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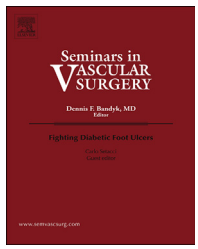

Traditional (5+2) versus integrated (0–5) vascular surgery training: the effect on case volume and the trainees produced

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ABSTRACT

The development of two training paradigms for the training of vascular surgeons has naturally resulted in concerns regarding competence equivalency. Comparison of the traditional 5+2 year and the integrated 0–5 year training programs has confirmed clear differences in trainee experience. To date, the overall vascular procedure case-log experience is equivalent except in the areas of open abdominal procedures that separate traditional vascular fellows from integrated vascular surgery residents. The integrated vascular surgery trainee has the advantage of increased time spent on vascular services, and this results in a significantly increased major vascular case volume. Finally, while there is a difference in the types of jobs attained by these two groups, with vascular residents trending toward a more academic scope of practice, both groups report very similar training and job attainment satisfaction, including salary compensation.

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1. Introduction

In the field of surgery, is new always better? While the jury might still be out on this concept, what we can say for certain is that new always begets a comparison to the traditional. This is the case regarding the training of vascular surgeons in the United States. In 2006, the integrated vascular surgery residency was approved and changed the way we would train the future vascular surgery work force [1]. Medical students would now have a chance to select vascular surgery as a specialty directly out of medical school and would become Vascular Surgery Board (but not General Surgery Board)–eligible after completing 5 clinical years of training. Within these 5 years, residents would complete a "core-surgery requirement" (18–24 months) to be defined by their individual program, and a vascular surgery requirement (36–42 months) [1–6]. The goal here is to compare these two training paradigms and the resultant products of their efforts.

Since its inception, there have been many skeptics and those who were unsure that this novel training paradigm would produce fully competent vascular surgeons [7]. There have been several published comparisons of these two groups using case logs, as well as surveys, to understand how the difference in training has affected clinical experience, traits distinguishing the two applicant pools, training satisfaction, and job attainment [5,8–10]. This article will focus on the results of the body of literature comparing these two groups with the ultimate goal of understanding what differences have been borne out through the research. This article will be structured in much the same way as the literature: first a look at the differences in case volume, then at the differences in the trainees themselves, and finally in the differences of products produced.

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2. Case volume

The first direct comparison of these two groups was published in 2015 by Batista et al [9]. The authors compiled 3 years of data on graduating integrated vascular residents and compared their national operative case logs to those of fellows graduating from the same years. Comparing the 11 integrated graduates to the 121 graduated fellows, these authors made several key observations in case-volume variation. First and foremost, they found that graduated integrated residents performed a significantly higher number of vascular cases compared to fellows (approximately 12% more; $P < .05$). When breaking down the case mix of the training groups, it became evident that the increased vascular volume was likely due to the significantly higher endovascular case volume of the integrated residents compared to the fellows (with residents performing approximately 24% more endovascular cases; $P < .05$). Interestingly, there was no significant difference in open case volume in any vascular bed between both trainee groups; an issue that has received significant attention in the era of endovascular surgery [5,11–13]. The authors did note that vascular fellows had a significantly greater overall case volume compared to their integrated resident counterparts (with integrated residents performing approximately 37% fewer total cases; $P < .05$) [9]. This is not surprising, given the additional 2 years of overall operative time afforded by the traditional training route; though it does call into question whether or not this extra, non-vascular operative time improves the overall quality of the vascular surgeon produced [14].

In the second comparison of case volume between these two groups, trends began to take shape thanks in part to an increased number of graduates by this point in time. This second comparison, published in 2017, had nearly triple the number of integrated vascular resident case logs to analyze [8]. The authors were able to pinpoint the significant difference in vascular case volume to major vascular cases, with integrated residents performing approximately 11% more major vascular cases during training ($P < .05$). When breaking down operative experience into the Accreditation Council for Graduate Medical Education case categories, vascular surgery residents significantly outperformed vascular fellows in seven of the recognized categories. As important, the authors show that there was no difference in open or endovascular aortic aneurysm case volume between both groups [8]. Due to the growing concern for the ability to train vascular residents in the intricacies of open aortic surgery during the endovascular revolution, the authors specifically compared the average vascular-related open abdominal surgical volumes of the two groups [13,15]. It was again found that there was no significant difference between these two trainee groups [8].

Although specific comparisons within both of these articles were made regarding open abdominal surgical training, the importance of this issue cannot be overstated. To that point, one of the most recent comparisons of these two groups, published in September of 2017 by Greenwood et al [11], addressed this issue solely. These authors looked at three specific categories of open surgery: overall open abdominal surgery, open abdominal vascular surgery, and open abdominal aortic aneurysm repair surgery. These authors found a significant difference in favor of vascular fellows with regard to all three case categories [11]. It is important to note that a key limitation to this study was comparing only the "surgeon chief" case volume of integrated residents (12-months of case volume) to "vascular fellow" case volume of vascular fellows (24-months of case volume), explaining the two-fold increase fellows had compared to integrated residents, contrasting the two previous articles analyzed.

3. The trainees

The next observation that has been appropriately made about these two groups is the fact that they are completely different cohorts with differing strengths and weaknesses. It should come as no surprise to anyone reading this article that there are staunch differences in training residents fresh out of medical school compared to those with 5 years of clinical surgery under their belt.

Starting at the baseline, when comparing integrated vascular resident candidates to their general surgery counterparts, Lee et al [16] found that integrated vascular candidates tended to be: older on average, more likely to have rotated on a vascular service, were able to identify a vascular mentor, and have a higher number of publications (specifically cardiovascular-related publications). When selecting for candidates that received an interview, the authors found that the vascular resident candidates were more likely to have a secondary degree and performed equally well in terms of class rank and with regard to standardized test scores. Most importantly, the authors found that the three most common reasons cited for pursuing an integrated training pathway (compared to the traditional fellowship pathway) were more focused training, interest in catheter-based therapies, and shorter training time [16].

At around the same time, Schanzer et al [17] publicized the competitive nature of the integrated vascular residency program compared to the vascular fellowship. In their research, the authors found that in the years studied, 88% of integrated vascular resident applicants failed to match into vascular positions, while 16% of traditional fellowship spaces went unfilled [16,17]. The authors also note that there was a high percentage of female applicants, and that the academic quality of these candidates compared favorably to any training program in surgery [17]. Several years later, Zayed et al [18] confirmed this continued trend in increased demand of integrated vascular residency training positions. These authors again confirmed that integrated residents tend to have the following characteristics: higher percentage of female applicants, higher percentage of applicants with secondary degrees, higher standardized testing scores, and were more likely to be in the top quartile of their medical school class compared to their fellow counterparts [18].

4. The end game

The final aspect we must touch upon is satisfaction of training once completed and its translation to job

attainment. Several survey-based publications have focused on these issues [19,20]. Colvard et al [19] surveyed graduates directly and found no perceived differences in case volume, case mix, or research time/opportunity. There were no differences in training satisfaction, with both groups reporting mostly high levels of satisfaction. When it came to the job search, offers, and salaries, the authors found that vascular fellows trended toward a higher number of interviews offered, though both groups attended similar number of interviews with similar starting salaries reported between both groups [19]. It is difficult to interpret the meaning of an increased number of interview offers in the setting of a similar end result for both groups. It could be that vascular fellows are more attractive as attending-candidates or an equally likely explanation is that vascular residents are more selective in the types of jobs they are looking for after completing their training. A key difference that was found was in the type of job selected by trainees, with 100% of integrated vascular residents selecting jobs with some academic component, while only 56% of vascular fellows followed this trend.

From the standpoint of those hiring, Peterson et al [20] found that among community vascular surgeons with hiring potential, vascular fellows were perceived as more mature, better prepared for open vascular surgery, and better prepared for endovascular cases. There was a difference in the percentage of these community surgeons who would interview versus hire an integrated vascular resident, with a smaller percentage being willing to hire compared to those willing to interview. Interestingly, of this group surveyed, nearly 17% cited the ability to cover general surgery call as an important factor in hiring [20].

5. Conclusions

There are clear differences that separate traditional vascular fellows from integrated vascular surgery residents. No one will question either group's qualifications that allowed them to match into their respective training paradigm. Throughout training, we see that while there may be some nuanced differences in open abdominal vascular case exposure, the case logs show that these groups have fairly equal exposure to all realms of vascular surgery. In fact, integrated vascular residents have the advantage of increased time spent on vascular services to report a significantly increased major vascular case volume. Finally, although there is a difference in the types of jobs attained by these two groups, with vascular residents trending toward a more academic scope of practice, both groups report very similar training and job attainment satisfaction with similar compensation regardless of training paradigm.

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