Recent Advances in Minimally-invasive Surgery

Essay

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الطرق الحديثة في التقنيات الجراحية اللاباضعة

رسالة

توطئة للحصول على درجة الماجستير فى
الجراحة العامة

مقدمة من

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Summary and Conclusion

Change is part of surgery but it is never easy to accept. At the dawn of surgery, excellence was associated with big incisions: "Big scar, big surgeon." Surgery with no scars was an impossible reverie. The introduction of the first laparoscopic cholecystectomy by Eric Muhe in 1985 was a corner-stone in the evolution of the surgical practice. Since that date, the concepts of surgery have changed and surgeons started to accept the idea of small incisions and role of laparoscopy in surgery.

Laparoscopy started to take the lead in many surgical practices driven by continuous developments and innovations in the equipments and instruments and creating novel techniques and approaches to perform various surgeries.

New techniques are arising and developing aiming at improving the outcomes of surgery and making the surgical procedures easier as much as possible.

Single Incision Laparoscopic Surgery (SILS) is gaining popularity nowadays as a surgical technique providing good and applicable surgical practice with the least unfavorable outcomes possible and minimal scaring in spite of its technical challenges regarding crowding of instruments and lack of triangulation.

Minilaproscopy is the natural evolutionary step in the history of laparoscopy concerning minimizing the incision size and decreasing the operative scars to the least possible. It is considered a transitional zone between conventional laparoscopy and

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List of Abbreviations

ASGE	**American Society for Gastrointestinal Endoscopy**
BSO	**Bilateral Salpingo-oophrectomy**
EMR	**Endoscopic Mucosal Resection**
e-NOTES	**embryonic NOTES**
ERCP	**Endoscopic Retrograde Cholangio-pancreatography**
EUS	**Endoscopic Ultrasound**
FDA	**Food & Drug Administration**
GERD	**Gastro-esophageal Reflux Disease**
GIST	**Gastro-intestinal Stromal Tumour**
HALS	**Hand Assisted laparoscopic Surgery**
ITP	**Immune Thrombocytopenic Purpura**
LC	**Laparoscopic Cholecystectomy**
LESS	**Laparo-endoscopic Single Site Surgery**
MASH	**Mobile Army Surgical Unit**
MLC	**Minilaparoscopic Cholecystectomy**
NOSCAR	**Natural Orifice Surgery Consortium for Assessment and Research**
NOTES RYGBP	**NOTES Gastric Bypass**
NOTES	**Natural Orifice Translumenal endoscopic Surgery**
NOTUS	**Natural Orifice Transumbilical Surgery**
NSAIDs	**Non-steroidal Anti-inflammtory Drugs**

List of Abbreviations (Cont.)

OPUS	**One Port Umbilical Surgery**
OTSC	**Over-the-scope Clip**
PONV	**Post-operative Nausea & Vomiting**
RATS	**Thoracoscopic Assisted Thoracic Surgery**
SAGES	**Society of American Gastrointestinal and Endoscopic Surgeons**
SILS	**Single Incision Laparoscopic Surgery**
SIMPL	**Single Instrument Port Laparoscopic Surgery**
SLAPP	**Single Laparoscopic Port Procedure**
SLIT	**Single Laparoscopic Incision Trans-abdominal Surgery**
SPA	**Single Port Access**
SPL	**Single Port Laproscopy**
SPLS	**Single Port Laparoscopic Surgery**
SSL	**Single Site Laparoscopy**
TEM	**Trans-anal Endoscopic Microsurgery**
TGTV-GBP	**Transgastric, Transvaginal Gastric Bypass**
TUBS	**Trans-umbilical Endoscopic Surgery**
TULLA	**Transumbilical Laparoscopic Assisted Appendectomy**
VBG	**Vertical Banded Gastroplasty**
VRS	**Verbal Rating scale**
WMD	**Weighted Mean Difference**

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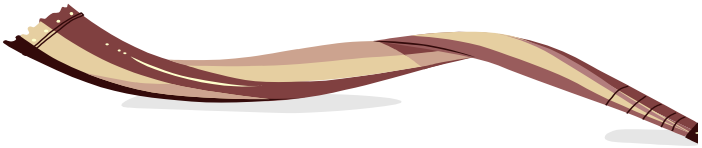

Introduction

Laparoscopy (also known as minimally invasive surgery or videoscopic surgery) has allowed surgeons to perform the same procedures as in traditional open surgery, using small incisions (keyhole surgery) instead of large abdominal incisions. Studies have shown major benefits to the patient in terms of reduced post operative pain, increased post operative comfort, reduced hospital stay, quicker return to normal physical activities and ultimately a quicker return to work. Improved cosmesis and reduced wound complications associated with large scars are also major advantages associated with this technique (Nagy et al., 2001).

Laparoscopic cholecystectomy was firstly considered the gold-standard operation for gallstone disease in 1992, mainly because of the advantages brought about by the minimally invasive techniques it began to employ. Since then, several technological developments have been achieved, some of them comprising an increasing interest towards attempting to reduce even further the surgical trauma by diminishing the caliber of the instruments (Cabral et al., 2008).

As innovation continues to move 21st century forward, one of the emerging concepts is Single-port or Single-incision laparoscopic surgery. The fundamental idea is to have all of the laparoscopic working ports entering the abdominal wall through the same incision (Romanelli et al., 2009).

The major drawback to such a surgical approach is that the concept of "triangulation" to which laparoscopic surgeons have grown accustomed in terms of both the instruments and Scope is lacking. This very paradigm shift has energized both surgeons and industry to research important issues and develop new technology to make concepts such as single-port laparoscopic surgery become a reality (Romanelli et al., 2009).

Despite cosmetic advantages of single incision laparoscopic surgery, technical challenges make these techniques non-intuitive and widespread acceptance is limited. Robotic surgery might have the potential to overcome such hurdles due its computer technology (Hagen et al., 2009).

Surgical robotics is a new technology that holds significant promise. Robotic surgery is often heralded as the new revolution, and it is one of the most talked about subjects in surgery today. Up to this point in time, however, the drive to develop and obtain robotic devices has been largely driven by the market. There is no doubt that they will become an important tool in the surgical armamentarium, but the extent of their use is still evolving (Anthony et al., 2004).

In recent years, many investigators have attempted to further improve on the established technique of conventional laparoscopy. Generally, the goal has been to minimize the invasiveness of this procedure by reducing the number and, more commonly, the size of the operating ports and instruments. From this concept, the term "minilaparoscopy" or "needlescopy" has emerged (Unger et al., 2000).

Natural orifice translumenal endoscopic surgery (NOTES) is a novel surgical technique that may improve patient outcomes in minimally invasive surgery; the clearest benefit is cosmetic because surgeons use the body's natural orifices for access rather than transfacial incisions. Leaders in gastroenterology and surgery anticipate that NOTES will reduce the incidence of hernia and may improve pain and recovery. In much the same way as laparoscopy 20 years ago, NOTES defies conventional surgical practices and has been the subject of some appropriate skepticism (Horgan et al., 2009).

The concept of natural orifice translumenal endoscopic surgery (NOTES) may represent a natural evolutionary convergence between developments in therapeutic flexible endoscopy and laparoscopic surgery. As it evolved, NOTES made use of multiple-channel flexible endoscopes inserted transorally, transvaginally, or per rectum for the performance of intra-abdominal surgeries (retroperitoneally or intrathoracically) under a pneumoperitoneum (Lee et al., 2009).

Aim of the Work

The aim of this work is to review the literature in recent trends and techniques of minimally-invasive surgery including advantages and disadvantages of each technique.