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Survey of Microsurgery Training Availability in US Urology Residency Programs

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Purpose: The Accreditation Council of Graduate Medical Education (ACGME) establishes surgical minimum numbers of cases for urologic training. Currently there is not a requirement for microsurgery, likely from a belief that programs do not offer exposure. In an effort to evaluate the availability of microsurgery training among urology residency programs we surveyed the programs.

Materials and Methods: We obtained a list of the 138 ACGME-accredited urology residencies and contact information the American Urology Association (AUA). We contacted the residency programs by phone and e-mail. For programs that did not reply, we performed a search of the program website. We answered 3-questions to assess resident subspecialty training in microsurgery and used penile implant and artificial urinary sphincters as a comparison. Data are reported as frequencies.

Results: We obtained data from 134 programs (97.1%). A total of 104 programs (77.6%) had fellowship-trained physicians for training in microsurgery, 86.6% for penile implants, and 88.8% for artificial urinary sphincters. The percentage of fellowship-trained microsurgeons per program did not vary significantly when comparing the different sections of the AUA. The northeast and southeast sections had the lowest percentage (67% and 68%).

Conclusions: Nearly 80% of urology residency programs have a fellowship-trained microsurgeon on faculty, we therefore believe that microsurgery should be added as part of the ACGME minimums. In order to provide an equal exposure to all graduating urology residents, urology residency programs that lack microsurgery should identify potential faculty with fellowship training.

Keywords: Andrology; Infertility; Microsurgery; Residency; Training techniques

INTRODUCTION

The Accreditation Council of Graduate Medical Educations (ACGME) Review Committee for Urology defines index categories for resident education in urology and establishes the surgical minimum numbers of cases. There is a well-established relationship between surgical volume and outcomes [1]. Currently, there are case requirements for general urology, endourology, reconstructive surgery, oncology, pediatrics, and laparoscopy/robotics. Within certain sub-specialties are more specific case requirements such as male incontinence surgery, orchiopexy, or prostatectomy (Table 1). However, there is not an ACGME requirement for micro-

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Table 1. Surgical minimum cases requirements for graduation from US Accreditation Council of Graduate Medical Education (ACGME)-accredited urology residencies, as reported by the ACGME

Category	Minimum
General urology	200
Transurethral resection	100
TRUS/prostate biopsy	25
Scrotal/inguinal surgery	40
Urodynamics	10
Endourology/stone disease	120
Uteroscopy	60
Percutaneous renal procedures	10
Reconstructive surgery	60
Male	15
Male penis/incontinence	10
Male urethra	5
Female	15
Intestinal diversion	8
Oncology	100
Pelvic	40
Pelvic-bladder	8
Pelvic-prostate	25
Retroperitoneal	40
Retroperitoneal-kidney	30
Pediatric-minor	30
Endoscopy	5
Hydrocele/hernia	10
Orchiopexy	10
Pediatric-major	15
Hypospadias	5
Ureter	5
Laparoscopy/robotic	50

surgery.

In 2002, an estimated 526,501 vasectomies were performed in the United States [2], and it is estimated that up to 6% of men who undergo vasectomy will request a reversal [3]. In addition, azoospermia, which affects approximately 1% of all males and 10% to 15% of infertile couples, often requires microsurgical exploration to recover sperm for *in vitro* fertilization [4]. Varicoceles are the most common surgically correctable cause for male infertility, affecting around 15% of the general male population, of which 15% to 20% report discomfort or fertility problems. Microscopic varicocelectomy is the gold standard for repair of varicoceles [5]. For comparison, there are roughly 11,500 artificial urinary sphincters placed globally each year, and over 20,000 penile prostheses placed annually in the US, and there is an

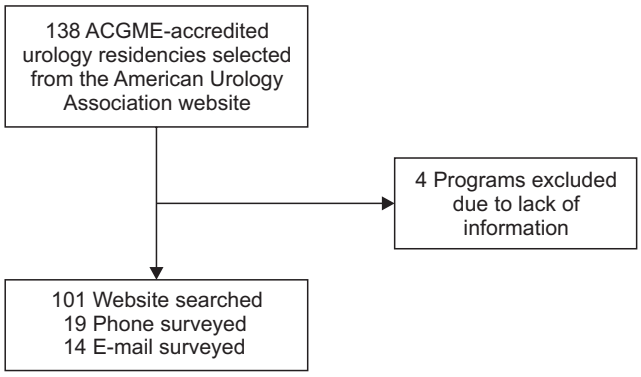

Fig. 1. Survey methodology. Of 138 Accreditation Council of Graduate Medical Education (ACGME)-accredited US urology residency programs, information was available for 134 comprising 97.1% of programs.

ACGME minimum requirement of 10 cases for male incontinence/penile reconstructive (including penile prosthesis and artificial urinary sphincter) procedures [6,7]. With such high numbers of urologic microsurgical procedures in the US, it appears there is a demand for microsurgery teaching in urology.

It is likely that the ACGME does not establish a minimum number of microsurgical procedures due to a belief that there is insufficient training in urology residencies. Therefore, we set out to evaluate the availability of microsurgery training for urology residents to either substantiate the lack of an ACGME requirement or propose that one be added to universally increase exposure to the field of microsurgery.

MATERIALS AND METHODS

1. Study design

We obtained a list of the 138 ACGME-accredited urology residencies and contact information from the American Urology Association (AUA) website. We contacted the residency programs by phone or e-mail survey. For programs that did not reply to our e-mails or phone calls, we performed a thorough search of the programs' websites and searched faculty members training background. The proportion of residencies that responded by each method is reported in Fig. 1. We administered a 3-question survey to assess resident subspecialty training in microsurgery. Programs were asked the following yes or no questions: Do your residents receive training in microsurgery? Do your residents receive training in penile implant surgery? Do your residents receive training in artificial urinary

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sphincter surgery? If yes, programs were then assessed to determine if the teaching physician was: An academic faculty who is fellowship trained, an academic faculty who is not fellowship trained, a private practice physician who is fellowship trained, or a private practice physician who is not fellowship trained. We used penile prosthetic and artificial urinary sphincter training as a comparison due to their low required case numbers, likelihood of teaching by faculty fellowship trained in Andrology or Genitourinary Reconstructive Surgery, and low prevalence. We then categorized the results according to the different AUA sections. Data are reported as frequencies.

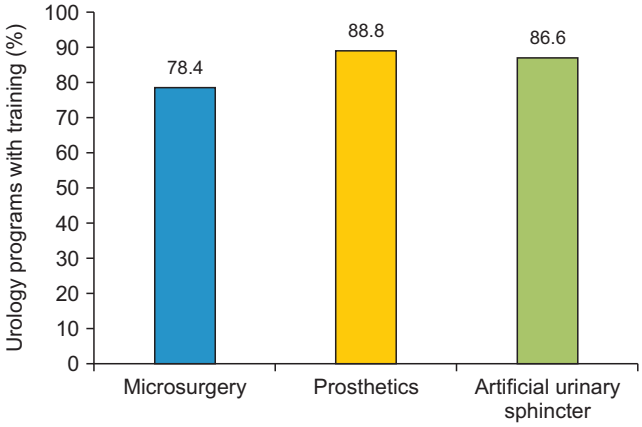

Fig. 2. Percentage of urology residency programs surveyed that offer training in microsurgery, prosthetics (penile implants), and artificial urinary sphincters.

2. Ethics statement

This study was reviewed and approved as non-human research through an Institutional Review Board (IRB) exemption from the University of Miami as non-human research (IRB No. 20190257).

RESULTS

We obtained data from 134 urology residency programs (97.1%); 33 (24.6%) through phone/e-mail survey and 101 (75.3%) from department website search. Of the 134 programs, a total of 105 programs (78.4%) provide training in microsurgery, 119 (88.8%) in penile prosthetics, and 116 (86.6%) in artificial urinary sphincters (Fig. 2). The percentage of programs offering training in microsurgery by AUA section ranged from 67% to 89%, with the Northeast and Southeastern sections having the lowest percentages at 67% and 68%, respec-

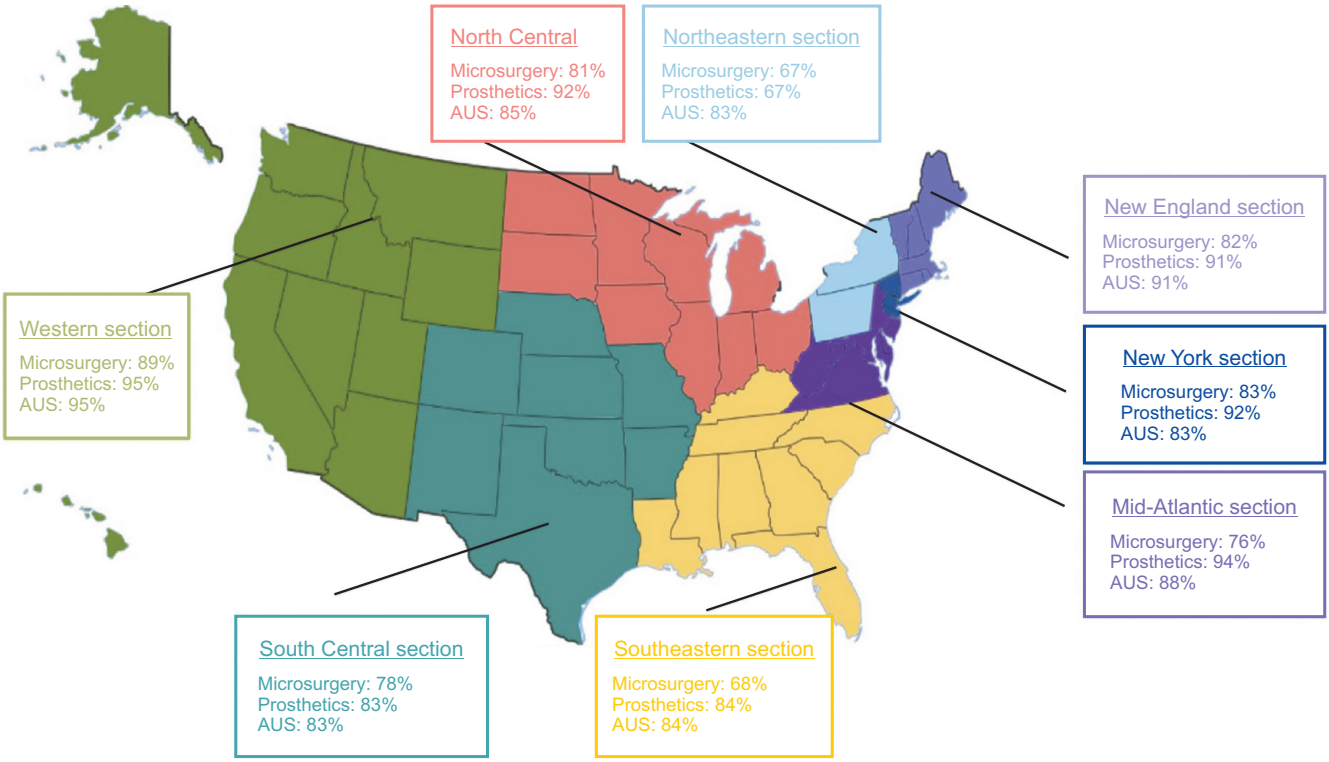

Fig. 3. Percentage of urology programs surveyed in each American Urology Association Section offering training in microsurgery, prosthetics (penile implants), and artificial urinary sphincters (AUS).

tively (Fig. 3). Overall, most microsurgery programs provide training by an academic faculty member who is fellowship trained (96%), while the remaining 4% of programs provide training by an academic faculty member who is not fellowship trained. As a comparison, penile prosthesis training is provided mostly by academic faculty who are fellowship trained (94%); only 5% of such training is provided by an academic faculty who is not fellowship trained and only 0.8% of training is provided by a private practice physician who is fellowship trained. Artificial urinary sphincter training is again provided mostly by academic faculty who are fellowship trained (96%), with the remaining 4% of programs providing training by an academic faculty who is not fellowship trained.

DISCUSSION

Currently, the ACGME does not require training in microsurgery, likely due to a belief there is insufficient availability in residency training. We collected data from 97% of US residency programs and found that approximately 78% of programs offer residents training in microsurgery, which is not far behind penile prosthetics (88.8%) and artificial urinary sphincters (86.6%). This is only about 10% lower than the prevalence of artificial urinary sphincter training and 11% lower than penile prosthetics, both of which are cases that are tracked and required by the ACGME.

Microsurgery first saw use in urology in 1971, when Dr. Earl Owen performed the first vasovasostomy in Australia [8]. Since then, microsurgery has found additional use in the field of urology, significantly improving outcomes for patients requiring orchidopexy, penile revascularization, varicocele repair, and testicular sperm extraction [9-11]. The large array of urologic cases which are best treated with microsurgery make its training extremely valuable to residents. Currently there are approximately 20 fellowship programs offering training in urologic microsurgery.

Undoubtedly, microsurgery requires practice and guidance to master. In the field of hand surgery, a 3-day intensive microsurgical laboratory experience increased fellows microsurgical competence and self-confidence performing procedures [12]. In urology, hands-on training in microsurgery increased retention of surgical skills compared to didactic learning alone [13]. It is unlikely that residency programs are routinely sending residents to microsurgery courses to supplement their training, though this was not directly asked in the survey.

It is difficult to assess the value that residents place upon their microsurgical training as it is unknown what proportion of residents go on to use microsurgery in their practice. We do know the value of microsurgical procedures such as vasectomy reversal, which is more cost effective than *in vitro* fertilization [14], and microscopic varicocelectomy, which is the gold standard for repair of varicoceles [5].

To our knowledge, this is the first study comprehensively evaluating microsurgery training in urologic residencies. Our survey received direct responses from 24% of US urology residency programs, which we supplemented with thorough website search to achieve data collection from 97% of programs. Limitations include ambiguity of some of the websites regarding the background and education of faculty, and low direct response rate. We also recognize that microsurgical case volume was not assessed in this study and that many of the microsurgical cases are tracked under scrotal and inguinal surgeries. We feel that future studies can investigate the microsurgical case volume at programs across the country and help to determine a meaningful minimum case requirement for graduation.

CONCLUSIONS

Currently the ACGME has no requirement for microsurgery however, greater than 75% of programs offer microsurgery training. We believe that that ACGME should consider adding microsurgery procedures to the resident curriculum. As the need for microsurgical procedures in urology grows adding fellowship trained faculty in microsurgery will be critical for optimal training.

Conflict of Interest

Dr. Ramasamy is a consultant for Endo Pharmaceutical Ascerus Pharmaceuticals, Endo Pharmaceuticals, Coloplast, and Boston Scientific, but made no influence on this work in relation with the company or its products. Other authors have no potential conflicts of interest to disclose.

Author Contribution

Conceptualization: TAM, NH, RM, RR. Data curation: TAM, SN, QR. Formal analysis: TM, SN, QR. Funding Investigation: TM, SN, QR. Methodology: TM, NH, RM, RR. Supervision: NH, RM, RR. Writing – original draft: TM, SN, QR. Writing – review & editing: NH, RM, RR.

Data Sharing Statement

The data required to reproduce these findings cannot be shared at this time due to personal information protection policy.

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