

# Maintaining Open Surgical Proficiency for AAA

Why the ability to perform open AAA repair is necessary and practical tips for learning and refining the skill.

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Open repair of abdominal aortic aneurysm (AAA) is decreasing but still not disappearing. Lack of exposure to this therapy influences our experience, training possibilities, and, consequently, results. Is it necessary to maintain open surgical proficiency, and how can we achieve it?

## WHY?

### Contemporary Vascular Surgery

Throughout the last 3 decades, vascular surgery has become an independent surgical branch due to the fragmentation of cardiovascular surgery from general surgery, instigated decades before. Vascular surgery gained an independent residency program, providing a “vascular and endovascular surgeon” title to our new-comer colleagues who faced a growing number of skills to acquire, diseases to understand, and, consequently, patients to treat in this field. These well-rounded physicians deal with arterial diseases from the carotid arteries to the pedal arteries, various venous pathologies, trauma, transplantations, and even oncology when the disease invades vascular structures. A substantial amount of vascular diseases have urgent clinical presentations, bringing more excitement and responsibility to the vascular surgery profession. In addition, vascular surgeons frequently rely on their diagnostic skills (performing ultrasound or interpreting CT images). The amplitude of activities depends on an institution’s position in the health care system, as well as an individual’s developed skills, enthusiasm, ambitions, interests, and capabilities. Once learned, skill is not permanent; rather, it needs to be continually developed and adapted to future challenges. Every learned skill should be routinely used and adjusted to changes in technology, health care organization, and patients’ epidemiology.

### Open Versus Endovascular

Open AAA repair as a skill has developed and changed during the last half of the 20th century. The pioneering work of Charles Dubost and other French surgeons continued throughout the world. It resulted in an initial mortality rate of approximately 20% for elective procedures and then continuously reduced as the homograft was replaced with a synthetic graft.<sup>1-4</sup> Nearly 70 years later, early mortality has reached approximately 1%.<sup>5</sup> Despite these improvements, Nicolai Volodos, MD, and Juan Carlos Parodi, MD, in different parts of the globe, searched for a better option that would be less invasive and less traumatic. Our vascular community became enthusiastic about the introduction of endovascular aneurysm repair (EVAR). We accepted it, and it opened a door to diverse options not only for treating patients but also for scientific work, education, career opportunities, and industry development, thus creating the vascular environment that we are still working in today.

As the limitations of EVAR were corrected and the pool of feasible patients to treat increased, the percentage of open repair procedures declined. The open repair to EVAR ratio varies among different hospitals and countries depending on the vascular health care organization, budget, and endovascular expertise level.<sup>6</sup> It is difficult to briefly summarize the last 30 years of changes in the treatment paradigm shift from open to endovascular repair; however, one might recognize three opinion profiles: (1) endovascular surgery is the end of vascular surgery; (2) EVAR is complementary but not a competitive procedure to open repair; and (3) if a patient is not fit for open repair, EVAR is not recommended. The first opinion was frequent in congress presentations in previous decades, the second is

a balanced representation of real-life scenarios, and the third is from the National Institute for Health and Care Excellence draft guidelines.

The scientific headlines on this subject result from randomized controlled trials (RCTs) and recommendations from recent guidelines. After up to 15 years of follow-up, the EVAR 1 trial showed long-term benefits of open repair compared with EVAR, but the OVER trial reported equal results between the two methods.<sup>7,8</sup> Recent European Society for Vascular Surgery (ESVS) guidelines recommend EVAR based on anatomy and life expectancy, and the Society for Vascular Surgery (SVS) based its recommendation on a center's procedural volume and results (mortality rate when considering open repair or mortality and conversion to open repair rates when considering EVAR).<sup>9,10</sup> Based on RCTs and guidelines, we still need to maintain proficiency in open AAA repair for patients with long life expectancies (especially screened patients), patients with hostile anatomies, and in centers with a low volume of EVAR procedures.

The long-term durability of EVAR is still under investigation, and studies on endovascular aortic procedures report a need for aortic-related reinterventions. Endoleaks caused by the progression of the proximal or distal segment, stent graft migration, and retrograde perfusion of the sac are frequently solved by repeat endovascular intervention.<sup>11,12</sup> Sometimes open conversion is the only solution for these complications; however, mortality might reach 10% to 15%.<sup>13,14</sup> In Dias et al and Davidovic et al, the incidence of such complications was low, and the experience was shared among multiple centers, making it difficult to achieve a high volume of experience. Surgeons and dedicated aortic teams familiar with complex open aortic interventions could provide better results to patients who require reintervention. Finally, stent graft infection is the most devastating complication, and only open conversion offers a definitive treatment for this complex condition, which potentially needs an intestinal surgeon and requires a high level of open surgical skills.<sup>15</sup>

### Volume and the Aortic Team

Outcomes of open AAA repair are determined by the procedural volume of a surgeon and/or the team. Although this was demonstrated in multiple studies, it is difficult to define the thresholds of exactly when volume substantially improves results.<sup>6,16</sup> SVS and ESVS guidelines on AAA repair, from two different sides of the Atlantic, accentuate the importance of the number of procedures performed.<sup>9,10</sup> These guidelines also insist on the availability of an aortic team that can provide both therapeutic options 24/7, either independently or in a "hub" network.

Problems arise with the decentralization of aortic therapy on a national and/or regional level and with the abuse of endovascular therapy by going outside the instructions for use, which can consequently negatively affect even the results of EVAR itself by causing more frequent complications. This usually occurs in low-volume, EVAR-oriented centers, where low volume causes worse results of open repair and insufficient education of new team members who prefer EVAR even when open repair might be favorable. In these situations, either EVAR experience should be at the highest expert level, providing all the different complex but durable endovascular options that are now available (which is not the case due to low volume), or open repair should be maintained and used when appropriate (eg, hostile anatomy, long life-expectancy).

### HOW?

Maintaining EVAR proficiency is facilitated by simulators, video animations, and other forms of e-learning options, as well as exposure to a high volume of procedures. The endovascular industry has a large contribution to this process. Patient safety is the final goal, but simulation-based education does not always follow strict curriculums. Conversely, open repair is like the older brother who receives less attention when a newborn arrives. The number of companies producing Dacron or polytetrafluoroethylene grafts has reduced, and educational budgets are lower. Instructional videos and electronic materials are less available and less attractive. Consequently, education in open surgery today is recognized as a priority among multiple stakeholders.

### Online and Printed Materials

Websites and social networks that provide videos of open procedures allow operators to gain basic knowledge about the procedural steps and visualize different technical solutions. The contribution of social media to training and education is increasing. Vascupedia and other similar projects provide videos and discussions, but the number of videos related to open AAA repair is low. On LinkedIn, challenging cases are frequently available, and discussion about therapeutic strategy is of value on this social network. Again, the endovascular solutions are always the majority.

There are also books and manuals that describe basic treatment options, surgical approaches, and reconstruction strategies.

### Workshops

The ESVS Academy committee has one goal: the education of vascular surgeons. This committee initiated a general needs assessment group. The group made a

list of skills that vascular surgeons should be taught on simulators, keeping in mind patient safety, cost-benefit, and the realistic performance of available simulations. The committee invited 189 key opinion leaders from 34 European countries to participate in a three-round Delphi survey, resulting in a list of 30 technical procedures to include in a simulation-based curriculum.<sup>17</sup> During ESVS annual meetings, hands-on workshops for open AAA repair are organized at the basic and advanced levels. Throughout the world, other independent organizations and institutions are organizing hands-on workshops that aim to help improve surgical proficiency in open repair.<sup>18</sup> These workshops are useful for practicing procedural steps, easily discussing performance, and adopting technical tips that might be useful in real life. Periodically repeating them provides the opportunity to improve technique and acquire new tricks; however, surveillance and assistance by an experienced teacher during the workshops are necessary, and the real-life application of adopted knowledge is crucial. Simulation-based education might also be useful for surgeons on a consultant level to reevaluate knowledge or rehearse the procedure.

### Exchange and Career Focus

Apart from the different methods of simulation-based education, exposure to real-life surgical situations is critical in a surgeon's education and further development. Contemporary university hospitals (and other hospitals) are struggling to provide sufficient open surgical practice to an increasing number of surgical residents. Additional hurdles are reduced working hours and training time and an expanding number of different techniques modern vascular surgeons need to conquer. Exchange of physicians between hospitals, even at the international level, might increase the exposure to vascular procedures and may be improved with the organization of therapy- or pathology-dedicated training hospitals. The ESVS has provided a network of European centers that can offer high-volume exposure to different pathologies or techniques; however, the decision to use these resources is left to a trainee's enthusiasm and motivation.<sup>19,20</sup> There may be a day when we face further subspecialization in arterial surgery, and being able to perform open AAA repair may be an important skill to have on your CV. This skill might bring an advantage when applying for a position in a high-volume aortic center that needs to provide all options to patients with AAA.

### CONCLUSION

Dedicated high-volume aortic teams that offer all AAA repair options around-the-clock are recommended

by the literature. Regardless of EVAR improvements, open surgical proficiency is still needed and is achievable through dedicated simulation-based workshops and exposure to open procedures through fellowships and interhospital exchange. In the future, we might face further subspecialization under vascular surgery training programs for those who want to focus their careers on specific therapies or pathologies like open AAA repair. ■

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