



## Editorial

# The Emerging Role of Robotic Surgery in the Treatment of Endometrial Cancer

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Endometrial cancer represents the most frequent gynecological malignancy worldwide, with about 65,950 new cases per year in the USA [1,2]. Obesity is one of the most clearly identified risk factors the incidence of this cancer and the problem continues to get worse [3]. As most of the primary cases of endometrial cancer are diagnosed at an early stage, 75–90% of those patients are cured. Total hysterectomy with bilateral salpingo-oophorectomy remains the cornerstone of the primary treatment [3]. The diagnostic and therapeutic role of lymphadenectomy is still under debate. However, for most of the cases of early stage endometrial cancer, lymphadenectomy, as a sentinel procedure, could be established as a reliable surgical procedure allowing for minimization of perioperative morbidity [3].

Although conventional laparoscopy developed over the last decades from an initially strictly diagnostic procedure to a minimally-invasive, sophisticated surgical treatment option, large prospective trials could make clear that the complete laparoscopic treatment of primary early endometrial cancer is not inferior to traditional open-surgery [4–6].

As surgeons acquired more experience with robotically assisted laparoscopic surgery, attempts were soon undertaken to transfer the convincing results of conventional laparoscopy to robotic laparoscopy [7]. In the majority of the cases, total laparoscopic hysterectomy with bilateral salpingo-oophorectomy can easily be performed with robotic surgery. In addition, the sentinel procedure based on indocyanine-green (ICG)-fluorescence, was found as a safe treatment option with high sensitivity [8,9].

Large and well-planned meta-analyses have demonstrate that robotic treatment concepts are superior to open surgery as well as at least equivalent to conventional laparoscopy surgery in many different contexts. Robotic surgery is associated with significantly lower blood loss, fewer transfusions and complications, and shorter hospital stays than are open surgery. Furthermore, robotic surgery has shown the same surgical efficacy and survival results as conventional laparoscopy [10,11].

A specific advantage of robotic surgery lies in the fact that even in cases of morbid obesity, regularly a complete surgical standard treatment can be made possible sparing the major perioperative risks of these patients, such as

blood loss, postoperative immobility or wound breakdown [11]. The combination of the excellent high-density three-dimensional (3D)-vision, the agility of the wrist-directed instruments, and the adoptive and effective power of the diathermy allow precise surgical movements in difficult anatomic regions and narrow spaces [7,10,11].

Future decisions on the mode of surgical treatment must focus on the combination of molecular pathological parameters and the consequences of indications. Though the knowledge on robotic surgery has been rapidly growing over recent years, there is still much research to be done to further improve the surgical set-up [12]. In terms of technical aspects of robotic surgery, one can anticipate with interest the next generation of robotic systems, which will transfer haptic impressions onto the console surgeon. Maybe this will allow even more differentiated and careful preparations on more difficult cases [7].

In addition, the economic aspects of robotic surgery should be considered. The basic investment in the robotic system and the costs of the disposable material are relevant. In the beginning, these costs amount to more than, for instance, the costs for conventional laparoscopy. In time however, the general costs for the surgical treatment can be lowered due to shorter surgical time, and for the patient, a lower complication rate, and a shorter hospital stay. This is, in particular, the case in the treatment of endometrial cancer.

As in any other surgical procedure, skills and the learning curve of the principal (console) surgeon, as well as optimal collaboration of all team members in the operating room, are essential.

In summary, robotic surgery has become a well-established routine treatment option for patients with primary early-stage endometrial cancer. Individual advantages over other standard surgical approaches such as open surgery or conventional laparoscopy, and economic factors, have been outlined. Future research efforts and technical developments will further improve and enhance the advantages of this surgical method.

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Substantial contributions to conception or design: ME, HA, CE, AR. All authors contributed to editorial



changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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