

Will advanced laparoscopic surgery go hand-assisted?

Developments in laparoscopic surgery over the last decade have resulted in widespread use and acceptance of laparoscopic cholecystectomy as the golden standard procedure. In contrast, and despite instrument and technological advances, extension of the laparoscopic approach to other more major intraabdominal operations has been limited to dedicated major centers and to surgeons with a professed major interest in laparoscopic surgery. There are various reasons that account for the limited widespread use of the laparoscopic approach for major intraabdominal operations, but complexity, long duration, difficulty of execution, inconsistent clinical outcome, and safety concerns have undoubtedly played a major role. The limitations of the total laparoscopic approach are restricted surgical manipulation from the limited degrees of freedom, reduced tactile feedback, inadequate exposure limiting complex and safe dissection, and lack of normal stereoscopic vision. These factors undoubtedly enhance the level of difficulty of execution. The lack of tactile feedback during operation for cancer leads to difficulties in localization of the extent of the pathology, including the assessment of locoregional spread of the disease.

Despite improvements, laparoscopic instruments remain traumatic, can easily inflict iatrogenic lesions to solid organs and intestines, and enhance the risk of tumor cell exfoliation, especially if the primary tumor is manipulated by the instruments. The necessity for the use of multiple access ports and frequent instrument changes during laparoscopic operations results in excessive "instrument traffic." This is not only time-consuming, but it carries the potential risk of contamination of the ports by viable tumor cells and hence the subsequent development of port-site deposits. There are other mechanisms involved in the pathogenesis of port-site deposits that have been a particular problem, especially in relation to laparoscopic surgery for colorectal cancer. This was true at least in the early years when this procedure was introduced into clinical practice [3].

Potential wound contamination and traumatic manipulations to the resected bowel segment may occur during specimen extraction through the small access incisions or small laparotomy at the end of the procedure. The laparoscopic approach may necessitate tissue reduction of a specimen by morcellation inside a rip-proof bag. However, this is not applicable to cancerous specimens since it precludes histologic staging. Thus for the safe extraction of these specimens, a protected wound of sufficient size to accommodate the delivery of the tumor is necessary toward the

end of the procedure. Last, but not least, the issue of tissue approximation necessary to restore continuity of the gut by bowel anastomosis requires the use of specific laparoscopic staplers as well as advanced suturing skills.

The limitations of advanced laparoscopic procedures and their slow dissemination stimulated surgeons and engineers to develop hand-assisted laparoscopic surgery (HALS). HALS was based on novel hand-access devices that permit the insertion of the surgeon's assisting hand with retention of the positive-pressure pneumoperitoneum. The article by Meijer et al. [7], in this issue of *Surgical Endoscopy*, reviews the progress in development of access port devices for HALS. This review documents the advantages and disadvantages, but it also indicates clearly that effective hand access devices are now available to enable the efficient performance of HALS-procedures.

The efficacy of HALS is also discussed by Meijer et al. [7], HALS appears to retain most of the advantages of the laparoscopic approach. It simply facilitates the execution so that the procedure is executed more expeditiously and with greater safety. The ability for immediate control of any major bleeding by the internal hand considerably reduces the stress level to the surgeon during major complex operations in anatomically crowded regions. In all these respects, HALS is superior to the totally laparoscopic approach, in colon surgery, where studies involving motion analysis have demonstrated the superior action efficacy of HALS vs the total laparoscopic approach confirming the potential benefit of HALS for advanced/major laparoscopic surgery.

The experience with the HALS vertical banded gastroplasty vs open surgery is presented in this issue by Bleier et al. [2]. This article indicates that the HALS approach is a viable alternative to the standard open approach. The readers of the articles on hand-assisted surgery in the October and November issues of *Surgical Endoscopy* will appreciate the broad spectrum of applications for the HALS approach. HALS has been successfully applied to a wide range of surgical procedures, for example, gastric resection, gastric bypass, vertical banded gastroplasty, transhiatal esophagectomy, pancreatic resections, drainage of pancreatic cysts, liver resections, splenectomy, and nephrectomy including live-donor nephrectomy. In colorectal surgery reversal of the Hartmann's procedure, rectopexy, right hemicolectomy, left and/or right colectomy, subtotal colectomy, sigmoid resection, and even proctocolectomy have been reported.

The October issue also includes the outcome of a pro-

spective randomized trial on HALS vs standard laparoscopic surgery for colorectal disease by Litwin et al. [6] on behalf of the HALS Study Group. The conclusion of this randomized controlled trial is that HALS is safe for benign and noncurable malignant disease, and it preserves the benefits of the laparoscopic approach, allowing the surgeon to perform complex operations more easily and more rapidly. It thus provides valid evidence encouraging the further development and exploitation of the HALS approach, especially for colonic surgery.

In the November issue of *Surgical Endoscopy: Ultrasound and Interventional Techniques*, Cuschieri [4] describes and comments on the use of a newly developed device, Omniport, and its application for hand-assisted pancreatic and liver surgery and other applications as well. In a separate section of his article, the important ergonomic aspects of HALS-procedures are emphasized. In addition, the reader is given information about the technique of HALS splenectomy and colonic resection. The article by Bemelman et al. [1] provides a detailed description of a HALS splenectomy with particular reference to the evolution of their technique. The article by Darzi [5] provides a comprehensive review of the technique of hand-assisted colonic resection using the HandPort.

The previously reported experience with HALS, together with the articles in the October and November issues of *Surgical Endoscopy*, confirm that HALS provides a solution to the major limitations of advanced laparoscopic surgery. HALS appears to be safe, effective, and efficient over a wide spectrum of operations. The main benefits are enhanced exposure, safe blunt digital dissection, atraumatic tissue handling, immediate control of major bleeding, restoration of tactile feedback, and compensation for loss of normal stereoscopic vision by means of restored proprioception. In addition, HALS offers distinct advantages for the conduct of laparoscopic resections for cancer, and it may indeed reduce the risk of tumor dissemination and port site metastasis. Reduction of the operation time by the HALS approach is documented for live donor nephrectomy, especially in relation to the warm ischemia time.

From the review of available literature on HALS, and our own experience with over 200 procedures for various disorders using different devices, HALS should enable the more widespread use of advanced laparoscopic operations with increased safety. However, the answer to the proposition that advanced laparoscopic surgery will progress by the hand-assisted approach will only materialize with continued development to optimize the techniques and devices, and from the evaluation of well-documented prospective studies on the different application areas of this promising hybrid of laparoscopic and open surgery. Until then, we should reserve judgment.

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