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European Association of Urology

Research Letter: Open Science

Penetrance of Robot-assisted Kidney Transplantation in Surgical Practice at Referral European Transplant Centres: An Audit Within the ERUS-RAKT Working Group

Progress in technique, technology, and available surgical tools have elevated the role of robotics in kidney transplantation (KT) [1–4]. Following the standardisation of the technique in the living donor (LD) setting, a number of European centres with large experience in both KT and robotic surgery have recently implemented robot-assisted kidney transplantation (RAKT) in several clinical scenarios [5]. However, there is a lack of evidence regarding the pattern of RAKT utilisation in the real-life setting.

To fill this gap, we queried prospectively maintained databases from seven European referral KT centres to identify patients who underwent KT from LDs or deceased donors (DDs) between January 2017 and December 2022. A joinpoint analysis was performed to assess the trend of RAKT adoption within the study period [6], estimating the annual percentage change (APC).

Overall, 4220 KTs were included, of which 860 (20.4%) were from LDs. The main characteristics of KT centres included in the study are reported in Supplementary Figure 1 and Supplementary Table 1.

The joinpoint regression analysis showed an upward trend of the proportion of RAKTs, rising from 6% in 2017 to 11% in 2022 ($APC_{2017–2022}$ = 15.24 [95% confidence interval {CI} 6.27; 24.97]; Fig. 1). These results were mainly driven by the implementation of RAKT in the LD setting, where the proportion increased over time, from 18% in 2017 to 44% in 2022 ($APC_{2017–2022}$ = 20.09 [95% CI: 12.73; 32.15]). Conversely, RAKTs from DDs showed markedly different dynamics, with consistently low proportions (1–2%) throughout the study period (APC = –11.42 [95% CI –22.76; 7.51]). Our data offer several insights to contextualise the current role of robotics in the field of KT. The increasing adoption of RAKT during the last years at referral European centres is in line with the trend of robot-assisted procedures spread across various urological fields. These results are mainly driven by the LD setting, where the proportion of RAKTs reached almost the half of all KTs. Notably, after the COVID-19 pandemic, which inevitably affected KT activities from LDs, 80/180 (44%) RAKTs were performed in 2022, showing a significant upward trend over time. Conversely, despite the potential advantages of robotics for fragile patients (ie, faster recovery), the limited number of RAKTs in the context of DDs highlights significant issues. First, logistical and organisational barriers are hindering the widespread adoption of robotics in this field (ie, unavailability of robotic platform and/or dedicated robotic surgical teams) [5]. The second issue is the potential difficulties in recruiting robotic surgeons trained in KT out of the LD setting. In this regard, the establishment of standardised training programmes endorsed by KT and urological communities for RAKT is still an unmet clinical need and represents a relevant challenge, even in robotic high-volume referral centres. Third, although robotics has become prominent in various urological procedures, its financial implications for healthcare systems remain a concern. However, the introduction of new robotic platforms in the upcoming years may contribute to a reduction in overall costs.

Despite its limitations (including the retrospective design, inclusion of referral centres, and lack of granular clinical data and a standardised decision-making process to select RAKT candidates), our study shows a rising trend of RAKT adoption in the LD setting [3], while its role in the DD setting is still marginal and should be an object of further investigation.

Relying on the largest and most updated series on RAKT across European KT centres, our data provide the first "snapshot" of the current penetrance of RAKT in KT practice.

Conflicts of interest: The authors have nothing to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.euros.2024.01.016.

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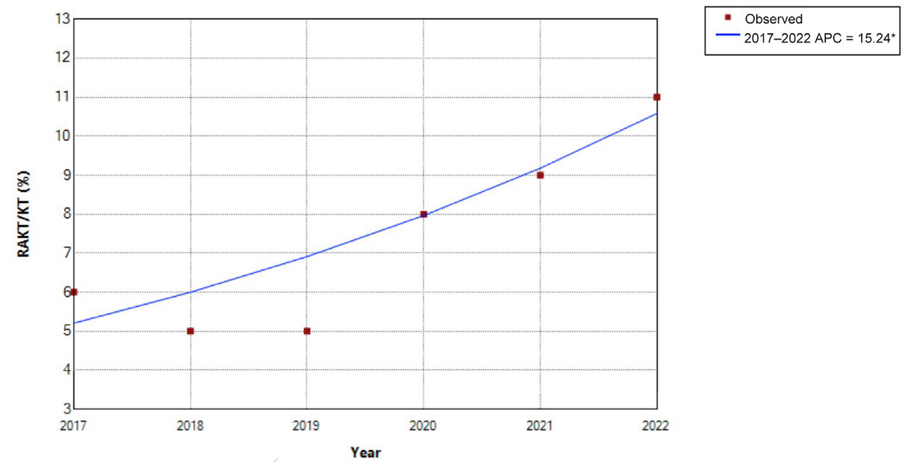
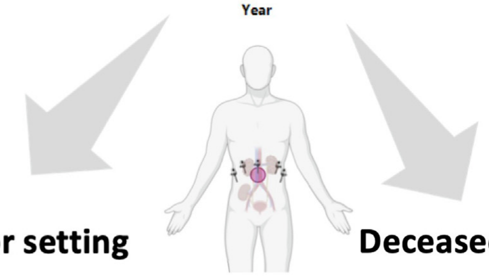
Proportion of robot-assisted kidney transplantation (RAKT) performed at seven European referral transplant centres between 2017 and 2022

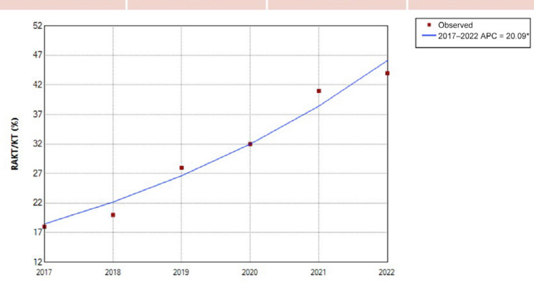
Period	APC	Lower CI	Upper CI
2017-2022	15.24	6.27	24.97





Living donor setting

Period	APC	Lower CI	Upper CI
2017–2022	20.09	12.73	32.15



Deceased donor setting

Period	APC	Lower CI	Upper CI
2017–2022	–11.42	–22.76	7.51

Fig. 1 – Graphical overview of the joinpoint analysis assessing the trend of robot-assisted kidney transplantation (RAKT) between 2017 and 2022 in the overall study cohort and stratified according to donor type (living and deceased donors). APC = annual percentage change; CI = confident interval; KT = kidney transplantation; RAKT = robot-assisted kidney transplantation. * p < 0.05.

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Alessio Pecoraro [a,b,c,†,*]
Giuseppe Basile [a,†]
Andrea Gallioli [a]
Angelo Territo [a]
Camille Berquin [a,d]
Begoña Etcheverry [e]
Josep Maria Gaya [a]
Graziano Vignolini [b]
Thomas Prudhomme [f]
Milla Ortved [g]
Philip Zeuschner [h]
Rodrigo Garcia-Baquero [i]
Malene Rohrsted [g]
Michael Stoeckle [h]
Nicolas Doumerc [f]
Francesc Vigues [e]
Sergio Serni [b,c]
Riccardo Campi [b,c,‡]
Alberto Breda [a,‡], on behalf of the European Association of Urology EAU Robotic Urology Section ERUS Robot-assisted Kidney Transplantation Working Group

[a] *Department of Urology, Fundació Puigvert, Universitat Autonoma de Barcelona, Barcelona, Spain*
[b] *Unit of Urological Minimally Invasive, Robotic Surgery and Kidney Transplantation, Careggi Hospital, University of Florence, Florence, Italy*
[c] *Department of Experimental and Clinical Medicine, University of Florence, Florence, Italy*
[d] *Department of Urology, ERN eUROGEN Accredited Centre, University Hospital Ghent, Belgium*
[e] *Department of Urology, Hospital Universitari de Bellvitge, Le'Hospitalet de Llobregat, Barcelona, Spain*
[f] *Department of Urology and Renal Transplantation, University Hospital of Rangueil, Toulouse, France*
[g] *Urological Research Unit, Department of Urology, Copenhagen University Hospital Rigshospitalet, Copenhagen, Denmark*
[h] *Department of Urology and Pediatric Urology, Saarland University, Homburg/Saar, Germany*
[i] *Kidney Transplant Unit, Urology Department, Hospital Universitario Puerta del Mar, Cádiz, Spain*

*Corresponding author. Unit of Urological Minimally Invasive, Robotic Surgery and Kidney Transplantation, Careggi Hospital, University of Florence, Florence, Italy. Tel. +3335423270; Fax: +390557949500.
E-mail address: alessio.pecoraro10@gmail.com (A. Pecoraro).

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Véronique Phé

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