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Platinum Priority – Editorial

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Reply from Authors re: Jens. J. Rassweiler, Marcel Fiedler-Hruza. The Learning Curve for Robot-assisted Partial Nephrectomy: There is Much Beyond a Trifecta. Eur Urol. In press. https://doi.org/10.1016/j.eururo.2018.10.022

The Clinical Implications of Surgical Learning Curve Analysis: Can We Optimize Patient Outcomes Using Structured Training Programs?

Alessandro Larcher [a,b,c,*], *Fabio Muttin* [a], *Gianfranco Baiamonte* [a], *Benoit Peyronnet* [d], *Geert De Naeyer* [c], *Zine-Eddine Khene* [d], *Paolo Dell'Oglio* [a,b,c], *Cristina Ferreiro* [b,c], *Peter Schatteman* [c], *Umberto Capitanio* [a], *Frederiek D'Hondt* [c], *Francesco Montorsi* [a], *Karim Bensalah* [d], *Alexandre Mottrie* [b,c]

[a] *Unit of Urology, Division of Experimental Oncology, Urological Research Institute, IRCCS San Raffaele Scientific Institute, Vita-Salute San Raffaele University, Milan, Italy;* [b] *ORSI Academy, Melle, Belgium;* [c] *Department of Urology, Onze Lieve Vrouw Hospital, Aalst, Belgium;* [d] *Department of Urology, Rennes University Hospital, Rennes, France*

We read with great interest the editorial comment [1] on our analysis [2] of the surgical learning curve for robot-assisted partial nephrectomy (RAPN). The aim of our study was to investigate the effect of the learning process on surgical performance and, consequently, on clinical outcomes for patients treated with RAPN. This specific need drove the choice of the study outcomes. Ischemia time should no longer be regarded as a hard clinical outcome, given its negligible impact on long-term renal function relative to other factors [3–5]. However, our findings demonstrated that the surgeon's speed during the most challenging phases of RAPN, namely tumor excision and renorrhaphy, is an extremely reliable metric for evaluating any potential improvement in surgical dexterity due to the learning process.

Moreover, the overall postoperative complication rate after partial nephrectomy ranges from 23% to 40% [6,7] and in this context, perioperative complications are acute adverse events of primary clinical relevancy. For instance, the rate of major complication requiring surgical treatment ranges between 5% and 9% according to tumor complexity and surgical strategy [8,9], whereas the rates of perioperative bleeding and urinary fistula were 30% and 4%, respectively, in a prospective controlled trial [10]. These worrisome figures underline the need for specific strategies to reduce the morbidity burden of partial nephrectomy to improve patient outcomes and, at the same time, reduce complication-related health care expenditure. In our study, surgical experience was also associated with a lower risk of major complications defined as Clavien-Dindo grade $\geq$3, and the importance of such events in the postoperative course for RAPN patients is unquestionable.

The keynote of the editorial on the need for solutions aimed at improving the surgeon's performance shoots at the very core of the clinical implications of our study: whenever our patients might experience suboptimal outcomes due to a learning process, there is room for improvement in our training modalities. Rassweiler and Fiedler-Hruza compare the heavy weight of research resources allocated to disease biology to the relatively light weight of the funds devoted to studying and improving any surgical-related human factors, such as the RAPN learning process.

We could not agree more with such key observations. Indeed, the constant improvement of surgical training has been one of the educational priorities of the European Association of Urology Robotic Urology Section (ERUS) [11]. ERUS is leading and supporting the development of structured programs based on theoretical courses, preclinical virtual reality-based and laboratory-based simulations, and modular clinical training that can guide a novice trainee to surgical independence. This process was described for the first time in the pilot study on the ERUS curriculum for robot-assisted radical prostatectomy [12]. The efficacy of the program was confirmed and expanded in a larger investigation [13] that had also the merit of defining step-specific learning curves rather than a single learning curve for the full procedure, implying a paradigm shift in the way trainee surgeons are instructed.

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* Corresponding author. Unit of Urology, Division of Oncology, Urological Research Institute, IRCCS San Raffaele Scientific Institute, Vita-Salute San Raffaele University, Via Olgettina 60, 20132 Milan, Italy. Tel. +39 02 26437286.
E-mail address: alelarcher@gmail.com (A. Larcher).

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Our analysis underscores the unmet need for similar programs for another major urological intervention such as RAPN. In this regard, the structure of the ERUS curriculum for RAPN [14] has already been defined and the pilot clinical validation study will report soon, including safety data for the patients treated during the program for the first time in the setting of robot-assisted surgery. How can we optimize the knowledge transfer between an expert trainer and a naïve trainee without any detriment to the patient? The answer to this critical question is a research priority that deserves special consideration in every field of urological surgery.

Conflicts of interest: Alessandro Larcher discloses consulting activity for Medtronic and a restricted research grant from Intuitive. Geert De Naeyer, Karim Bensalah, and Alexandre Mottrie disclose consulting activity for Intuitive. The remaining authors have nothing to disclose.

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