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Active Polysubstance Abuse Concurrent With Surgery as a Possible Newly Identified Infection Risk Factor in Inflatable Penile Prosthesis Placement Based on a Retrospective Analysis of Health and Socioeconomic Factors

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ABSTRACT

Introduction: Since the introduction of inflatable penile prostheses (IPPs), risk of infection has decreased. However, concurrent substance abuse has not been investigated in prosthetic urology.

Aims: To determine whether substance abuse would stand out as a relevant risk factor for infection in patients undergoing IPP implantation.

Methods: This retrospective study was conducted on charts from the past 12 years at our institution, where a single surgeon completed 602 primary IPP surgeries, with only 12 cases (2%) resulting in postoperative infection. Five of these patients (42%) were actively misusing at least one substance at the time of operation (ie, alcohol, marijuana, cocaine, heroin, other illicit substances, and prescription narcotics). Substance abuse was identified in the medical chart by *International Classification of Diseases, Ninth Revision* code or by clear documentation by a provider. Multivariate logistic regression analysis was used to estimate the probability of infection as a function of demographic, physical, and treatment variables.

Main Outcome Measures: Logistic regression analysis was used to determine statistically significant correlations between risk factors and IPP infection.

Results: Polysubstance abuse, poorly controlled blood sugar, and homelessness at the time of procedure positively correlated with postoperative infection. Use of the mummy wrap correlated with decreased infection.

Conclusion: Active polysubstance abuse, poor glycemic control, and homelessness increase infection risk at IPP implantation. We encourage other implanters to discuss active polysubstance abuse with their patients and to tread cautiously because of the increased risk of infection.

Key Words: Inflatable Penile Prosthesis; Infection; Risk Factor; Substance Abuse

INTRODUCTION

Inflatable penile prosthesis (IPP) implantation is the gold standard in the treatment of erectile dysfunction in patients for whom medications and vacuum erection devices have failed.[1] In the four decades since the introduction of IPPs, risk of infection has decreased substantially.[2] This decrease is due to multiple surgeon-dependent and device-dependent factors, including implementation of the no-touch technique, use of antibiotic-coated devices, chlorhexidine-alcohol skin preparation, and novel draping methods.[1,2] Data have shown that for primary placement of a penile prosthesis the infection rate ranges from 0.6% to 8.9%, but that most commonly an infection rate in the range of approximately 1% to 3% is observed.[2] Patients' own skin flora typically serves as the source of infection in these cases, with bacterial seeding from distant sites rarely observed. In addition, there remains a risk of infection conferred by surgical patients from their own comorbidities, such as diabetes mellitus[3] and coronary artery disease.[4]

One other condition that confers considerable infection risk to the prosthetic surgical patient in other surgical fields is concurrent substance abuse; however, this has not been investigated in

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prosthetic urology. This topic has been widely studied in the orthopedic surgical literature. In 2015, Menendez et al[5] found that for elective orthopedic surgeries the odds of surgical site infection in patients who misused opioids at the time of surgery was 2.5 times greater than that of patients who did not have a history of opioid misuse. A retrospective study by Wieser et al[6] in 2012 found that patients with a history of illicit intravenous drug use who underwent total hip replacement had 5- and 10-year implant survival rates with failure for septic reasons of 70.6% and 60.5%, respectively. The risk of infection increases with the use of drugs,[7,8] and the rate of periprosthetic joint infection after bacteremia, like that often seen in drug abusers, is reported to range from 30% to 40%.[9,10] Optimization of alcohol abuse also is recommended to lower the risk of periprosthetic joint infection after orthopedic surgery.[11]

AIMS

Although the risk of infection in illicit drug users in the context of orthopedic implantation procedures has been clearly delineated, what is less clear is the role illicit drug use plays in the outcomes of prosthetic penile implants. It stands to reason that substance abuse would portend negative outcomes for men undergoing primary IPP placement, but no studies in the urologic literature have clearly demonstrated this point. In our retrospective analysis, we hypothesized that when patient health, surgical, and socioeconomic characteristics were considered, substance abuse would stand out as a relevant risk factor for infection in our patients undergoing IPP implantation.

METHODS

This is a retrospective study exempted from institutional board review (BUMC IRB protocol H-33597) conducted on charts from the past 12 years at our institution, where a single surgeon completed 602 primary IPP surgeries. Of these, only 12 cases (2%) resulted in postoperative infection. His surgical approach remained consistent across all these cases, and over the years he rapidly adopted evidence-based techniques to improve infection prophylaxis. On initial review, we noted that 5 of the 12 patients (42%) who developed postoperative infection were actively misusing at least one substance at the time of operation. Substance abuse was defined as misuse of at least one of the following items, as reported by the patient or listed in the patient's chart: alcohol, marijuana, cocaine, heroin, other illicit substances, and prescription narcotics.

The link between active substance abuse and infection seemed particularly plausible because, of the 590 cases that did not result in infection, only 8% of these patients were engaged in substance abuse at the time of surgery. Substance abuse was identified in the chart by *International Classification of Diseases, Ninth Revision* code or by clear documentation by a provider. The electronic medical record system used in our hospital (Centricity, General Electric, Fairfield, CT, USA) automatically generates CAGE questionnaires and other tools to quantify abuse when a patient is first identified as a substance abuser and at subsequent visits. We reviewed the charts of all patients who underwent primary IPP placement and carefully compiled relevant procedural data, patient data, and patient demographics to analyze whether other variables might have contributed to these disproportionate rates of infection (Table 1).

Rigorous statistical analysis was performed on the data. Multivariate logistic regression analysis was used to estimate the probability of infection as a function of demographic, physical, and treatment variables. All analyses were carried out using SAS (SAS Institute, Inc, Cary, NC, USA).

MAIN OUTCOME MEASURES

The main outcome measures were statistically significant correlations between risk factors and IPP infections as determined by logistic regression analysis.

Table 1. Variables of Interest

Surgical data
Type of prep used
Betadine
Chlorhexidine
Hibiclens
Techniques used
No-touch technique
Mummy wrap
Jackson-Pratt drain
Patient medical history
Age
Hypertension
Hyperlipidemia
Diabetes mellitus
Last $HgbA_{1c}$
Last serum glucose (preoperatively)
HIV status
Last CD4 count
MRSA status
Cigarette smoker
Active
Former
Active substance abuse (alcohol, marijuana, cocaine, heroin, etc)
Patient demographics
Homelessness
Race
Marital status
Insurance
Employment status

$HgbA_{1c}$ = hemoglobin A_{1c}; MRSA = methicillin-resistance *Staphylococcus aureus*.