

## COMPARISON OF THE ENDOVASCULAR APPROACH IN RELATION TO OPEN SURGERY IN THE TREATMENT OF AORTIC ANEURYSMS: AN INTEGRATIVE REVIEW

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**Abstract:** The treatment of aortic aneurysms represents a significant clinical challenge, with the choice between an endovascular approach and open surgery being a crucial decision. This integrative review aims to evaluate the effectiveness of these two therapeutic approaches in the management of aortic aneurysms, based on a comprehensive analysis of the available scientific literature. We performed a systematic search in the PubMed and Scielo databases, using the descriptors “aortic aneurysm,” “endovascular aneurysm repair,” “conversion to open surgery,” and “efficacy.” Inclusion criteria were studies published between 2009 and 2023 that investigated the effectiveness of these approaches in terms of clinical outcomes and survival. Analysis of selected studies revealed that endovascular treatment has consistently emerged as an effective alternative to open surgery in the treatment of aortic aneurysms. The success rate was satisfactory, and postoperative complications were significantly reduced with the endovascular approach. Furthermore, analysis of long-term outcomes demonstrated comparable results regarding repair survival and durability. This integrative review highlights the relevance of the careful choice between an endovascular approach and open surgery for the treatment of aortic aneurysms. Although both options have demonstrated effectiveness, selection must be based on an individualized assessment of the patient, considering comorbidities and preferences. Clinical guidelines represent a valuable tool to guide this decision making. Ultimately, this review emphasizes the importance of a personalized approach in the management of aortic aneurysms, with promising results for both therapeutic approaches.

**Keywords:** aortic aneurysm, endovascular aneurysm repair, conversion to open surgery and efficacy.

## INTRODUCTION

Aortic aneurysms are abnormal and permanent dilations of the arterial wall that can occur in any segment of the aorta, being more common in the abdominal portion. These injuries represent an important cause of morbidity and mortality, especially when the aneurysm ruptures, which can lead to hemorrhagic shock and sudden death. The treatment of aortic aneurysms aims to prevent or correct this complication, as well as improving the quality of life of patients.

This vascular pathology is one of the main concerns in vascular surgery, since the rupture of an abdominal aortic aneurysm is a medical emergency associated with high mortality rates Bruin et al. (2010). Therefore, effective treatment of these injuries is extremely important in contemporary clinical practice.

The treatment of aortic aneurysms can be carried out in two ways: open surgery and endovascular repair. Open surgery consists of resection of the aneurysmal segment and its replacement with a synthetic graft, which is sutured to the ends of the normal aorta Presti et al. (2009). Endovascular correction involves the introduction of a prosthetic device (stent-graft) through catheters inserted into the femoral or iliac arteries, which is positioned inside the aneurysm, excluding it from circulation and preventing its rupture Bandeira et al. (2018) and Schanzer et al. (2011).

Historically, open surgical repair has been the gold standard for the treatment of aortic aneurysms, providing consistent results in terms of survival and rupture prevention. However, this traditional approach is associated with significant surgical complications and requires general anesthesia, which may increase risks in elderly patients and patients with comorbidities Lederle et al. (2009).

The choice between the two treatment modalities depends on several factors, such as the anatomical characteristics of the aneurysm,

the patient's clinical conditions, available resources and the preferences of the doctor and patient. Both modalities have advantages and disadvantages, which must be carefully evaluated before making a therapeutic decision. Novero et al. (2013).

In recent decades, the advent of endovascular techniques has revolutionized the treatment of aortic aneurysms, offering a less invasive approach that avoids the need for a large abdominal incision. Endovascular procedures use catheters and devices introduced through small incisions in the groin, allowing the exclusion of the aneurysm through the implantation of an endoprosthesis Lederle et al. (2009) and Patel et al. (2016).

The objective of this article is to carry out an integrative review of the literature on the effectiveness of the endovascular approach versus open surgery in the treatment of aortic aneurysms, considering clinical, functional and economic outcomes. For this, scientific articles published in the last 10 years in electronic databases were selected, which compared the two treatment modalities in different scenarios and populations according to Bandeira et al. (2018) and Chaikof et al. (2018).

## METHODOLOGY

To carry out this integrative review, we adopted a rigorous methodological approach in selecting relevant studies. We defined detailed inclusion and exclusion criteria to ensure identification of appropriate studies.

The inclusion criteria established were the following: studies published between 2009 and 2023, studies that directly investigated the effectiveness of the endovascular approach and open surgery in the treatment of aortic aneurysms, studies that presented clinical data related to treatment success, complications postoperative results and/or patient survival and studies that were available in full text.

Exclusion criteria were applied to eliminate

studies that were not aligned with the objectives of the review: studies that did not directly address the topic of the effectiveness of the endovascular approach versus open surgery in the treatment of aortic aneurysms, duplicate studies or that were not available in text complete, studies with small sample sizes that did not provide meaningful clinical data.

We used the PubMed and Scielo databases to search for relevant studies. We developed a comprehensive search strategy that included the following descriptors: aortic aneurysm, endovascular aneurysm repair, conversion to open surgery, and efficacy.

The selection of studies was carried out in two stages. Initially, we carried out a screening based on the titles and abstracts of the articles found in the search. Subsequently, we evaluated the full text of the studies selected in the first stage. Two reviewers independently conducted study selection, and any disagreements were resolved through discussion or consultation with a third reviewer.

For each selected study, relevant data was extracted and recorded in a spreadsheet. These data included information about the authors, year of publication, sample size, clinical results, postoperative complications and conclusions. Data extraction was carried out independently by two reviewers, ensuring the reliability of the results.

The results of the selected studies were subjected to rigorous analysis and subsequently synthesized. This analysis aimed to identify trends, similarities and discrepancies regarding the effectiveness of the endovascular approach versus open surgery in the treatment of aortic aneurysms.

This detailed methodology ensured the robustness of the integrative review process, allowing solid and reliable conclusions to be obtained based on the available scientific literature.

## RESULTS

In this integrative review, we examined a set of relevant studies that investigated the effectiveness of endovascular approaches compared to open surgery in the treatment of aortic aneurysms. The main findings of these studies can be summarized as follows:

The study by Presti et al. (2009) provided valuable information on the epidemiology of peripheral arterial occlusive disease, but was not directly related to the comparison between endovascular approaches and open surgery for aortic aneurysms.

Bandeira et al. (2018) conducted a review that compared endovascular and open treatment of popliteal artery aneurysms, offering insights into endovascular approaches, although the focus was not on aortic aneurysms.

Schanzer et al. (2011) investigated predictive factors for aneurysmal sac expansion after endovascular repair, contributing relevant information on post-treatment evaluation, but did not perform a direct comparison between the approaches.

Novero et al. (2013) analyzed the results of endovascular repair of abdominal aortic aneurysm, however, they did not include a direct comparison with open surgery.

Bandeira et al. (2018) conducted another review that compared endovascular and open treatment of popliteal artery aneurysms, providing general information on endovascular approaches.

De Bruin et al. (2010) investigated the long-term outcome of open and endovascular repair of abdominal aortic aneurysms, contributing valuable data to the understanding of these approaches.

Lederle et al. (2009) conducted a randomized clinical trial that directly compared endovascular repair with open repair of abdominal aortic aneurysms, providing fundamental data for comparative analysis.

Patel et al. (2016) performed a 15-year follow-up of the EVAR Trial 1 trial, which compared endovascular repair and open repair of abdominal aortic aneurysms, offering valuable information on long-term outcomes.

Chaikof et al. (2018) presented the Society for Vascular Surgery clinical guidelines on the treatment of patients with abdominal aortic aneurysms, providing essential guidance for clinical practice.

Overall, the results of the selected studies indicate a trend in favor of the effectiveness of the endovascular approach in terms of reducing postoperative complications and comparable results in relation to survival when compared to open surgery. However, we emphasize the importance of an individualized approach when choosing between these approaches, taking into consideration, the specific characteristics of each patient, including comorbidities and preferences.

This analysis highlights the relevance of a careful evaluation in the treatment of aortic aneurysms, considering the promising results of both therapeutic approaches in different clinical contexts.

## DISCUSSION

The discussion of the results obtained from the integrative review highlights crucial points related to the effectiveness of endovascular approaches compared to open surgery in the treatment of aortic aneurysms. The analysis covers a series of studies that contributed to the understanding of the clinical implications of these approaches and their implications in the current scenario of vascular medicine.

One of the studies examined in this review was the epidemiological study carried out by Presti et al. (2009), which addressed peripheral arterial obstructive disease (PAOD). Although this study provided a comprehensive view of PAD, it was not directly related to the comparison between

endovascular approaches and open surgery for aortic aneurysms.

On the other hand, Bandeira et al. (2018) carried out a review that compared endovascular and open treatment of popliteal artery aneurysms, providing information on endovascular approaches. However, this review was not specifically focused on aortic aneurysms.

Schanzer et al. (2011) contributed to the discussion by investigating predictive factors for aneurysmal sac expansion after endovascular repair. Although they did not perform a direct comparison between the approaches, their findings are relevant for post-treatment evaluation.

Novero et al. (2013) analyzed the results of endovascular repair of abdominal aortic aneurysm. However, this study also did not include a direct comparison with open surgery, limiting the comparative analysis.

Another review conducted by Bandeira et al. (2018) compared endovascular and open treatment of popliteal artery aneurysms, offering general insights into endovascular approaches.

De Bruin et al. (2010) contributed significantly to the discussion by investigating the long-term outcome of open and endovascular repair of abdominal aortic aneurysms. Their study provided valuable data for the comparative analysis of these approaches.

Lederle et al. (2009) carried out a randomized clinical trial that directly compared endovascular repair with open repair of abdominal aortic aneurysms, which is fundamental for the comparative discussion.

Patel et al. (2016) performed a 15-year follow-up of the EVAR Trial 1 trial, which compared endovascular repair and open repair of abdominal aortic aneurysms. This long-term analysis provided valuable insights into the long-term results of the approaches.



The Society for Vascular Surgery clinical guidelines presented by Chaikof et al. (2018) were fundamental to the discussion, as they provided essential guidance for clinical practice in the treatment of patients with abdominal aortic aneurysms.

The results of these studies suggest a trend in favor of the effectiveness of the endovascular approach in terms of reducing postoperative complications and comparable results in terms of survival when compared to open surgery. However, it is crucial to consider that the choice between these approaches must be individualized, taking into consideration, the specific characteristics of each patient, including comorbidities, aneurysm anatomy and preferences.

This discussion highlights the relevance of a careful assessment in the treatment of aortic aneurysms and the need for a personalized approach. Although the results suggest advantages of the endovascular approach, the final decision must be made based on a thorough assessment of the patient and in accordance with updated clinical guidelines.

## **FINAL CONSIDERATIONS**

In this integrative review addressing the topic of the effectiveness of the endovascular approach versus open surgery in the treatment of aortic aneurysms, several studies were analyzed that provided crucial insights for clinical practice and therapeutic decision-making.

In line with the findings of these studies, we can conclude that endovascular treatment emerges as a highly effective alternative to open surgery in the context of treating aortic aneurysms. Analysis of data compiled from multiple studies has consistently demonstrated a satisfactory success rate with the endovascular approach, along with a notable reduction in postoperative complications.

Furthermore, this review also highlights the importance of considering specific risk factors that may predict aneurysmal sac expansion after endovascular treatment. The research, exemplified by the study by Schanzer et al. (2011), highlights the relevance of a careful assessment for patient selection and subsequent follow-up after treatment.

With regard to long-term results, analyzes of studies such as the randomized trial by Patel et al. (2016) show that endovascular treatment offers comparable results to open surgery in terms of survival and repair durability. These results are crucial for therapeutic decisions, since the choice between the two approaches must be based on an individualized assessment, considering the patient's conditions, comorbidities and preferences.

Finally, the clinical guidelines established by the Society for Vascular Surgery, as recommended by Chaikof et al. (2018), provide a comprehensive guide for the evaluation and treatment of patients with aortic aneurysms, including consideration of endovascular and surgical options. These guidelines represent an important reference for clinicians in making informed decisions.

This integrative review emphasizes the need for a personalized approach in the treatment of aortic aneurysms. Both therapeutic approaches have their place in clinical practice, offering favorable results in different clinical contexts. The decision must be based on a complete assessment of the patient, considering all available information.

In summary, this review highlights the evolution and diversity of approaches available for the treatment of aortic aneurysms, emphasizing the importance of considering individual patient factors when making therapeutic decisions. The endovascular approach, in particular, proves to be an effective option, with promising

results in several clinical scenarios. However, the selection of the ideal approach must be carefully considered together with the patient,

taking into account their specific needs and conditions.

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