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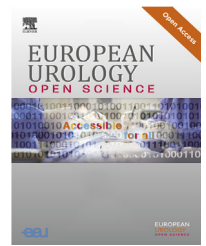
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European Association of Urology



Brief Correspondence

A 5-Year Contemporary Nationwide Evolution of the Radical Prostatectomy Landscape

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Abstract

The evolution in the past decade of recommendations for prostate cancer (PCa) management, from screening to surgical treatment, may have affected the radical prostatectomy (RP) landscape. However, comprehensive data at a national level remain scarce. We extracted 5-yr data for RP patients in France from the central database of the national health care system. The primary endpoints were surgical approach (open [ORP], laparoscopic [LRP], and robot-assisted RP [RARP]), length of stay (LOS), and complication and readmission rates. The annual number of RPs was stable during the study period. The proportion of RARPs increased from 39.8% in 2015 to 52.6% in 2019, whereas the proportion of ORPs decreased from 34.4% to 24.5%. LOS continuously decreased over time irrespective of the surgical approach. The proportion of centres in the highest quartile of hospital volume increased from 22.0% to 28.3% ($p = 0.006$). LOS and complication and readmission rates were significantly lower ($p < 0.001$) in the LRP cohort at each time point. National trends confirmed that RARP progressively replaced ORP, with a stable number of annual RPs over time. Greater centralisation and better early postoperative outcomes were observed with laparoscopy.

Patient summary: We reviewed French data for patients undergoing removal of the prostate for prostate cancer between 2015 and 2019. We found that robot-assisted minimally invasive surgery has increased over time and the length of hospital stays has decreased. Rates of complications and readmission were lower with minimally invasive surgery.

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The management of prostate cancer (PCa) is a constantly evolving field with major changes observed. However, comprehensive data remain scarce at a national level. A previous analysis of a French national registry demonstrated a dramatic decrease of 20% in the number of yearly radical prostatectomies (RPs) in France between 2007 and 2010

[1]. This trend was explained by the combination of stabilisation of the PCa screening rate and the introduction of active surveillance. The same overall tendencies were observed in other countries at this time point [2]. However, important changes have emerged during the past decade showing an important stage migration of PCa at diagnosis,



partly explained by the controversy related to screening programs since 2009 [3,4]. Moreover, greater centralisation of surgery is strongly encouraged in various countries and may have a visible impact on countrywide statistics [5]. Taking into consideration all these evolving factors during the past decade, it appeared relevant to evaluate the contemporary changing face of RP at a country-specific level.

The study population consisted of all patients undergoing RP in France between 2015 and 2019. Data were obtained from the nationwide French Programme de Médicalisation des Systèmes d'Informations registry, a centralised database hosted by the French national health care system. This system comprehensively records, for claims purposes, information for every surgical procedure performed in a private or public hospital. For this study, information was extracted from aggregated data for all patients who underwent RP via an open (ORP) or laparoscopic (LRP; including robot-assisted [RARP]) approach between 2015 and 2019. The system did not separately encode pure versus robot-assisted laparoscopic RP.

Ancillary data collected for each procedure included patient age, date, hospital volume, concomitant pelvic lymph node dissection (PLND), and length of stay (LOS). A severity index, encoded at hospital discharge, was also included. In the French health care system, patients are

classified into four severity classes according to risk factors, comorbidities, complications, and LOS. An algorithm determines the level of severity for each patient and provides the corresponding reimbursement rate to be pursued by the institution for the procedure. For the severity index (SI), levels 1 and 2 correspond to uncomplicated cases, whereas levels 3 and 4 are associated with surgical complications in 85% of cases [6].

The primary endpoints for our study were surgical approach, hospital volume, LOS (in days), complications (assessed as the occurrence of SI3 and SI4 cases), and 30- and 90-d readmission rates, and their evolution over time. Hospital volume is reported by quartiles (low volume: <10 annual cases; very high volume: >40 annual cases). Univariate analyses were carried out for comparisons. Statistical significance was set at $p < 0.05$. SPSS 22.0 (SPSS Inc., Chicago, IL, USA) software was used for all statistical analyses.

Figure 1 shows the number of RP procedures each year by surgical approach (ORP, LRP, and RARP). The proportion of RARPs increased from 39.8% ($n = 7621$) in 2015 to 52.6% ($n = 10\,577$) in 2019 ($p < 0.001$). The proportion of ORPs decreased from 34.4% ($n = 6592$) in 2015 to 24.5% ($n = 4931$) in 2019 ($p < 0.001$). The rate of pure LRPs (non-robot-assisted) was stable during the study period (from 25.8% [$n = 4951$] to 22.8% [$n = 4590$]). Patient age

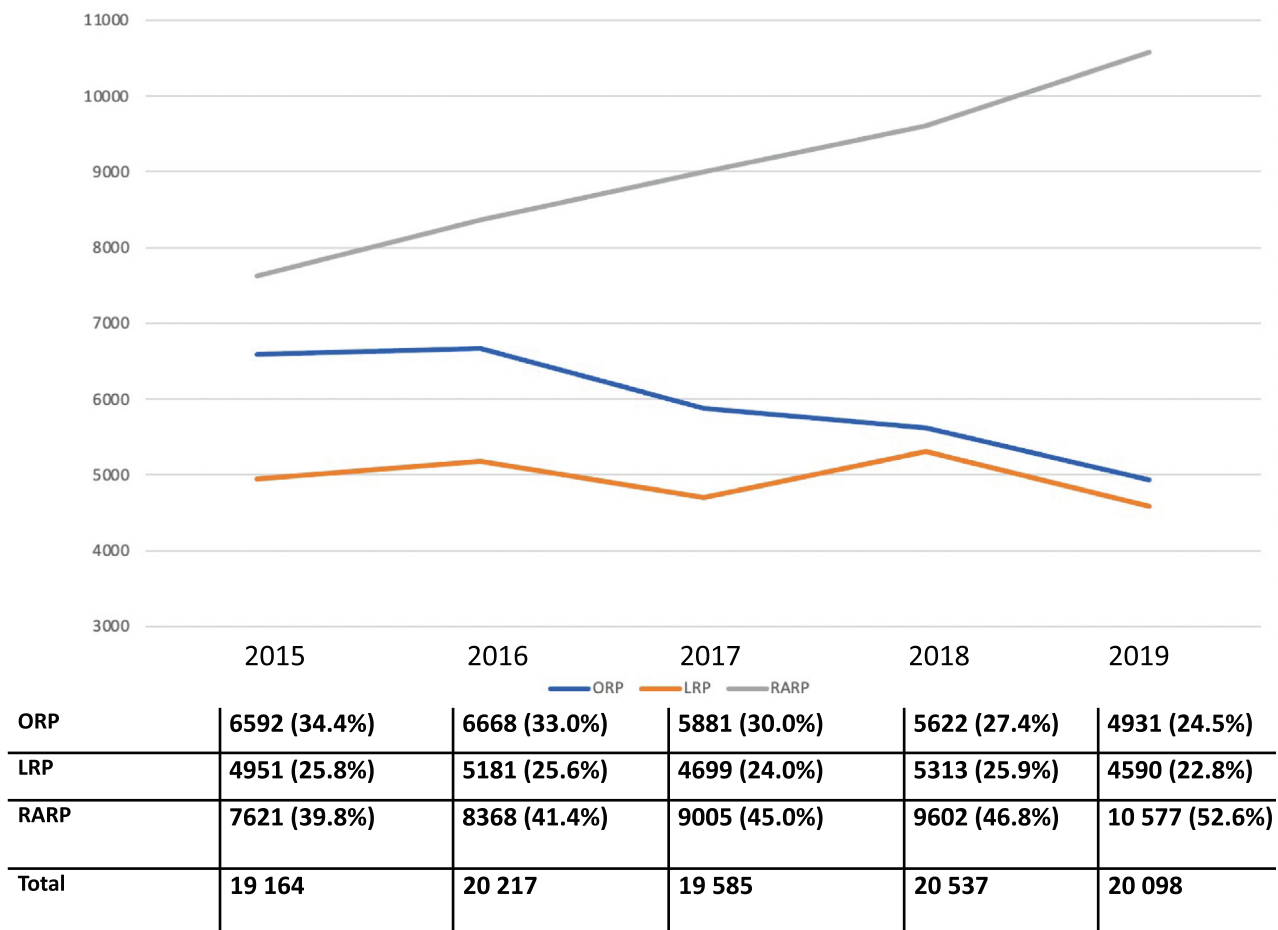


Fig. 1 – Evolution of the number of open (ORP), laparoscopic (LRP), and robot-assisted (RARP) radical prostatectomy cases in France over time.

increased significantly over time ($p < 0.001$). Rates of SI3 ($p = 0.772$) and SI4 ($p = 0.560$) cases and of 30-d ($p = 0.759$) and 90-d ($p = 0.928$) readmissions were stable over time. LOS continuously decreased from 8.5 d in 2015 to 7.1 d in 2019 ($p < 0.001$). The proportion of very high-volume centres (highest quartile for hospital volume) increased from 22.0% to 28.3% ($p = 0.006$). Mean hospital volume per centre (44.4 RPs) slightly increased over time without a significant difference ($p = 0.894$), as did the rate of concomitant PLND (from 46.9% to 52.7%; $p = 0.148$).

Greater centralisation was observed in the LRP cohort, with a higher mean number of RPs per centre (57.9 vs 27.8 in the ORP cohort; $p < 0.001$) and a higher proportion of very high-volume centres (39.6% vs 10.0% in the ORP cohort; $p < 0.001$; Table 1). There was a nonsignificant trend towards more PLND procedures performed in very high-volume centres compared to the lowest-volume centres (48.8% vs 52.6%; $p = 0.076$). Rates of SI3 and SI4 cases and of 30- and 90-d readmissions were stable over time, irrespective of the surgical approach. Nevertheless, the rates of SI3 cases ($p < 0.001$), SI4 cases ($p = 0.004$), 30-d readmission ($p < 0.001$), and 90-d readmission ($p < 0.001$) were significantly lower in the LRP cohort at each time point. Rates of SI3 and SI4 cases were higher among low-volume centres (12.8% and 5.8%, respectively) than among very high-volume centres (6.5% and 1.6%, respectively; $p < 0.001$). LOS decreased from 9.3 to 8.6 d in the ORP cohort and from 7.5 to 5.8 d in LRP cohort ($p < 0.001$ within each cohort and for ORP vs LRP).

Our analysis covering 2015–2019 showed that the annual number of RPs in France was stable at approximately 20 000 per year. ORP accounted for only a quarter of the procedures in 2019, compared to a third in 2015. Conversely, RARP cases increased by 32% to reach more than half of all RP procedures, whereas pure LRP cases remained stable. Interestingly, stage migration towards higher PCa grade at diagnosis was evidenced in our series by the increase in the proportion of concomitant PLND procedures over time. This percentage increased from 47% to 53% in 5 yr in the absence of any changes to in the French and European

guidelines during the study period. We hypothesise that this increase may be correlated with a trend towards higher stage at diagnosis. The relationship between outcomes and volume has been highlighted in a previous report [7].

In large population studies, the readmission rate after RP is not negligible, reaching up to 35% in low-volume centres [8]. It is worth noting that we took into account readmissions for nonurological reasons and visits to the emergency department (even without subsequent hospitalisation) for the overall readmission rate.

The outcomes of complex oncological surgery depend on various factors, including surgeon experience, hospital volume, patient status, and quality of postoperative care provided by the whole team. Most of these parameters were not available for analysis. Efforts should be directed to implementation of a national quality improvement programme for health care to promote prospective registration of postoperative outcomes.

The main limitation of our analysis is that the registry does not include important parameters linked to disease characteristics and functional outcomes. We were not able to assess recurrence rates and time to continence recovery. Moreover, although the data were exhaustively collected over a 5-yr period in France, the differences observed should be interpreted with caution owing to the high likelihood of confounding factors and missing parameters.

These 5-yr nationwide data illustrate the changing face of RP in France. After an important decrease in yearly cases with the adoption of active surveillance, overall stabilisation in the number of annual RP procedures since 2015 is evident. The trends also confirm that RARP progressively replaced ORP over time. Greater centralisation and better early postoperative outcomes are observed with laparoscopy.

Author contributions: Guillaume Ploussard had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Ploussard, Grabia, Lequeu.

Acquisition of data: Grabia, Lequeu.

Table 1 – Evolution of RP parameters and outcomes over time by surgery approach

| Year | Mean RPs | LVC | VHVC | Age | SI3 | SI4 | LOS | Readmissions (%) | |
|--------------------|-------------------------|------|------|------|------|-----|-----|------------------|------|
| | per centre ^a | (%) | (%) | (yr) | (%) | (%) | (d) | 30-d | 90-d |
| Open RP | | | | | | | | | |
| Whole study period | 27.8 | 66.4 | 10.0 | 65.0 | 12.1 | 3.9 | 8.9 | 20.8 | 26.8 |
| 2015 | 28.2 | 64.5 | 10.8 | 64.5 | 12.3 | 3.0 | 9.3 | 20.9 | 27.0 |
| 2016 | 28.4 | 66.4 | 9.8 | 64.7 | 11.9 | 3.8 | 9.0 | 20.0 | 26.7 |
| 2017 | 27.3 | 68.2 | 9.0 | 65.1 | 12.0 | 4.2 | 8.7 | 21.1 | 26.6 |
| 2018 | 28.5 | 62.6 | 10.0 | 65.6 | 11.5 | 4.3 | 8.8 | 20.9 | 26.9 |
| 2019 | 26.4 | 71.1 | 10.4 | 65.3 | 12.8 | 4.3 | 8.6 | 21.1 | 26.8 |
| Laparoscopic RP | | | | | | | | | |
| Whole study period | 57.9 | 37.3 | 39.6 | 64.5 | 6.9 | 2.2 | 6.6 | 19.4 | 24.9 |
| 2015 | 57.5 | 43.1 | 34.8 | 64.2 | 7.3 | 2.0 | 7.5 | 20.2 | 25.5 |
| 2016 | 59.1 | 39.2 | 37.5 | 64.2 | 6.0 | 1.9 | 7.0 | 19.3 | 24.7 |
| 2017 | 56.6 | 39.2 | 38.5 | 64.6 | 6.9 | 2.5 | 6.6 | 18.6 | 24.7 |
| 2018 | 58.3 | 34.3 | 41.5 | 64.6 | 6.9 | 2.5 | 6.2 | 19.2 | 24.7 |
| 2019 | 57.9 | 30.9 | 44.7 | 64.9 | 7.3 | 2.2 | 5.8 | 19.8 | 25.2 |

RP = radical prostatectomy; LVC = low-volume centres (centre volume in the first quartile; <10 annual RPs); VHVC = very high-volume centres (centre volume in the fourth quartile; >40 annual RPs); SI = severity index; LOS = length of stay.

^a After excluding centres performing <10 RPs per year.

Analysis and interpretation of data: Ploussard, Grabia, Beauval, Rozet, Lequeu, Rouprêt.

Drafting of the manuscript: Ploussard, Rouprêt, Lequeu.

Critical revision of the manuscript for important intellectual content: Barret, Brureau, Dariane, Fiard, Fromont, Gauthé, Mathieu, Renard-Penna, Roubaud, Ruffion, Sargos, Rozet, Rouprêt.

Statistical analysis: Ploussard, Grabia, Lequeu.

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