Small incision—no small brain: the changing frontiers of laparoscopic surgery

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During the implementation of laparoscopic surgery, "open" surgeons used to speak of "small incision—small brain" to disqualify the new procedures and its pioneers (1). Now some 20 years later and after a major triumph laparoscopic surgery is undisputed. Nevertheless, there is an ongoing discussion on which operations are not suitable for the laparoscopic access. Especially guideline recommendations often 10 years old (2,3) argue for open access surgery in T4 colon cancer.

Leon and coworkers (4) presented their oncologic outcomes following laparoscopic colon cancer resections in T4 colon cancer in *Surgical Endoscopy* 2017. They included 147 patients into their retrospective analysis of whom 68 underwent laparoscopic resection. Groups were comparable concerning age, gender, BMI, ASA score, tumor localization and previous surgeries. Patients with open surgery had significantly more often invasion of the duodenum, pancreas and the retroperitoneum. There were no statistically significant differences between patients with open and laparoscopic surgery with regard to disease-free and overall survival, number of lymph nodes harvested and rates of R1 resections. Patients with laparoscopic resections had shorter operation time, less intra-operative blood loss, and shorter hospital stay. Morbidity and mortality were comparable between the groups but less frequent in the laparoscopic patients.

The study showed the known advantages of laparoscopy in selected patients with T4 colon cancer pushing known boundaries even more forward. Limitations of the study are the retrospective design and a selection bias. The study also underlines that guidelines are nowadays often outdated by the evolution of operative techniques and technical devices. A fact that is also undisputed is that the results observed by the study are not to be generalized for all colorectal surgeons in the world and that these results and the results of multicenter, randomized controlled trials are often associated with a substantial learning curve.

Because of the always-faster introduction of new techniques into the surgical armentarium (robotic assisted surgery, TEM, TAMIS, single-port, scarless surgery) the primary goal for the future has to be the implementation of surgical knowledge management programs. These programs have to involve on the one hand tools for decision-making processes based on evidence-based interventions and on the other hand on-site training programs of surgical novices and attendants. The surgeons cognitive cost is significantly higher in new and more minimally invasive procedures (5). On the other hand, it was shown that novices could be guided to gaze like experts onto the operation field and have thus less errors and steeper learning curves (6). Another important aspect is the institutional experience. The learning curve of new surgeons is truncated in institutions that already established a specialized program (7).

The future holds enough secrets to be discovered by future surgeons. It is not known until now to which extent the outcome of the patients is influenced by the laparoscopic access itself, fast-track recovery programs and epidural analgesia (8-11). The future of laparoscopic surgery is bright for surgeons that know how to deal with small incisions and better results and that are able to pass on

their knowledge to the following generations.

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