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Platinum Priority – Editorial and Reply from Authors

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Laparoendoscopic Single-site Surgery (LESS) and Nephrectomy: Current Evidence and Future Perspectives

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Two groups independently reported the first cases of laparoendoscopic single-site surgery (LESS) for transumbilical nephrectomy in 2007 [1,2]. Shortly thereafter, the first single-center large series was described, including the entire spectrum of urologic laparoscopic procedures done by LESS [3]. Today, LESS remains a dilemma for practitioners in the field of minimally invasive surgery: Is LESS marketing hype or real progress? Elite surgery or a reproducible surgical standard? When is LESS indicated and for which patients? Using which instrumentation?

On the one hand, we have witnessed an exponentially increasing number of reports on this approach by a growing number of groups from all over the world [4]. These reports can be regarded as a proof of the undeniable appeal of this novel approach. On the other hand, a few issues remain to be addressed, keeping the debate open to points and counterpoints.

Laparoscopic nephrectomy was introduced >20 yr ago and is now considered the reference procedure, given its significant advantages over the old standard open nephrectomy [5]. Those practitioners who are expecting a similar epoch-making shift when moving from standard multiport laparoscopy to LESS, however, are going to be disappointed, at least at this time.

In our recently reported cumulative analysis of the outcomes in urologic LESS worldwide, nephrectomy procedures were by far the most commonly performed, accounting for almost 50% of >1000 cases [6]. So far, a variety of LESS nephrectomy techniques have been described by different authors, with similarly encouraging outcomes.

In this issue of *European Urology*, Fan and colleagues report a systematic review and meta-analysis of all publications comparing laparoscopic and LESS nephrec-

tomy, including 2 randomized trials and 25 retrospective case-control studies [7]. Notably, >1000 cases were included in the analysis by taking into account simple, radical, partial, and donor nephrectomy procedures. Major findings from this analysis showed that LESS patients benefit from less postoperative pain, lower analgesic requirement, shorter hospital stay, faster recovery time, and not surprisingly, a better cosmetic outcome. No significant differences were observed in other main surgical outcomes, such as complications, estimated blood loss, warm ischemia time, and postoperative renal function (for donor and partial nephrectomy procedures). Nevertheless, the authors found that LESS takes more operative time, and the procedure carries a higher chance of conversion. In a recent multi-institutional analysis done on a large sample of LESS cases that included but were not limited to nephrectomy procedures, we found a conversion rate of 19.7%, but a rate of only 1.1% for conversion to open surgery [8].

Are these findings the ultimate proof that LESS is the way to go? Obviously, they are not. This elaborate analysis moves in the right direction toward the Idea, Development, Evaluation, Assessment and Long-Term Study (IDEAL) assessment of a surgical innovation such as LESS [9]. However, a few limitations need to be recognized, which are mostly related to the methodological quality of the studies included. As the authors pointed out, only two randomized trials have been reported so far in this field, whereas most of studies have been small case-control retrospective series [7]. Conference abstracts were also included, although that choice is questionable.

Of note, the broad term *nephrectomy* that the authors use in the title to characterize the study subject

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Procedure	Pros	Cons
SN and RN	<ul style="list-style-type: none"> Limited technical complexity 	<ul style="list-style-type: none"> Large incision needed for specimen extraction Data needed to demonstrate oncologic safety (for RN)
PN	<ul style="list-style-type: none"> Small specimen to be extracted 	<ul style="list-style-type: none"> Mainly for low-complexity masses Technically demanding: warm ischemia time to be minimized; clamping and suturing potentially required Data needed to demonstrate oncologic safety (for oncology cases)
DN	<ul style="list-style-type: none"> Cosmetically very appealing for the healthy donor 	<ul style="list-style-type: none"> Technically demanding: warm ischemia time to be minimized

Fig. 1 – Laparoendoscopic single-site surgery nephrectomy procedures: pros and cons. SN = simple nephrectomy; RN = radical nephrectomy; PN = partial nephrectomy; DN = donor nephrectomy.

encompasses a broad range of procedures, each one with specific features, peculiar challenges, and potential risks (Fig. 1) [7].

Simple nephrectomy represents a very appealing indication for LESS, as it is (most of the time) a straightforward extirpative procedure that does not require (most of the time) a large extraction-site incision.

Initially, investigators remained careful and selective in applying LESS for oncologic conditions. In a recent analysis, Greco et al found that besides the American Society of Anesthesiologists score, malignant disease at pathology represented a predictive factor for complications after LESS for upper urinary tract surgery [10]. When looking at radical nephrectomy, a few considerations should be made. The role of this procedure in the management of renal masses has been significantly reduced, given the exponential development of nephron-sparing surgery. It is now an established principle that whenever feasible, a nephron-sparing approach should be attempted. Thus, the quest for a scarless procedure cannot undermine the adoption of nephron-sparing techniques, which is similar to what has happened with standard laparoscopy [11]. LESS radical nephrectomy has been well described with encouraging surgical outcomes [12–14], but its likely oncologic safety remains to be supported by long-term follow-up studies. Additionally, the systematic need for a large incision to effectively extract the specimen represents per se a difficult issue to solve.

This is not the case for LESS partial nephrectomy, a procedure reported by our group and others since 2009 [15,16]. As standard laparoscopic partial nephrectomy is already a demanding procedure with a steep learning curve, one can easily argue that the limited range of motion and the ergonomic constraints of LESS represent additional major limitations. In a recent analysis, we found that not surprisingly, partial nephrectomy represents by far the procedure most likely to be converted during LESS [8]. Thus only highly selected masses can be approached with LESS to maintain acceptable outcomes. From a technical stand-

point, then, mainly masses in which clamping the hilum and suturing are not needed are the ones suitable for LESS.

Another potential LESS application is donor nephrectomy. Despite already reported large single-center series [17] and encouraging comparative analyses [18], the procedure poses unique challenges and risks. However, the concept of minimizing the skin incision in a healthy (and frequently young) individual is appealing and can be regarded as an incentive to organ donation. Other scarless approaches have been investigated, including transvaginal natural orifice transluminal endoscopic surgery–assisted laparoscopy [19].

While gathering evidence to support the application of LESS to kidney surgery, the development of LESS remains strictly related not only to surgical expertise but also to the development of appropriate instrumentation. In this respect, robotics is going to play a major role in the field. A safe clinical application of the current robotic platform to LESS has been demonstrated [20]. Purpose-built instrumentation for single-site robotic surgery has also been recently introduced [21,22]. Other innovations are likely to follow, and they will further address the current challenges of LESS.

LESS is still far from being the new standard in minimally invasive urologic surgery, but it would be unfair to confine the technique within the realm of a meaningless and purely academic experimental surgical exercise. The jury might be still out, but proofs of evidence are being collected. As investigators in this field, it is our responsibility to stay tuned and to look forward to future developments.

Conflicts of interest: Jihad H. Kaouk serves as a speaker/consultant for Intuitive Surgical Inc.

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Laparoendoscopic Single-site Surgery (LESS) and Nephrectomy: Feasible, but Still a Long Way to Go

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We greatly appreciate the insightful editorial [1] by Kaouk and Autorino accompanying our article [2] in this issue of *European Urology*, and we appreciate the opportunity to respond. Urologists are always at the forefront of minimally invasive innovation. We have witnessed the development and maturity of laparoscopic nephrectomy over the past two decades. Actually, laparoscopic nephrectomy has now been established as the gold standard procedure [3], given its significant advantages over the former standard of open nephrectomy [4]. In an attempt to further reduce the morbidity and scarring associated with surgical interven-

tion, another innovative approach, laparoendoscopic single-site surgery (LESS) for nephrectomy, came onstage in 2007 [5]. Although there are an exponentially increasing number of reports on the use of this approach all over the world [1,6], the potential benefit of LESS beyond the cosmetic outcome remains to be determined. Hence we carried out a systematic review and meta-analysis comparing LESS versus conventional/multiport laparoscopic surgery for nephrectomy. We tried to identify, assess, synthesize, and (if appropriate) combine the results of all relevant studies to provide the most up-to-date evidence on this topic. As they noted in the editorial, major findings from our meta-analysis showed that LESS patients benefit from less postoperative pain, lower analgesic requirements, shorter hospital stay, faster recovery time, and, not surprisingly, better cosmetic outcome. No significant differences were observed in other main surgical outcomes. In addition, LESS takes more operative time, and the procedure carries a higher chance of conversion. Therefore, we concluded that LESS is safe and efficient with appropriate patient selection.

We agree with the statement of Kaouk and Autorino [1] that these findings are obviously not the ultimate proof that LESS is the way to go. Although systemic review and meta-analysis is a robust methodology that attempts to collate all empirical evidence that fits prespecified eligibility criteria to answer a specific research question [7], it is not free of criticism. Statistically significant, “positive” results indicating that an intervention works are more likely to be published. Nevertheless, when it comes to the contribution

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