THE JOURNAL OF
SEXUAL MEDICINE

ORIGINAL RESEARCH

SURGERY

Trends in Penile Prosthetics: Influence of Patient Demographics, Surgeon Volume, and Hospital Volume on Type of Penile Prosthesis Inserted in New York State

James A. Kashanian, MD,[1] Ron Golan, MD,[1] Tianyi Sun, MS,[2] Neal A. Patel, MD,[1] Michael J. Lipsky, MD,[3] Peter J. Stahl, MD,[3] and Art Sedrakyan, MD, PhD[2]

ABSTRACT

Introduction: Penile prostheses (PPs) are a discrete, well-tolerated treatment option for men with medical refractory erectile dysfunction. Despite the increasing prevalence of erectile dysfunction, multiple series evaluating inpatient data have found a decrease in the frequency of PP surgery during the past decade.

Aims: To investigate trends in PP surgery and factors affecting the choice of different PPs in New York State.

Methods: This study used the New York State Department of Health Statewide Planning and Research Cooperative (SPARCS) data cohort that includes longitudinal information on hospital discharges, ambulatory surgery, emergency department visits, and outpatient services. Patients older than 18 years who underwent inflatable or non-inflatable PP insertion from 2000 to 2014 were included in the study.

Outcomes: Influence of patient demographics, surgeon volume, and hospital volume on type of PP inserted.

Results: Since 2000, 14,114 patients received PP surgery in New York State; 12,352 PPs (88%) were inflatable and 1,762 (12%) were non-inflatable, with facility-level variation from 0% to 100%. There was an increasing trend in the number of annual procedures performed, with rates of non-inflatable PP insertion decreasing annually ($P < .01$). More procedures were performed in the ambulatory setting over time ($P < .01$). Important predictors of device choice were insurance type, year of insertion, hospital and surgeon volume, and the presence of comorbidities.

Clinical Implications: Major influences in choice of PP inserted include racial and socioeconomic factors and surgeon and hospital surgical volume.

Strengths and Limitations: Use of the SPARCS database, which captures inpatient and outpatient services, allows for more accurate insight into trends in contrast to inpatient sampling alone. However, SPARCS is limited to patients within New York State and the results might not be generalizable to men in other states. Also, patient preference was not accounted for in these analyses, which can play a role in PP selection.

Conclusions: During the past 14 years, there has been an increasing trend in inflatable PP surgery for the management of erectile dysfunction. Most procedures are performed in the ambulatory setting and not previously captured by prior studies using inpatient data. **Kashanian JA, Golan R, Sun T, et al. Trends in Penile Prosthetics: Influence of Patient Demographics, Surgeon Volume, and Hospital Volume on Type of Penile Prosthesis Inserted in New York State. J Sex Med 2017;XX:XXX–XXX.**

Key Words: Penile Prosthesis; Erectile Dysfunction; Inflatable Prosthesis; Semirigid Prosthesis; New York State

INTRODUCTION

Since the inception of the surgically implanted penile prosthesis (PP) in the 1970s, there have been multiple subsequent technologic advancements resulting in improved outcomes, increased durability, and fewer complications.[1] Although the PP is reserved for the final step in the management of erectile dysfunction (ED) compared with phosphodiesterase inhibitors or intracavernosal injection therapy, the PP allows for a more

Received October 4, 2017. Accepted December 6, 2017.

[1]Department of Urology, New York Presbyterian–Weill Cornell Medicine, New York, NY, USA;

[2]Department of Health Services and Policy Research, Weill Cornell Medicine, New York, NY, USA;

[3]Department of Urology, New York Presbyterian–Columbia University Medical Center, New York, NY, USA

https://doi.org/10.1016/j.jsxm.2017.12.005

spontaneous sexual experience and results in improved patient satisfaction and sexual function.[2] The PP options include non-inflatable (semirigid or malleable) PPs (NPPs) and 2- and 3-component inflatable PPs (IPPs)[3]; however, minimal data exist detailing the difference in patient demographics between groups.

Multiple studies have reported a decrease in the frequency of PP (IPP and NPP) surgery during the past decade.[4,5] This is somewhat paradoxical because the prevalence of heart disease and obesity, which are risk factors for the development of ED, continues to increase.[6,7] These studies were conducted mostly in in-hospital settings and might be limited in their generalizability. Innovations in device design and improved insertion techniques might shift the practice from an inpatient to an ambulatory outpatient setting. We investigated the trends in New York State of PP surgery in inpatient and outpatient surgery settings and evaluated provider- and patient-level factors associated with prosthetic device selection.

METHODS

This study used the New York State Department of Health Statewide Planning and Research Cooperative (SPARCS) database for analysis. Established in 1979, SPARCS collects patient, treatment, and provider information for hospital discharge, ambulatory surgery, emergency department visits, and outpatient services. The database assigns each patient a unique identifier, which can be used for longitudinal analysis, and each record contains patients' characteristics, diagnoses, procedures, length of stay, and charges. Diagnoses and inpatient procedures are coded using *International Classification of Diseases, 9th Revision* codes, and outpatient procedures are coded using *Current Procedural Terminology* codes (eTable 1).

Patients at least 18 years old who underwent primary insertion of an IPP or an NPP from 2000 to 2014 in the inpatient or outpatient setting were included in this study. Patient characteristics included age, race, insurance type, procedure year, comorbidities, and hospital volume. Hospital volume was determined based on average annual number of PP procedures and grouped into tertiles. Hospital volume and surgeon volume were ranked by ascending NPP percentage and assigned identifier numbers (Figure 1). The bubble size represents the cumulative PP volume from 2000 to 2014 and the y-axis corresponds to the cumulative NPP rate.

Trends in the number of PP procedures over time were evaluated using Poisson regression. The χ^2 test for categorical variables and the Student t-test for continuous variables were used to assess differences in baseline characteristics. Individual predictor effect on the selection of a PP was performed using generalized linear mixed models, accounting for hospital clustering as random effects. For each predictor, the odds ratio (OR) and its 95% CI were adjusted for other variables in the model. All analyses were performed using SAS 9.3 (SAS Institute, Cary, NC, USA).

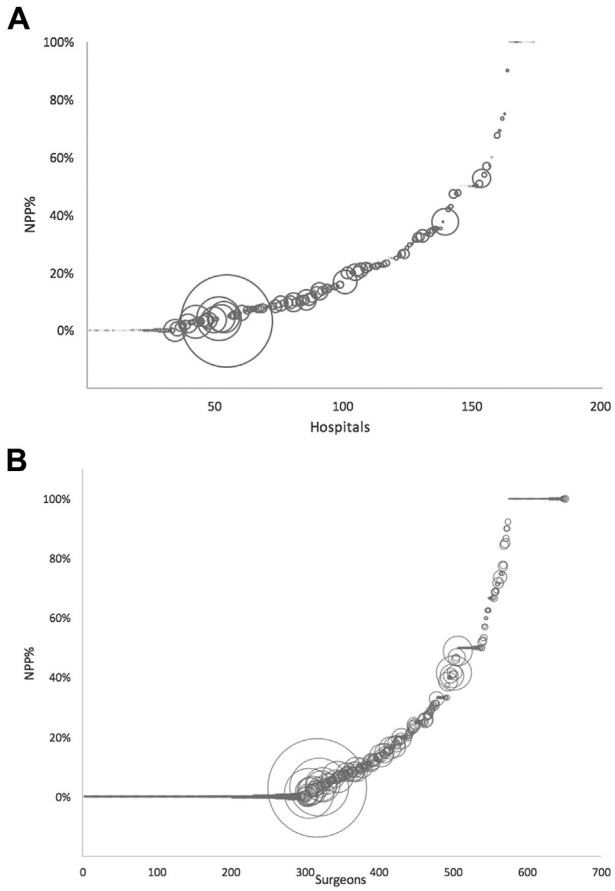

Figure 1. Panel A shows bubble plot of the relation between individual hospital volume and NPP%. The cumulative volume of individual hospitals is indicated by the size of the circle. Panel B shows bubble plot of the relation between surgeon volume and NPP%. Cumulative surgeon volumes are indicated by the size of the circles. NPP% = percentage of non-inflatable penile prostheses.

RESULTS

From 2000 to 2014, 15,417 PPs were inserted, with an increasing yearly trend in the number of initial PP procedures performed ($P < .01$; Figure 2). There was a significant decrease (by 60%) in the number of NPP placements and a reciprocal increase (by 37%) in the number of IPP placements from 2000 to 2014 ($P < .01$). There also was a significant increase in the number of outpatient procedures performed, with a concurrent decrease in the number of inpatient procedures during the same 14-year period ($P < .01$; Figure 3).

Men who received an IPP were more commonly white, commercially insured, had a more recent year of insertion, were treated at a higher-volume center (high > 44, medium = 11–44, low < 11), and had a history of depression, anxiety, Peyronie disease, prostate cancer, or radical prostatectomy (Table 1). At multivariable analysis, higher-volume centers (high vs low, OR = 3.58, CI = 1.24–10.32, $P = .02$; medium vs low, OR = 2.34, CI = 1.23–4.44, $P < .01$), more recent year of insertion (OR = 3.31, CI = 2.80–3.92, $P < 0.01$), commercial