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Featured Article

Influence of fellowship educational experience on practice patterns for adrenalectomy: A survey of recent AAES fellowship graduates

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ABSTRACT

Background: Current practice patterns for adrenalectomy among endocrine surgeons is a limited area of study. Here we survey relatively junior endocrine surgeons regarding educational experiences in adrenalectomy and correlate these with current practice.

Methods: An electronic survey was sent to recent AAES-accredited fellowships graduates (2014–2019), querying adrenalectomy volume and approaches during fellowship and current practice patterns.

Results: Most graduates (63.2%) performed >20 adrenalectomies in fellowship. Exposure was greatest to open (94.1%) and laparoscopic transabdominal (92.6%) adrenalectomy, followed by retroperitoneoscopic (86.7%). The majority (73.5%) of respondents stated their current practice patterns are the same as their exposure during training. Preoperative diagnosis, side of lesion, and patient comorbidities were all ranked as significant predictors affecting choice of approach ($p < 0.001$).

Conclusion: The large majority of AAES fellowship graduates receive high-volume adrenalectomy experience in several approaches. The technique to which a trainee was exposed to most frequently was the greatest predictor for preferential approach in current practice.

Introduction

Disorders of the adrenal gland can range from under- or overproduction of hormones, intrinsic or extrinsic disruptions in hormonal signaling, and benign or malignant lesions. While adrenal-related pathology is highly prevalent, the need for surgical intervention is not always required. In turn this can make training in adrenalectomy more difficult.[1] The impact of specialty training and operative volume among urologists, general surgeons, and endocrine surgeons has been previously described. Findings show that endocrine surgeons have significantly higher clinical volumes for adrenalectomy, and that these volumes strongly correlate with decreased morbidity and mortality.[2,3]

As subspecialty surgeons have become higher volume for adrenalectomy, so has a shift towards a minimally-invasive approach to these procedures,[4,5] including adoption of new technologies and innovative advances such as robotic and retroperitoneoscopic approaches.[6–9] Yet with a wide array of approaches to adrenalectomy, there is little evidence defining the most current and widespread practice patterns for adrenalectomy among endocrine surgeons. In this report, we describe the educational experiences for adrenalectomy of recent American Association of Endocrine Surgeons (AAES) fellowship graduates in terms of volume, operative approach and decision-making, and correlate these with current self-reported practice patterns.

Material and methods

An electronic survey was designed in order to capture aspects of adrenalectomy education and practice, as well as approach preferences, both during fellowship and after (Table 1).

Additionally they were asked to rank several factors most important for deciding on optimal approach to adrenalectomy including patient habitus, side of lesion, preoperative diagnosis, patient/provider request, comorbidities, equipment/staff availability and “Other”. The final survey consisted of eleven items, and was piloted for clarity and response process validity with two practicing endocrine surgeons. The AAES website was used to identify AAES-accredited endocrine surgery fellowship graduates from 23 programs from 2014 to 2019. Individual emails were sent via the Qualtrics platform (Provo, UT. Version: October 2019) to 121 graduates with publicly listed emails on the AAES website. Up to 3 reminder

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Table 1
Queried content in electronic survey.

	Survey Content
1	Number of Adrenalectomies During Fellowship
2	Number of Adrenalectomies Since Start of Independent Clinical Practice
3	Exposure to Approaches in Adrenalectomy During Fellowship
4	Types of Approaches to Adrenalectomy in Current Clinical Practice
5	Preferred Approach to Adrenalectomy
6	Factors to Consider When Choosing Approach
7	Reason for Adopting Current Clinical Practice
8	Region of Training
9	Region of Practice
10	Number of Years in Practice
11	Gender

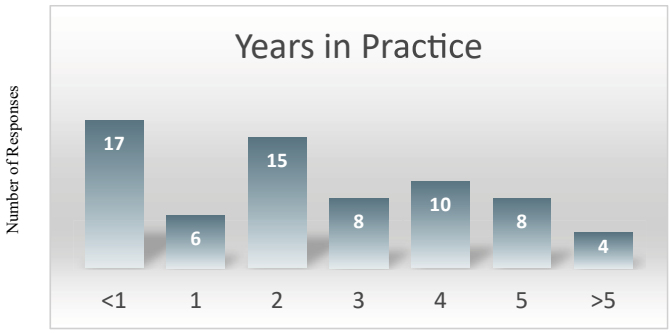

Fig. 2. Number of years in practice since completing fellowship (n = 68).

emails were sent individually at one, two and three weeks after initial invitation. The link to the survey remained active for a total of 5 weeks and only completed surveys were included in the analysis. Kruskal Wallis, Chi-square, and linear regression tests were used for statistical analysis, where appropriate. Significance was defined as $p < 0.05$. The survey was approved as exempt by the Institutional Review Board at the University of Alabama at Birmingham.

Results

Seventy-seven surveys were initiated by respondents and 68 surveys were completed (completion rate 88%). The average time to complete the survey was 4 min 10 s. Of the 68 (56.2%) surgeons who provided responses, 79.4% self-identified as women. Those surveyed were asked the location of both their training facility and their current practice location. The majority of individuals, both in training and in practice were located in the central US and East coast (Fig. 1). Experience in practice ranged from less than one full year in practice to greater than 5 years (Fig. 2).

The majority of respondents (63.2%) performed more than 20 adrenalectomies during fellowship. No individuals surveyed reported less than 5 adrenalectomies during training. The majority (50.9%) reported performing between 11 and 50 adrenalectomies since beginning independent clinical practice (Fig. 3).

With regard to types of approach, nearly all reported exposure during fellowship to open (94.1%) and laparoscopic transabdominal (LTA) (92.6%) adrenalectomy. These approaches were closely followed by experience in retroperitoneoscopic adrenalectomy (86.7%). Robotic approach to adrenalectomy was fairly limited with only 13.2% reporting experiences on the console of any type (Fig. 4). In the same figure is listed the types of approaches performed by respondents since starting clinical practice.

The number of adrenalectomies performed was strongly associated with years in practice ($p < 0.001$). There was no significant relationship between volume of adrenalectomies in training to number of adrenalectomies performed while in current practice. The majority (73.5%) of respondents stated their current practice patterns are the same as their exposure during training. Of the minority that state their current practice deviates from training, they list several other contributing factors (Table 2).

The most favored approach in current clinical practice was LTA (60.3%), followed by PRA (32.4%). There was a statistically significant association between the number of LTA and PRA adrenalectomies in fellowship with current practice preference ($p = 0.04$ and 0.003, respectively).

Those queried were asked to rank factors in order of importance[1–7] that influence their choice of surgical approach and these are listed in Fig. 5. Respondents felt that preoperative diagnosis and patient habitus were the two most important factors when choosing an optimal approach to adrenalectomy. These were followed in order by comorbidities, side of lesion, "other", patient/provider request, and robotic/block time availability. For those listing "other", individuals were asked for further information, and they stated that prior abdominal surgery (4 responses), the size of the lesion,[4] physician comfort,[2] and presence of bilateral disease[1] were important factors while choosing their approach. Preoperative diagnosis, side of lesion, and patient comorbidities were all ranked as significant independent predictors affecting surgeon choice of approach ($p < 0.001$).

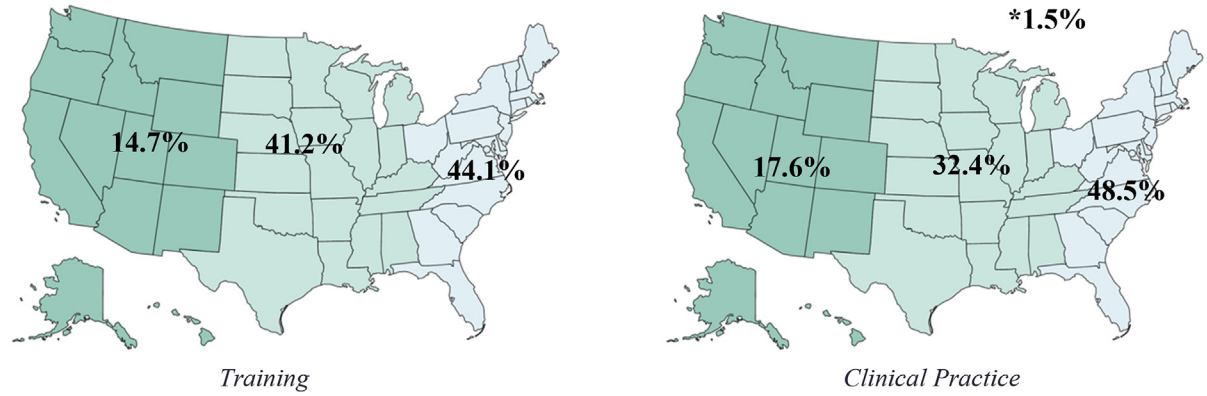

Fig. 1. Distribution of training region and clinical practice (West, Central, East, International).

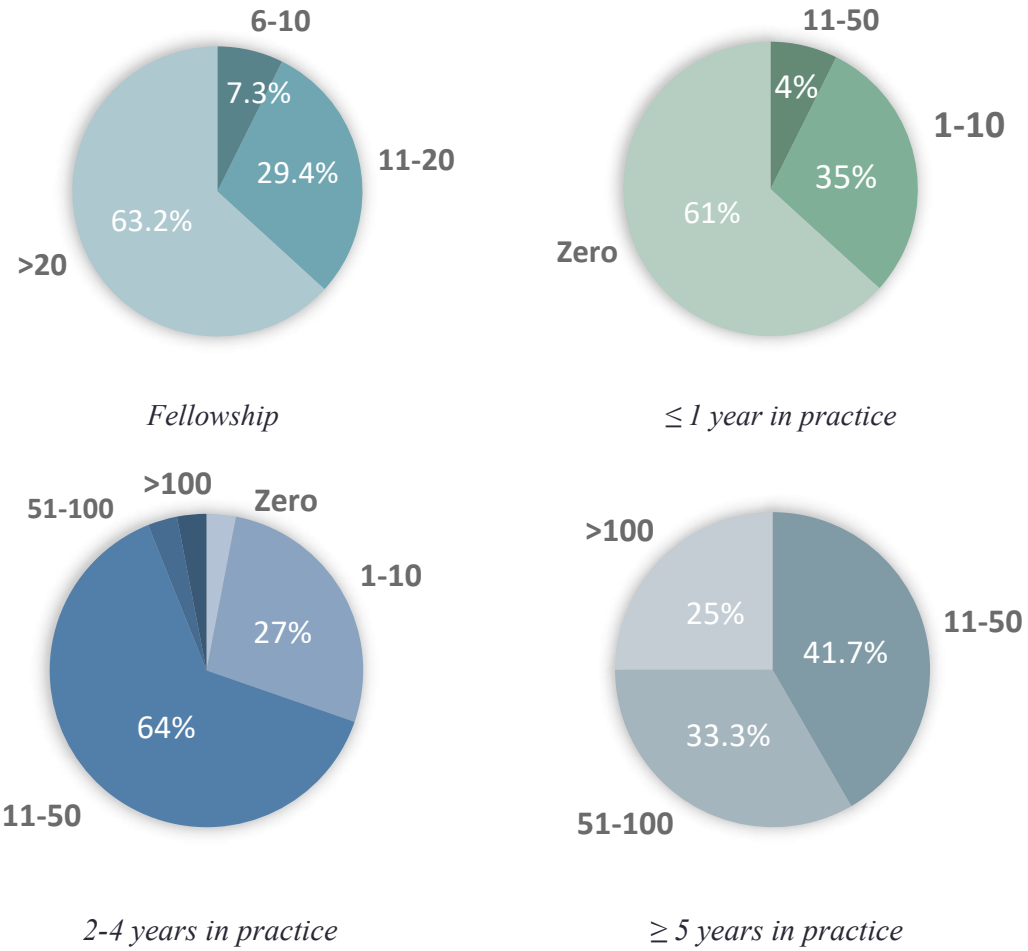

Fig. 3. Number of adrenalectomies performed during fellowship and while in independent practice.

Discussion

This survey of adrenalectomy education and practice patterns among recent AAES-accredited endocrine surgery fellowship graduates highlight several important findings. First, endocrine surgeons completing their training over the last 5 years are graduating from fellowship with high volumes for adrenalectomy that have increased over time. In a 2010 survey entitled, "Endocrine surgery: where are we today? A national survey of young endocrine surgeons", the authors reported that fellows graduated on average

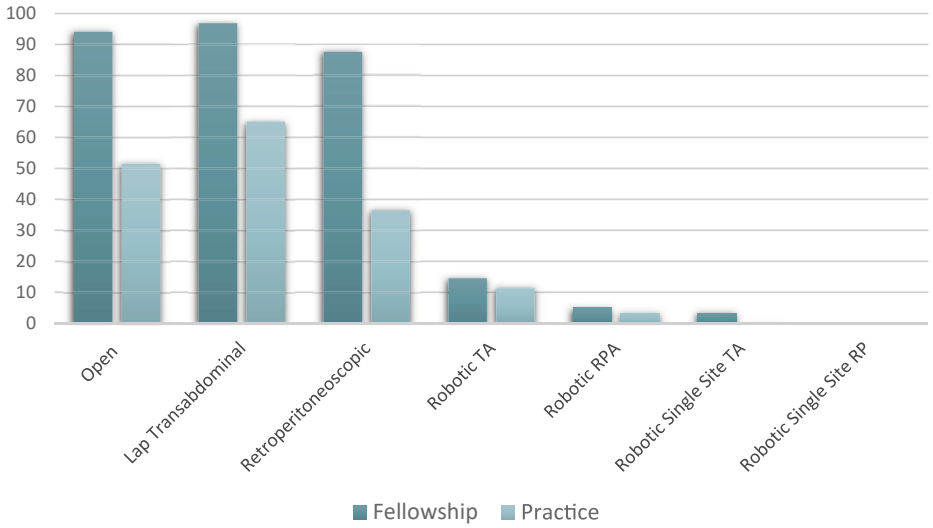

Fig. 4. Percent of respondents that indicated exposure to an adrenalectomy approach during training and utilization of an approach in clinical practice.

Table 2
Contributing factors to adoption of clinical practice deviating from fellowship experience (number of responses).

Reasoning
Prefer Clinical Partner's Approach[5]
Sought Additional Training After Fellowship[3]
Not Enough Exposure in Training to Adopt that Approach[3]
Will Now (or near future) Incorporate Robotic Approach[3]
Other
-"Senior partners not able to assist with approach learned in training"[1]
-"Did not have access to appropriate equipment in clinical practice"[1]
-"Not enough volume to feel comfortable"[1]

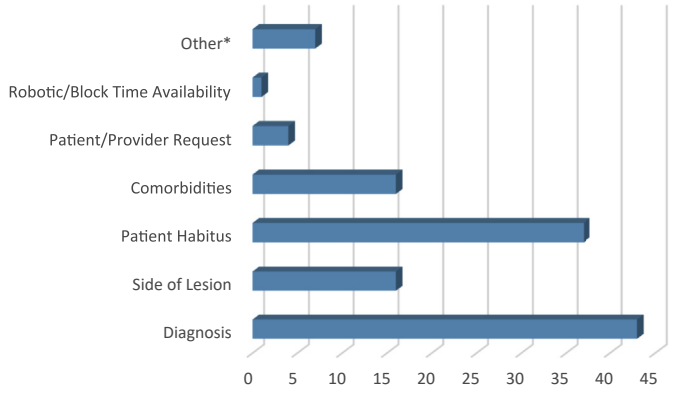

Fig. 5. Survey results showing first- or second-ranked factors in order of importance for choice of surgical approach.

with 13 laparoscopic adrenalectomies during their training.[10] Among respondents to the current survey, greater than 60% reported more than 20 adrenalectomies performed during fellowship, the majority of which were minimally-invasive.

The responses also highlight that endocrine surgery fellows are exposed to multiple different approaches to adrenalectomy during their training. This reinforces the commonly-held belief that a well-rounded surgical skillset allows the surgeon multiple options when deciding how to best serve their patients. For example, while it has been shown to be safe to perform laparoscopic adrenalectomy in the setting of prior abdominal surgery,[11] those with training in the posterior retroperitoneoscopic approach to adrenalectomy could offer this to their selected patient population. Furthermore, previous study has shown a steep learning curve for learning PRA, where mastery can be achieved in a relatively small number of cases.[8]

Not surprisingly, the survey also underscores the impact that mentorship and training have on current practice patterns. Those queried were far more likely to adopt in their current practice the forms of adrenalectomy they most commonly performed during fellowship, while those that did not cited lack of a senior partner that could assist with that approach if called upon. This again stresses the importance of mentorship throughout training, at any level.[12–16] Furthermore we found a unique subset of individuals that have sought additional training after fellowship. These individuals report adoption of current partner's practices and even independent training opportunities with new technology (*ex. robotics*). This raises the potential of collaboration, both at the fellowship level and beyond between endocrine surgeons. Interestingly, there were no significant correlations between preferred approach to adrenalectomy and years in practice, region of training or current practice, or gender.

Just as current studies examine factors affecting intraoperative behavior and decision-making in adrenalectomy,[17] we should also focus on the factors surgeons rank as important in preoperative planning for adrenalectomy. While many elements with regard to patient, disease, and surgeon can influence the choice of approach, this study has found that preoperative diagnosis, patient habitus, and comorbidities are weighted most heavily, though some surgeons also cited prior abdominal surgery as a contributing factor. While diagnosis was not asked to be further specified, many surgeons would consider changing operative approach if an adrenal malignancy were strongly suspected. Additionally, patient/provider preference may have also encompassed multi-disciplinary recommendations as an influencing factor for operative approach. We also found no correlation between years of experience in clinical practice with regard to ranking of factors.

Our study is subject to the limitations of most survey-based research. We surveyed only recent AAES fellowship graduates (2014–2019). While our completion rate neared 60%, there may be systematic ways in which respondents differ from non-respondents, reflective of selection bias. Seventeen (25%) individuals surveyed were also less than one year since completion of fellowship, and this may place a higher emphasis on experience solely from training, as these individuals have been in practice for a relatively shorter amount of time. While our cohort does not represent endocrine surgeons in practice $\geq$6 years and thus may miss experiences of those entering mid-career, it does capture the most current encapsulation of the approaches that modern-day endocrine surgeons are being trained in. Additionally, a survey of all AAES members performing adrenalectomy would provide a more longitudinal representation of how training affects independent clinical practice and should be considered in the future.

Conclusion

Graduates of AAES fellowship gain exposure to a high volume of adrenalectomy procedures across multiple approaches including open, laparoscopic transabdominal, retroperitoneoscopic and robotic during training. The approach to which the trainee was exposed to most frequently during fellowship was the greatest predictor for preferential approach in current practice. Recent graduates place a high emphasis on preoperative diagnosis, side of the lesion, and patient comorbidities when deciding on the most appropriate approach to adrenalectomy.

Declaration of competing interest

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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