for patients with morbid obesity or severe intra-abdominal adhesions.
3. Its successful implementation depends on continued technological advances, the standardization of protocols, and comprehensive training programs.
4. Addressing both technical and non-technical challenges through organized research efforts–such as those led by the Natural Orifice Surgery Consortium for Assessment and Research (NOSCAR)–is essential.

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5. These factors are critical for integrating NOTES into routine clinical practice and fully realizing its potential.

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