

SURGICAL TREATMENT OF CAROTID STENOSIS: A COMPARATIVE ANALYSIS

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Abstract: Carotid stenosis is a reduction in diameter of the main arteries that carry blood to the brain. One of the risk factors for this narrowing is atherosclerosis, which is an inflammatory pathology, where an atheromatous plaque reduces blood flow. This blockage can be complete or partial, and there may be complications depending on the location of this obstruction, which may result in a stroke. The indication for surgical treatment must be assessed on an individual basis. Angioplasty is one of the most recent treatments and indicated for symptomatic patients. In asymptomatic patients, it is not as effective as endarterectomy, but in larger stenoses, endarterectomy has a greater benefit in preventing ischemic stroke, not demonstrating as much effectiveness and with contraindication in stenoses less than 30%. The objective is to carry out an analysis of the treatments for carotid stenosis, comparing the surgical procedures of endarterectomy and angioplasty, identifying favorable and unfavorable aspects that each treatment can favor. This is an integrative bibliographic review of the literature and the following databases were used to carry out this study: Scielo, Lilacs and Medline. Initially, 13 articles were identified and after the inclusion and exclusion criteria, 8 studies were selected for analysis. It was noted in the discussion of this work that there is evidence in a group of the same patients treated by the same surgeon. In this case, both endarterectomy and angioplasty, the two techniques studied, presented the main comorbidities associated with arterial hypertension, diabetes mellitus, coronary disease and dyslipidemia. In both endarterectomy and angioplasty, this evidence is important to reflect on these risks and evidence.

Keywords: Angioplasty; Endarterectomy; Carotid Stenosis.

INTRODUCTION

Carotid stenosis is a reduction in diameter of the main arteries that carry blood to the brain. This narrowing is caused by atherosclerosis, which is an inflammatory pathology, where an atheromatous plaque reduces blood flow. This blockage can be complete or partial, with complications depending on the location of this obstruction, which can result in a stroke¹. Stroke is the third leading cause of death in the world, surpassed only by heart disease and cancer. The risk factors for stroke and carotid artery disease are systemic arterial hypertension (SAH), diabetes, smoking and coronary artery disease. In addition to drug treatment, we have surgical treatment through angioplasty or carotid endarterectomy (CE). Endarterectomy is an effective surgical procedure for preventing ischemic stroke, proving to be beneficial for symptomatic and asymptomatic patients².

The indication for surgical treatment must be assessed on an individual basis. Angioplasty is one of the most recent treatments recommended for symptomatic patients. In asymptomatic patients, it is not as effective as endarterectomy. However, in larger stenoses, endarterectomy has a greater benefit in preventing CIVA, not demonstrating as much effectiveness and with contraindication in stenoses smaller than 30%³. Endarterectomy is one of the most used vascular treatments in the world, considered the gold standard for years in the treatment of stenosis, despite risks such as neurological complications, nerve damage, heart attack and surgical wound infection, including in high-risk patients. The indications are stenosis greater than 40% - 50%, evolving stroke, attached thrombus and bifurcation with AF and TIA. Angioplasty emerged as an option to be used in patients at high risk for endarterectomy, indicated for patients with stenosis less than 30% - 40%⁴.

It is relevant to analyze surgical intervention in the case of carotid stenosis in terms of surgical treatment, analyzing and comparing endarterectomy and angioplasty in the surgical intervention of patients, aiming at the indications, complications and effectiveness of the two procedures. In view of the above, the research aims to present an analysis of the treatments for carotid stenosis, comparing the surgical procedures of endarterectomy and angioplasty, raising negative and positive aspects that each treatment can offer.

METHODOLOGY

KIND OF STUDY

This is an integrative review of the literature. Review studies have been widely used by students and health professionals to relate and compare results previously obtained in the health area (Sousa et al., 2018), and contribute to an extensive view of this area of research, a critical investigation of the results obtained, developing elements to justify suggestions, highlighting the important theoretical and practical complications based on the results found and suggesting a field study on the subject (Hirschle; Gondim, 2020).

STUDY PERIOD

The study was carried out between February and November 2023.

ARTICLE ELIGIBILITY CRITERIA

To carry out this study, the following databases were used: Scielo (Scientific Electronic Library Online), Lilacs (Latin American and Caribbean Literature in Health Sciences) and Medline (Medical Literature Analysis and Retrieval System Online). The following descriptors were used in this research process: Angioplasty. Endarterectomy. Carotid Stenosis.

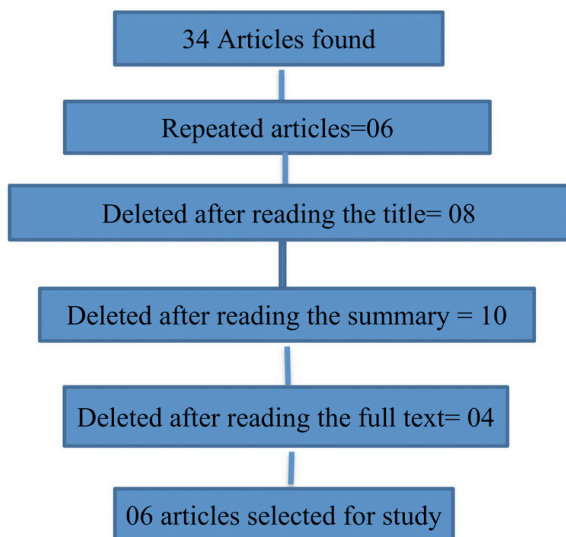


Figure 1- Flowchart of Article Eligibility Criteria

Source: Author (2023).

INCLUSION CRITERIA

The inclusion criteria for this research were national and international scientific articles in Portuguese, English and Spanish, articles related to the topic addressed, articles published in the aforementioned databases, covering studies published between 2014 and 2023.

EXCLUSION CRITERIA

Review articles, paid articles, articles that did not present at least two of the aforementioned descriptors and articles outside the mentioned period range were excluded.

DATA COLLECTION AND SELECTION

Steps were developed for the construction process of this research, with the definition of the theme, descriptors and search for studies in the databases.

ORGANIZATION AND ANALYSIS OF DATA

According to the data process, following the data collection steps, the articles are presented through the results table, containing the following information: authors, year of publication, title of the study and the main findings.

LEGAL AND ETHICAL ASPECTS

There was no need for this research to be sent to the ethics committee, according to resolution 510/16 of the National Health Council, as it is a literature review and the data analyzed in this study are publicly accessible.

RESULT AND DISCUSSION

Soon after carrying out a formative review on the theme that permeates the risk factors behind carotid stenosis, the texts analyzed were carried out through an exploratory analysis responding to the questions raised in the objectives of this study proposal. Next, ideas were organized to identify the positive and negative aspects of the two procedures performed on patients with narrowed arteries or carotid stenosis.

The two procedures analyzed in this study were endarterectomy and angioplasty. Subsequently, it was possible to organize ideas about two types of patients: symptomatic and asymptomatic. We noticed the characteristics that each author has to contribute. The bibliographies used in the discussion of this article will be ordered in Table 01, which is listed below with the most fundamental discussions that each of the authors raises, the names of the authors, the respective years of each publication, title of the article and the main findings will be displayed in the same table.

Throughout the process of choosing data collected analyses, arguments from relevant authors were presented to discuss the topic,

AUTHOR	TITLE	MAIN RESULTS
Jatobá, Melo e Lins ² 2021	Comorbidities and postoperative complications in patients undergoing carotid endarterectomy	In this work, a result is reached based on the evidence, the basic procedures regarding carotid endarterectomy that the author reports on this safe and effective surgical procedure, the sample with a number of sixty-nine patients shows that the CE (say what it is) is established as a surgical and effective procedure through randomized clinical trials.
Crusius ⁷ 2016	Endarterectomy versus carotid angioplasty with stent: neurofunctional and neuropsychological analysis.	There was an increase in connectivity, with statistical difference, in two networks (DMN and PDF) of post-angioplasty functional connectivity and a reduction in these same networks, with no statistical difference for the postoperative endarterectomy group. Within the endarterectomy group, there was improvement after the procedure on the Boston naming test.
Henrique <i>et al.</i> ¹ 2014	Angioplasty and Carotid Endarterectomy: Risks and Benefits during the procedure and post-operatively.	The authors of this work concluded that carotid angioplasty, endarterectomy. In this treatment, the influence of patients' habits, complications and side effects. Research has come to understand that both procedures, both angioplasty and endarterectomy, aim to establish and restore the patient's blood flow, enabling an improvement in the patient's clinical condition.
Oliveira ⁸ 2023	Retrospective analysis of surgical intervention in symptomatic extracranial carotid stenosis in a tertiary referral hospital.	Of the sixty-nine interviewees, patients with symptomatic extracranial carotid stenosis undergoing interventions, it was noted that there are similarities in randomized studies and main outcomes, with the exception of the preponderance of patients with arterial hypertension.
Bogniotti ⁹ 2020	Assessment of the incidence of hemodynamic depression in patients undergoing carotid angioplasty and endarterectomy	In the current study, which examined two hundred and twenty patients undergoing angioplasty and/or endarterectomy. Hemodynamic depression in this was the response in relation to the author's outcomes. After retrospective analysis of multivariate medical records, pathologies such as myocardial infarction, stroke and death due to vascularity were the diseases that were most present in the medical records.
Ristowet <i>al.</i> ¹⁰ 2020	Determinants of success in the treatment of acute cerebral and ocular ischemia through carotid revascularization. An observational study of a series of cases	This study suggests identifying determinants of success regarding carotid revascularization after a recent cerebral ischemic event. The results were that no deficit was seen in relation to carotid revascularization after ischemic events, being able to be performed without any morbidity.

Table 1 – Characteristics of the Studies

Source: The authors (2023).

highlighting positive and negative aspects about the effects or manifestations studied that imply important factors about carotid stenosis. Oliveira⁸ highlights that there may be diabetes insipidus, microembolization, hyperfusion syndrome. Reflects on some cases of ischemia and other very serious arrhythmias that permeate problems such as stroke.

The discussions about carotid stenosis for him reflect relevant elements related to this systemic inflammatory pathology, therefore reaching disparate and complex conclusions where the greater risk is perpetuated for the most distinct arterial sites. As mentioned in the work, when the artery responsible for the blood flow of the ailments in the individual decreases, thrombosis, hemodynamic

instability, respiratory failure and other illnesses can manifest. These investigations were important to understand probable complications of carotid endarterectomy.

However, an important analysis is the discussion produced by the work of Henrique *et al.*¹, avoiding the perspective of the very serious problems that pervade, the authors of this work conclude that carotid angioplasty is based on good lifestyle habits, such as regular physical exercise, a regular night's sleep, helping to maintain a healthy life influenced by good habits. The authors reflect on how patients remain before and especially after the surgical procedures we discussed, as highlighted by Henrique *et al.*¹

In addition, the presence of serious heart or lung diseases, presence of atherosclerotic plaque in the upper part of the neck, which cannot be completely removed through surgery, blockage of other vessels that carry blood to the brain, carrying out the procedure for the second time in the same artery, diabetes and smoking are contributing factors to the emergence of complications.¹

Jatobá, Melo and Lins² describes that the classic recommendations for angioplasty and stent implantation, always with brain protection, include previous cervical radiotherapy, critical restenosis after endarterectomy, high stenosis, fibrodysplasia, lesions near the emergency of the aortic arch, and very select cases of high-risk patients. In services with extensive experience and good results, or involved in randomized trials, the procedure is justified in symptomatic patients. This technique should not be applied to asymptomatic patients or octogenarians. After more than six decades of experience, the old surgical procedure bravely stands the test of time by constructing narratives about the unclogging of arteries.

According to Crusius⁷, the treatment is surgical, endovascular or ischemic manifestation, and many considerations have been made in the cases of patients treated with the two techniques analyzed as the main ones. It was possible to observe that the analyses have their main focus on restoring the patient's blood flow. The methods chosen for the patients were evaluated for the negative and positive aspects and risk factors. What is the fat impairment taking into account the relationships that involve the patient's well-being for the choice of the right procedure, reflecting and having as a point of view the age, the lifestyle habits.

Ristow et al.¹⁰ reported that all this discussion is aimed at avoiding the results of fatty plaques in the carotid artery. It is an

important procedure, and it is necessary to understand the risk factors, as the human being ages they are formed, it is essential that you prevent this plaque from appearing and obstructing the carotid arteries. Understanding the risk factors, diabetes, high blood pressure, among others. Discussions took place around the two procedures: the indication of endarterectomy and the placement of carotid stents for different patients, asymptomatic and symptomatic. In these cases, there may be an occurrence of infarction, stroke or death thirty days after the procedure, and another relative case occurred five years after the procedure.

Bogniotti⁹ concludes that different consequences appear soon after carotid endarterectomy, permeate questions that circulate in the midst of neurological dysfunction, other serious problems such as hemodynamic instability and respiratory failure, which may depend on the patient's condition, are also debates in the scientific field of health. These results and discussions are somewhat equivalent when we think about these patient deaths five years after surgery. In a new theoretical approach, it becomes hegemonic in the midst of clinical medicine practices. According to the authors, the paradigm that these analyses seek to break are the studies that were part of the period of the 1980s and 1990s, the most current analyses refute somewhat conflicting results. As can be seen, there are two discussions in two parts in the USA whether there is a line that states that ischemic events are inferior to angioplasty and stenting, with regard to endarterectomy. In conclusion, good lifestyle habits reflect the circumstances surrounding these two surgical procedures.

FINAL CONSIDERATIONS

When gathering the results of the articles selected for this study, it is concluded that it is extremely important to analyze and compare the endarterectomy and angioplasty procedures in the treatment of carotid stenosis, reporting the risk, benefit and indication of each one. Seeking to add to society as a whole the importance of indicating correct treatment according to the patient's needs, evaluating the strengths and weaknesses of each procedure.

It was noted in the discussion of this work that there is evidence in a group of the same patients treated by the same surgeon. In this case, both endarterectomy and angioplasty, the two techniques studied, presented the main comorbidities associated with arterial hypertension, diabetes mellitus, coronary disease and dyslipidemia. The randomized and comparative studies used by the authors concluded that the incidence of a stroke and possible death within thirty days was 5% in both cases, both in endarterectomy and angioplasty. This evidence is important to reflect on these risks and evidence.

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