Editorial

Human and robot: an amity not a discord

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Since the use of robot-assisted laparoscopic prostatectomy (RALP) was first reported in 2000, there has been rapid adoption of robotic surgery for men with prostate cancer (PCa). In the USA, more than 85% of prostatectomies are done robotically over open, and although the proportion is lower in the UK and Europe, it is increasing (1). Despite the cost and inherent minimally invasive advantage of the former over the latter this has gone exponential application without a strong evidence of benefit overcoming the costs. Recently, Yaxley *et al*. (2), has disclosed that the early outcomes of a well conducted prospective randomized trial. This has become a ringing bell, which triggered a lot of discussion about the flaws and strengths of this revelation in the field of urology. This study included of men with localized PCa who were electronically randomized to receive robot assisted radical prostatectomy (RARP) or open radical prostatectomy (ORP). The surgery was performed by a young robotic surgeon with 200-case and an experienced open surgeon with 1,500 cases. The primary endpoints were sexual and urinary function at 6 weeks, 12 weeks, and 24 months and oncological outcome. Their results showed that urinary and sexual function did not significantly differ at 12 weeks (83.80 *vs*. 82.50; P=0.48 and 35.00 *vs*. 38.90; P=0.18, respectively). However, RARP took the edge on the surgery time, occurrence of intraoperative adverse event, blood loss and length of hospital days (P<0.001, P=0.02, P<0.001, and P<0.001, respectively). Likewise, patients who received RARP had also lower postoperative complications (≥grade III) although the p value didn't reach statistical significance (1 *vs*. 7, P=0.05).

As the saying goes, we should "compare apples to apples". In this study, the incomparable differences between the two surgeons made the primary endpoint less measurable. This heterogeneity in experience may have brought an impact on the recovery of continence and risk of complications (3,4). Additionally, lack of generalisability may also be brought by short term results because we all know that functional outcome is expected to improve between 12–18 months (5). But looking on the other side of the coin, the less experienced surgeon delivered a comparable result to a surgeon with robust experience by the robotic aide. While we agree to a strong correlation between surgeon experience and surgical outcomes, it would also be worth stating that a robotic system can potentially fill the experience gap.

Undeniably, RARP arm should also be given credit for the preoperative advantages it has shown. This inherent advantage of the minimally invasive technique such as RARP is still quite worth mentioning like shorter surgery time and hospital stay, less blood loss and adverse events, and less postoperative complications. This superiority was never placed as one of the key messages of this paper but rather focused on the importance of surgeon experience which lacks proper support from their results. It is perhaps likely that with further technological evolutions these advantages will be more quantifiable for the patients.

This incongruent findings from what has been reported and thought of before, has brought us a meaningful message that this is just the beginning of a new horizon in robotics. A tip of the iceberg; as we may say, equality of outcome

between open and robotic surgery will trigger further innovations and advancements to surpass such. At present time, these equivalent outcomes between techniques have shown that above all technologies, surgeon and his vast experience prevail over them. While everyone awaits for the long-term outcome of the contemporary open technique and robotic surgery, it might be insightful to also look at what is at hand for us. Despite the very well-known advantages such as improved vision and better ergonomics, robotic technology has also brought a different perspective in training of new robotic surgeons (6,7). This in effect has translated into lower learning curve due to structured courses and simulation exercises without compromising patient's safety. Aside from this, several reports have shown promising incorporation of other new technologies in the robotic platform. Integration of fluorescence into robotic system have shown acceptable outcome without any morbidity (8). This enhancement will further facilitate lymph node yield which will potentially lead to improved oncological outcome. Furthermore, intraoperative ultrasound linked to robotic system has also demonstrated key anatomical structures and valuable guidance for the console surgeon (9). In the future, we might even see an artificial intelligence integrated within a robotic interface. These innovations together with rapidly evolving technologies at hand are all aimed towards one goal which is achievement of better treatment outcome.

Unquestionably, one of the major factors why robotic surgery hasn't become the recommended treatment option is its cost-effectiveness despite its widespread use. The cost that entails in obtaining robot along with consumables and maintenance are always part of the hurdle against the advantages it offers. Recently, several other robotic companies have reported success with different platforms. The ALF-X system (SORAR, SpA, Milan, Italy) has boosted its specifications having haptic feedback and infra-red eye-tracking system. Its success in porcine model has now been proven to be likewise feasible and effective in gynecologic patients (10). Asian countries like South Korea and China has also developed their own robotic system. Abdel Raheem *et al.* (11) have reported their success in animal study using REVO I robot system (Meree company, Seoul, South Korea) and recently commenced with human trials. In China, Yi *et al.* (12) reported safe and effective outcome of clinical cases utilizing Micro Hand S System. With these potential uprising of other systems, costs effectiveness of robotic surgery might no longer be an issue in the future.

At the end of the day, surgeon experience will always play a critical role in surgical outcome. Meanwhile, when these technologies and enhancements have become readily available on the main stream an inevitable paradigm shift might be expected. This will help us embrace the robotic technology as an evolution of what awaits us in the future which could further fill the experience gap of less experienced surgeons.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Hu JC, Gandaglia G, Karakiewicz PI, et al. Comparative effectiveness of robot-assisted versus open radical prostatectomy cancer control. Eur Urol 2014;66:666-72.
2. Yaxley JW, Coughlin GD, Chambers SK, et al. Robot-assisted laparoscopic prostatectomy versus open radical retropubic prostatectomy: early outcomes from a randomised controlled phase 3 study. Lancet 2016;388:1057-66.
3. Ficarra V, Novara G, Rosen RC, et al. Systematic review and meta-analysis of studies reporting urinary continence recovery after robot-assisted radical prostatectomy. Eur Urol 2012;62:405-17.
4. Novara G, Ficarra V, Rosen RC, et al. Systematic review and meta-analysis of perioperative outcomes and complications after robot-assisted radical prostatectomy. Eur Urol 2012;62:431-52.
5. Walsh PC, Marschke P, Ricker D, et al. Patient-reported urinary continence and sexual function after anatomic radical prostatectomy. Urology 2000;55:58-61.
6. Smith AL, Scott EM, Krivak TC, et al. Dual-console robotic surgery: a new teaching paradigm. J Robot Surg 2013;7:113-8.
7. Santok GD, Raheem AA, Kim LH, et al. Proctorship and mentoring: Its backbone and application in robotic surgery. Investig Clin Urol 2016;57:S114-20.
8. KleinJan GH, van den Berg NS, de Jong J, et al. Multimodal hybrid imaging agents for sentinel node mapping as a means to (re)connect nuclear medicine to advances made in robot-assisted surgery. Eur J Nucl Med

Mol Imaging 2016;43:1278-87.
9. Mohareri O, Ischia J, Black PC, et al. Intraoperative registered transrectal ultrasound guidance for robot-assisted laparoscopic radical prostatectomy. J Urol 2015;193:302-12.
10. Fanfani F, Restaino S, Rossitto C, et al.. Total Laparoscopic (S-LPS) versus TELELAP ALF-X Robotic-Assisted Hysterectomy: A Case-Control Study. J Minim Invasive Gynecol 2016;23:933-8.
11. Abdel Raheem A, Troya IS, Kim DK, et al. Robot-assisted Fallopian tube transection and anastomosis using the new REVO-I robotic surgical system: feasibility in a chronic porcine model. BJU Int 2016;118:604-9.
12. Yi B, Wang G, Li J, et al. Domestically produced Chinese minimally invasive surgical robot system "Micro Hand S" is applied to clinical surgery preliminarily in China. Surg Endosc 2017;31:487-93.

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