

Surgeon Adoption of Minimally Invasive Radical Prostatectomy

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Abstract

Introduction: Minimally invasive radical prostatectomy has become the most common surgical treatment for prostate cancer. In this study we describe patterns of minimally invasive radical prostatectomy adoption among surgeons who performed open radical prostatectomy before their first minimally invasive radical prostatectomy and those who did not.

Methods: We performed a retrospective cohort study using the population based SEER (Surveillance, Epidemiology, and End Results)-Medicare data set. We identified all surgeons who performed minimally invasive radical prostatectomy in 2003 to 2010 in men with prostate cancer 66 years old or older. Surgeons were classified as “converters” if they performed open radical prostatectomy before their first minimally invasive radical prostatectomy or “de novos” if they had not. We estimated annual minimally invasive radical prostatectomy volume and the proportion of prostatectomies performed minimally invasively. We used logistic regression to identify predictors of minimally invasive radical prostatectomy discontinuation.

Results: A total of 11,511 minimally invasive radical prostatectomies were performed by 738 minimally invasive radical prostatectomy surgeons (converters 337 and de novos 401). Converters performed 55% of all minimally invasive radical prostatectomies and had higher median annual minimally invasive radical prostatectomy volume than de novos (4 vs 2). About 34% of converters and 54% of de novos discontinued minimally invasive radical prostatectomy after their first year. Second year discontinuation of minimally invasive radical prostatectomy was more likely among de novo surgeons (OR 1.9, 95% CI 1.3–2.7) and less likely among surgeons with higher minimally invasive radical prostatectomy volume in their first year (OR 0.5, 95% CI 0.5–0.6).

Conclusions: During the years of the greatest growth in minimally invasive radical prostatectomy, surgeon adoption of this technique varied by surgeon type and volume. Many surgeons discontinued, and possibly abandoned, minimally invasive radical prostatectomy. Based on these observations, experienced and higher volume surgeons will be most successful adopting new surgical technology.

Key Words: prostatectomy, robotics, prostatic neoplasms

Abbreviations and Acronyms

MIRP = minimally invasive radical prostatectomy

NCI = National Cancer Institute

ORP = open radical prostatectomy

RP = radical prostatectomy

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With the popularization of minimally invasive surgical techniques, including laparoscopy and robotic surgery, the majority of radical prostatectomies in the United States are now performed minimally invasively.^{1–3} The initial dissemination of minimally invasive radical prostatectomy was not supported by evidence of superior oncologic or patient reported outcomes, although early studies did demonstrate reduced intraoperative blood loss and faster convalescence.⁴ Some proposed explanations for the rapid growth of MIRP include competition among hospitals, competition among surgeons and direct-to-consumer marketing fueling patient demand.^{2,5}

Prior studies have demonstrated the role of surgeon level factors in the decision to adopt novel minimally invasive technology, such as amount of training, technical support and ability to collaborate with colleagues.^{6–14} Surgeons who choose to perform MIRP must invest a substantial amount of time and effort to learn the procedure, teach their operative team and overcome a lengthy learning curve.^{15,16} Despite the importance of the surgeon in technology adoption, most studies have investigated the growth of MIRP at the patient, hospital and regional levels, with a relative paucity of information about its growth among surgeons.^{3,17–19} A better understanding of surgeon characteristics associated with MIRP adoption can inform surgeons, health systems and third party payers interested in investing in advanced surgical technology.

Surgeons have presumably adopted MIRP in 1 of 2 ways, as some initially performed ORP, then learned the minimally invasive technique and converted some portion of their practice to MIRP, while others learned MIRP during residency or fellowship and began performing it from the beginning of their independent clinical practice. While surgeons in the former group may have had more experience treating men with prostate cancer, those in the latter group may have had more structured training in minimally invasive surgery. Our objectives were to characterize these different types of surgeons, describe their patterns of MIRP adoption as this procedure was gaining popularity and evaluate surgeon characteristics associated with successful adoption of MIRP.

Materials and Methods

Data Source

We used SEER cancer registry data linked with Medicare claims. The NCI sponsored SEER registry program collects information on patient and tumor characteristics, with followup for vital status and cause of death, for all incident cancer cases in 18 geographic regions representing

approximately 28% of the U.S. population. Medicare claims and enrollment records have been linked to SEER records for beneficiaries diagnosed with cancer in SEER areas. The study was deemed exempt research by the institutional review board at Memorial Sloan Kettering Cancer Center and was conducted in adherence with a data use agreement from the NCI.

Cohort

We identified all surgeons who submitted a claim for MIRP performed in a Medicare beneficiary with prostate cancer between 2003 and 2010. In the absence of a billing code specific to robotic prostatectomy during this time, the code for MIRP (55866) included all laparoscopic prostatectomies with and those without robotic assistance. The billing code for MIRP was not available before 2003. The cohort was limited to surgeons whose first MIRP was performed before 2009. Therefore, all surgeons in the analysis had at least 2, 365-day periods (experience years) of potential followup from the date of first MIRP.

In 59% of the procedures we identified, claims were submitted by more than 1 surgeon. The cohort was restricted to primary surgeons for each case, defined as the surgeon who received the greatest reimbursement for the procedure. Among surgeons who ever performed MIRP, we defined a “converter” as a MIRP surgeon who submitted a claim for ORP before his or her first MIRP and a “de novo” surgeon as a MIRP surgeon with no prior claims for ORP. Claims for ORP in 2002 were used to determine whether MIRP surgeons in 2003 were converters or de novos. Claims for ORP in subsequent years were used to estimate the percentage of all RPs performed minimally invasively by converters. We used the National Provider Identifier-Unique Physician Identification Number encrypted crosswalk file provided by the NCI to track physicians over time.

Analysis

Years of MIRP experience were defined by 365-day intervals starting at the date of the first Medicare claim for MIRP as primary surgeon. For surgeons who performed at least 1 MIRP during each year of experience, we estimated annual MIRP volume among Medicare beneficiaries in the data set. Volume estimates for each experience year included only surgeons who had a full experience year of Medicare claims in the data set. For converters we also estimated the percentage of RPs performed minimally invasively in each year of MIRP experience.

We identified the number of surgeons who continued performing MIRP during each year of experience after the

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