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Standardized and Validated Training Programs for Robot-assisted Laparoscopy: The Challenge of the Future

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Nephrectomy was not the first indication for laparoscopy in urology, but it was the initial procedure that paved the way for this technique [1]. The morbidity of surgery was greatly reduced, resulting in a clear benefit for the patient. Despite initial reluctance regarding the oncologic safety of laparoscopy, the results from large series were also convincing in this respect [2]. Quite quickly the number of indications increased, even including complex procedures such as cystectomy and urinary diversion. However, wide dissemination of laparoscopy was greatly hindered by its steep and long learning curve. Therefore, the next important step in the evolution of laparoscopy was the development of surgical robots, initiated by the US army with the idea of remote surgery. It was quickly realized that the true benefit of robot-assisted laparoscopy was not remote surgery but lies in a substantial reduction in the learning curve. In addition, laparoscopic radical prostatectomy turned out to be the ideal indication for robotic assistance [3]. Surgeons specialized in open radical prostatectomy were able to translate their skills to robot-assisted laparoscopy without the need to undergo the long learning curve for standard laparoscopy. Therefore, the introduction of these robots greatly accelerated the dissemination of laparoscopy and the only drawback were the high costs of this new technology.

As with every new technology, training became a major issue, as comprehensively documented in the literature [4]. Only appropriate training will guarantee optimal results and minimum complications. This also has important legal implications. When analyzing training we have to differentiate between training for basic skills and for procedure-based skills. Basic skills are directly correlated to the structure and function of the robot and, so far, robots for laparoscopic procedures have almost exclusively been provided by Intuitive. Their da Vinci robots function as master-slave systems. Basic skills—dissection, retraction, cutting, and suturing—can be learned via dry and wet laboratory exercises. The structure of the da Vinci robot is also well suited for virtual reality simulators, which are ideal for standardization of exercises. Several such simulators are now available [5]. The usefulness of the performance of specific tasks has to be validated, and therefore tools have been developed to assess the efficacy of a given simulator as well as that of the exercises. In addition, the performance of the trainee and his learning curve have to be assessed objectively [6,7]. Our task for the future will be to implement a structured set of exercises and assessment tools to create a standardized and validated curriculum for teaching and learning of the basic skills for robotic surgery [8]. Augmented reality is a novel simulation modality that takes elements from virtual reality to create an immersive, interactive, and virtual experience [8]. This technology may enhance training in the future.

Procedure-based skills have to be learned according to the specific procedure. Here, clinical experience is the mainstay of training, including observation, assisting in the operative room, and direct clinical work with mentorship [8]. Procedure-based skills also have to be assessed during the learning curve using standardized protocols. In this respect, it should be noted that training is required not only for the surgeon on the console but also the assistant on the table and the team, including nurses and technicians. The report in this issue of *European Urology* by Collins et al. [9] not only presents a validated comprehensive curriculum for

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the training of basic and procedure-specific skills but is also the first effort to present a program to train the trainers, which is a prerequisite for a validated training program at a standardized high level.

So far, training in daily practice has mainly been organized and provided by Intuitive (www.intuitive.com/en/healthcare-professionals/surgeons). This training has proven to be effective, but in the long term, standardized training programs should be developed and validated by academic centers as demonstrated by Collins et al. [9], or—even better—by organizations such as the European Association of Urology and the American Urological Association. The situation will change dramatically in the near future. Several companies are almost ready to present their surgical robots, and the number of surgical robots and their variety will greatly increase. The availability of different models of surgical robots will certainly accelerate their distribution, so that finally no hospital will remain without such a tool. As a consequence, the scope of training will also change. The typical trainee of the future will not be a fully trained open surgeon switching to robot-assisted laparoscopy, but a novice in surgery. Finally, it is clear that robot-assisted surgery will become the surgical standard of the future for many indications. As a consequence of all these changes, the need for specific training will increase. Since these new robots are likely to differ in several technical details, training programs for basic skills will have to be tailored to the individual requirements of each specific robot, although the required procedure-based skills should not differ too much.

There is much work to be done to achieve all these goals. Successful surgeries will be the reward for these efforts.

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References

[1] Clayman RV, Kavoussi LR, Soper NJ, et al. Laparoscopic nephrectomy: initial case report. J Urol 1991;146:278–82.

[2] Cadeddu JA, Ono Y, Clayman RV, et al. Laparoscopic nephrectomy for renal cell cancer: evaluation of efficacy and safety: a multicenter experience. Urology 1998;52:773–7.

[3] Abbou CC, Hoznek A, Salomon L, et al. Laparoscopic radical prostatectomy with a remote controlled robot. J Urol 2001;165:1964–6.

[4] Fisher RA, Dasgupta P, Mottrie A, et al. An over-view of robot assisted surgery curricula and the status of their validation. Int J Surg 2015;13:115–23.

[5] Hertz AM, George EI, Vaccaro CM, et al. Head-to-head comparison of three virtual-reality robotic surgery simulators. J Soc Laparoendosc Surg 2018;22, pii:e2017.00081.

[6] Aghazadeh MA, Mercado MA, Pan MM, et al. Performance of robotic simulated skills tasks is positively associated with clinical robotic surgical performance. BJU Int 2016;118:475–81.

[7] Kang SG, Ryu BJ, Yang KS, et al. An effective repetitive training schedule to achieve skill proficiency using a novel robotic virtual reality simulator. J Surg Educ 2015;72:369–76.

[8] Sun AJ, Aron M, Hung AJ. Novel training methods for robotic surgery. Indian J Urol 2014;30:333–8.

[9] Collins JW, Levy J, Stefanidis D, et al. Utilising the Delphi process to develop a proficiency-based progression train-the-trainer course for robotic surgery training. Eur Urol 2019;75:775–85.