Albanian Journal of Trauma and Emergency Surgery (2024) 8/1: 1323-1330
DOI: 10.32391/ajtes.v8i1.356

ORIGINAL ARTICLES

Surgical Treatment of Abdominal Aortic Aneurysms. A Retrospective Study.

Edmond Nuellari [1*], Saimir Kuci [2], Albana Kenga [1], Denis Kosovrasti [1], Alfred Ibrahimi [2], Ervin Bejko [2]

Received: 05 October 2023 / *Accepted:* 01 November 2023 / *Published online:* 20 January 2024
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Abstract

Introduction: Surgical treatment of abdominal aortic aneurysms poses a significant challenge in the field of vascular surgery, with numerous factors influencing operative technique and surgical outcome.

This study aimed to assess the outcomes of open surgical treatment for patients with abdominal aortic aneurysms at the Vascular Surgery Service of University Hospital Centre "Mother Teresa" Tirana and provide recommendations for improving outcomes.

Material and Methods: A single-center, non-randomized, retrospective study of the results of open surgical treatment of abdominal aortic aneurysms in 206 patients from January 2008 to December 2015 was performed at the Vascular Surgery Service of University Hospital Centre "Mother Teresa" Tirana. The study only included patients with a histologically confirmed diagnosis of abdominal aortic aneurysm, while patients with ruptured abdominal aortic aneurysm were excluded.

The study evaluated the incidence of abdominal aortic aneurysms, clinical and imaging findings of the disease (ultrasound, tomographic, and arteriographic), frequency of involvement of the iliac artery in the pathological process, and postoperative complications. Transabdominal access was the most commonly utilized, while retroperitoneal access was deemed the safest. No significant differences in recurrence rates were noted between the two approaches.

Results: During the study period, 206 patients underwent surgery for AAA and met the inclusion criteria. Of these, 188 (91.3%) were male and 18 (8.7%) were female. The mean age of the patients was 67.8±5.7 years, with 67.7±5.9 years for men and 69±3.1 years for women. There were no statistically significant differences in age between genders (p>0.05).

Conclusion: In all other cases of abdominal aortic aneurysms, surgical treatment should be strongly recommended. Finally, given the clinical benefits of using surgical treatment of asymptomatic aneurysms to reduce mortality, it is necessary to conduct an economic assessment of the feasibility of abdominal aortic aneurysms screening in the population over 55 of the age of both sexes.

Keywords: aortic repair; operative surgical procedures; screening program; quality of care; treatment outcome.

Introduction

Abdominal aortic aneurysm (AAA) is a challenging problem in vascular surgery [1, 2, 3].

AAA is a life-threatening vascular disease, with a prevalence ranging from 1.2% to 2.8% in industrialized countries [4].

The annual incidence of AAA surgery *(Castro-Ferreira et al., 2019)* [5] is significantly lower than the overall prevalence of the disease, and it varies considerably across different countries, with rates of elective surgery ranging from 2.2 to 17.3 per 100 000 population (mean 9.6) for 2010-2018.

The significant variation between countries suggests that this issue remains unresolved.

Original article, no submission or publication in advance or in parallel

* ***Corresponding author:***
Asc. Prof. Edmond Nuellari MD, PhD
✉ *edmondnuellari@yahoo.com*

1 *Vascular Surgery Service, University Hospital Centre "Mother Teresa" Tirana, ALBANIA*
2 *Anesthesia-Reanimation Service, University Hospital Centre "Mother Teresa" Tirana, ALBANIA*

In a nationwide prospective cohort study examining the surgical outcomes of intact abdominal aortic aneurysms, *Alberga A.J. et al.* (2022) [6] analyzed the outcomes of endovascular treatment in 11 624 patients (74.8%) and open intervention in 3 908 patients (25.2%) from 2014 through 2019. They observed a decrease in total complications from 10.1% to 7.0%, postoperative mortality from 6.1% to 4.6%, and an increase in the proportion of patients with cardiac comorbidity since the creation of this nationwide initiative.

Meanwhile, *Brown C.S. et al.* (2022) [7] found that of 11 601 open AAA surgeries between 2003 and 2019 at 223 different clinical centers, the median annual surgery volume was 7.4 (interquartile range, 3.0-13.3), and the variability of corrected risk-adjusted mortality rates was 1.3% to 8.2%.

Sharma G. et al. (2021). [8] reported a postoperative mortality rate of 4.1% (n=126) in a Vascular Quality Initiative registry study of 3078 patients who underwent elective open surgery for AAA.

Tshomba Y. et al. (2022). [9] examined the long-term outcomes of open treatment of complex AAAs in 119 patients at a significant vascular center from January 2010 to June 2016, with a mean follow-up of 76 months. They found that open repair of complex AAAs can be performed with acceptable surgical risk and consistent results despite 37% of deaths and 43.8% of patients experiencing long-term chronic renal failure.

There are different views on AAA screening at both national and regional levels in many countries *(Pratesi et al., 2022)*.[10] *Powell J.T. and A. Wanhainen (2020)* [11] compared the recently published National Institute for Health and Care Services (United Kingdom) 2020 European Society for Vascular Surgery (France) 2019 guidelines on diagnosis and management of patients with abdominal aortic aneurysm, which contain conflicting recommendations in essential areas.

The authors similarly explain the differences in the recommended treatment methods for juvenile aneurysms, reflecting different perspectives, methodologies, and quality assurance. Despite strong evidence supporting the need for screening to reduce mortality [12, 13, 14], there are only a few national programs in the United States, Great Britain, Sweden, and Norway, and other countries are currently evaluating the economic effectiveness of screening programs before implementing them [4, 15].

Therefore, the problem of surgical treatment of AAAs is urgent and essential for practical tasks of vascular surgery. This study aims to analyze the surgical treatment of patients who underwent open surgery for AAA to identify factors contributing to improved outcomes. Specifically, the aim was to determine the place of AAA in the structure of vascular pathology, the frequency of concomitant obliterating pathology of the iliac and femoral segments, clinical characteristics of patients, their complaints and symptoms, imaging results of aneurysm signs using different methods, and to compare the results of transabdominal and retroperitoneal methods and their possible complications.

Materials and Methods

A single-center, non-randomized, retrospective study of the results of open surgical treatment of abdominal aortic aneurysms in 206 patients from January 2008 to December 2015 was performed at the Vascular Surgery Service of Mother Teresa University Hospital Centre in Tirana. The study only included patients with a histologically confirmed diagnosis of abdominal aortic aneurysm, while patients with ruptured abdominal aortic aneurysm were excluded.

Patient identification was based on the analysis of surgical logs, statistical data from medical records, and radiology imaging protocols. The data collected for each patient included demographics such as age and sex, timing of complaints before referral, comorbidities such as arterial hypertension, heart and lung diseases, diabetes mellitus, probable risk factors such as smoking, hypertension, positive family history, metabolic disorders, etc. Preoperative aneurysm imaging findings were divided into different categories based on the size of the aneurysm, which included 4 cm, 4.5 cm, 5 cm, 5.5 cm, 6 cm, 6.5 cm, 7 cm, and >7 cm. The localization of the aneurysm, involvement of iliac and femoral vessels, and aneurysm shape (sac-like, spindle-shaped, mixed) were also recorded.

The selection of the surgical intervention option for AAA depended on clinical features; surgery was performed using either a retroperitoneal or transabdominal approach, and the European Society for Vascular Surgery recommendations were followed. The surgical treatment strategy was determined and coordinated by a multidisciplinary team, which included vascular surgeons, interventional radiologists, and anesthesiologists. The date of surgery, type of surgery (transabdominal, retroperitoneal), type of first surgery and access in case of recurrence, results of the pathohistological examination, immediate and long-term results of surgery, postoperative laboratory data, postoperative complications, and their treatment were recorded. Short-term follow-up was defined as follow-up within the first year after surgery, while long-term follow-up was defined as follow-up over five years.

The licensed version of the statistical program SPSS Statistics version 17 Chicago was used to analyze the data. Statistical analysis of indicators was carried out by studying the characteristics of the process under study, followed by the selection of indicators and their ranking by importance. The collected values of the indicators were grouped in the form of statistical tables. Methods of descriptive statistics processed the results without testing the compared populations on the nature of the distribution. A two-sided Student's t-test was used to evaluate the statistical significance of differences between average values, followed by comparing the calculated value with the critical table value of the coefficient. To compare the relative frequency rates in the compared groups, we used the $\chi 2$ (chi-square) goodness-of-fit test compared to the table value of the critical value.

Results

Patient characteristics

During the study period, 206 patients underwent surgery for AAA and met the inclusion criteria. Of these, 188 (91.3%) were male and 18 (8.7%) were female. The mean age of the patients was 67.8±5.7 years, with 67.7±5.9 years for men and 69±3.1 years for women. There were no statistically significant differences in age between genders ($p>0.05$). Following the detection of AAA, all patients were hospitalized for surgical treatment after a thorough clinical examination based on a standard protocol. In almost all patients, diagnosis was delayed from 2 to 25 weeks, resulting in a difference in time from the onset of symptoms to hospitalization. On average, this time was 2.3±6.4 weeks for men and 2.5±35.2 weeks for women, with a statistically significant difference between genders ($p<0.05$). Abdominal pain was reported by 12 male patients and six female patients, with a statistically significant difference in the frequency of abdominal pain between genders ($\chi^2=4$, df=1, $p=0.05$). Detailed clinical features are provided in Table 1.

	Men	**Women**	**Total**
Clinical signs	6	0	6
Abdominal pain + lumbar pain + intermittent claudication	6	6	12
Abdominal+lumbar+back pain	8	0	8
Intermittent claudication	9	0	8
Abdominal + lumbar + chest pain	4	0	4
Epigastric + lumbar + right hypogastric pain	6	2	8
Lumbar + gluteal pain + left lower extremity	8	0	8
Colic	4	6	10
Peri umbilical pain + pelvis	24	14	38
Peri abdominal and umbilical pain	104	4	108
No symptoms	178	28	206

Source: created by the authors.

Table 1. Distributions of clinical signs

Before surgery, in addition to standard clinical tests, routine instrumental studies were conducted, and specialists were consulted as necessary. All patients exhibited concomitant pathology on admission. The most common comorbidities were chronic obstructive pulmonary disease (COPD) and chronic smoker's bronchitis (52.9%), hypertensive disease (61.1%), angina and postinfarct cardiosclerosis (20.4%), vascular pathology including cerebral atherosclerosis (21.4%), and diabetes mellitus (8.7%, all male). This information will be considered when distributing patients according to surgical intervention types. Among the examined patients, the following risk factors were identified: active smoking in 6 cases (2.9%) among women and in 96 cases (4.4%) among men; coronary heart disease of varying severity was found in 54 patients (26.2%); mild degree obstructive diseases were found in 60 patients (29.1%), moderate degree in 32 patients (15.5%), and severe obstructive changes in 18 patients (8.73%), with obstructive phenomena absent in 96 patients (46.6%).

Confirmation of the diagnosis and follow-up imaging were performed using color Doppler echography (CDE), contrast-enhanced computed tomography (CT), and arteriography. According to standard guidelines, patients with an AAA size of 3.0-4.4 cm underwent follow-up once a year, while those with a size of 4.5-5.4 cm underwent follow-up every three months. Follow-up patient observation and results recording were also performed using color CDE, CT with contrast, and arteriography. The average AAA diameter was 5.8 cm in men according to CDE and 4.6 cm in women, with a statistically significant difference ($p=0.05$). On a CT scan, AAA sizes were slightly different, 6.34 cm and 5.5 cm in men and women, respectively ($p=0.05$). The frequency of involvement of the underlying vessels was also analyzed, and the results are shown in Table 2.

	Women	Men	Total
Femoral arteries	0%	2.92%	2.92%
Iliac arteries	2.92%	42.73%	45.64%
Iliac-femoral arteries	2.92%	5.82%	8.74%
Without involvement arteries	0%	0%	38.8%
No data	0%	0%	2.92%

Source: created by the authors.

Table 2. Prevalence of AAA and involvement of the iliac and femoral arteries

The iliac arteries on both sides were involved in 3.88% of cases, the right iliac and femoral arteries in 2.92% of cases, the left iliac and femoral arteries in 3.88%, and the femoral arteries on both sides in 2.92%.

Characteristics of operations

The selection of the surgical intervention option for AAA depended on clinical features, and the European Society for Vascular Surgery recommendations were followed. Surgical treatment was recommended for cases of detected or suspected aneurysm rupture, rapidly enlarging aneurysms irrespective of symptoms, aneurysms over 4.5 cm in diameter, signs of embolization, thrombosis, occlusion, and atypical aneurysm forms such as mycotic, stratifying, or circular. All of these cases posed a high level of danger for the patient.

Surgery for AAA was performed using either a retroperitoneal or transabdominal approach. The transabdominal technique was performed by a median

incision of the anterior abdominal wall from the xiphoid process to the symphysis, the Treitz ligament was dissected, and the retroperitoneal space was opened to the left of the aorta. If the aneurysm was infrarenal, the retroperitoneal space was dissected to expose the aorta to the level of the left renal vein, and the left renal vein was mobilized if suprarenal clamping was necessary. Distal clamping was performed below the level of the lesion. In the retroperitoneal method, the patient was laid on the right side, and access was made from the 10th intercostal space to the upper-anterior apex of the iliac bone through the lateral abdominal muscles. The left kidney was mobilized ventrally, the left ureter was visualized, and it was diverted anteriorly along with the kidney. Before aortic clamping, systemic heparin was administered at a dose of 80–100 units/kg weight, regardless of the approach. The clamping sequence was started from the distal portions of the aorta and then switched to the proximal portions to reduce the risk of distal embolization. The transabdominal route was used in 120 (58.3%) cases, and the retroperitoneal route was used in 86 (41.7%) cases. The use of each method, depending on the clinical situation, is shown in more detail in Table 3.

	Transabdominal procedures	Retroperitoneal procedures	Validity of the difference
Smoking	70	33	0.5
Cardiac infarction	6	12	0.05
Diabetes mellitus	8	10	0.07
Hypertension	86	40	0.05
Stenocardia	14	10	0.01
COPD	66	40	0.01
Carotid artery disease	16	8	0.02
Total	120	86	

Source: created by the authors.

Table 3. Distribution of patients depending on comorbidities and method of intervention

Anesthesia support for surgical interventions on the aorta and its branches in AAA was provided in a combined manner, including epidural anesthesia. This approach reduced the volume of narcotic analgesics used and allowed for prolonged anesthesia for several days after surgical intervention. The advantages of this approach included complete protection of the patient from afferent impulses from the surgical area, adequate muscle relaxation, absence of respiratory and metabolic disorders, and reduction of surgical blood loss. The average values are shown in Table 4.

	Transabdominal procedures (n=120)	Retroperitoneal procedures (n=86)	Validity of the difference
Time of operation (hours)	3.18±0.19	3.55±0.18	0.006
Intravenous analgesics (mg)	49.5±28.5	36.6±21	0.004
Epidural analgesics (mg)	56.6±9.5	39.5±6.4	0.004
Time spent in hospital (days)	11.8±2.3	7.2±1.6	0.02
Effectiveness	82.7±5.46%	85.3±4.03%	0.05

Source: created by the authors.

Table 4. Comparative values of the mean values in both groups

The maintenance of anesthesia during AAA surgeries was tailored to the specific patient, taking into account various influencing factors, including indications for the particular case, the duration of the surgical intervention, the degree of hypothermia, the level of blood loss and hemodilution, and intraoperative homeostasis results.

The optimal aortic prosthesis was based on specific requirements for its physical characteristics, including elasticity, adaptability, flexibility, ease of stitching, resistance to material separation, smooth lumen surface, and resistance to infection and thrombogenicity. It should have no toxic or allergic side effects and be consistently available in a full range of sizes and lengths in a moderate price range. The configuration of the aortal prosthesis depended on the extent of the aneurysm and the specific clinical data of the patient. Two types of aortic vascular prostheses were used in this study: "Dacron" – 167 (81%) operations and "PTFE" (polytetrafluoroethylene) – 39 (19%) operations. No fundamental differences in the frequency or complications associated with the type of prosthesis used have been revealed.

The surgical procedures involved in the study included aorta-aortic lumen reconstruction in 12 cases (5.8%), aorta-subiliac artery reconstruction in 120 cases (58.3%), aorta-common femoral artery reconstruction in 18 cases (8.7%), aorta-deep femoral artery reconstruction in 6 cases (2.9%), aorta-anterior iliac artery reconstruction in 32 cases (15.5%), aorta-both external iliac arteries reconstruction in 12 cases (5.8%), and common iliac-external iliac artery reconstruction in 6 cases (2.9%).

The present study used objective criteria derived from macroscopic CT, interventional data, and microscopic anatomic-pathological findings to define aneurysms as inflammatory.

The classification of inflammatory aneurysms was based on the presence of specific macroscopic features, such as thickening in the aneurysm wall, retroperitoneal fibrosis, and adhesions to neighboring organs, as well as

microscopic features, including inflammatory infiltrates with plasma and lymphocytic walls, adventitial fibrosis, obliterating endarteritis, and fibrosis around nerves. These objective criteria allowed for a clear distinction between inflammatory and noninflammatory aneurysms.

The inflammatory nature of AAA was observed in six patients (2.91%) during the study, while mycotic aneurysms were encountered in two patients (0.97%).

Characteristics of complications

Despite all the measures implemented, complications occurred during the study. Intraoperative complications were observed in 11 cases (5.3%). Damage to the *ureter* occurred in 6 cases (2.6%), requiring primary suture in 2 cases and stenting in 4 cases. *Inferior vena cava* damage occurred in 6 cases (2.9%), all of which were treated with primary sutures. The duodenal injury occurred once (0.5%) and was also sutured. These injuries were detected and eliminated promptly without affecting the further course of the operation and postoperative period in patients. Postoperative complications occurred more frequently, and their types and frequencies are presented in Table 5.

	Complications
Pulmonary complications	20 (9.7%)
Cardiovascular complications	16 (7.8%)
Gastrointestinal complications	20 (9.7%)
Postoperative hernia	11 (5.3%)
Hemorrhagic complications	11 (5.3%)
Thromboembolic	11 (5.3%)
Bedsores	12 (5.8%)

Source: created by the authors.

Table 5. Type and frequency of postoperative complications

As can be seen from the table, pulmonary complications were the most common, recorded in 8 patients (8.8%) in the retroperitoneal group and 12 patients (9.2%) in the transabdominal group. However, this difference was not statistically significant (p=0.07). Cardiovascular complications occurred in 6 patients (13.3%) in the retroperitoneal group compared to 10 patients (15.8%) in the transabdominal group, with a statistically significant difference (p=0.004). Gastrointestinal complications were observed in 5 patients (5.8%) in the retroperitoneal group compared to 15 patients (12.5%) in the transabdominal group, with a statistically significant difference (p=0.002). Postoperative hernia developed in 6 patients (6.9%) in the retroperitoneal group compared to 5 patients (4.2%) in the transabdominal group, without a statistically significant difference (p=0.5). Hypotension and drainage bleeding were observed in 6 cases (9.5%) in the transabdominal group and 5 cases (11.1%) in the retroperitoneal group, without a statistically significant difference. Bedsores and wounds of the sacrum and gluteal muscles were observed in 7 patients (11.1%) in the transabdominal group and four patients (8.8%) in the retroperitoneal group, without a statistically significant difference. Acute thromboembolism of the femoral artery was observed in 6 cases (9.5%) in the transabdominal group and 3 cases (6.6%) in the retroperitoneal group, without a statistically significant difference.

The surgery time for retroperitoneal interventions it has averaged 3.55 hours, while for transabdominal interventions, it was 3.18 hours, with a statistically significant difference (p=0.06).

Thirty-one repeated interventions were performed to eliminate complications: nephrectomy (1 case, 0.5%), colostomy (6 cases, 2.9%), catheter thrombectomy (12 cases, 5.8%), iliofemoral arterial shunt (4 cases, 1.9%), femoral arterial shunt (6 cases, 2.9%), relaparotomy and abdominal revision (2 cases, 0.9%).

Discussion

The present study investigated the impact of various complications on the outcomes of surgical treatment for AAA. While some complications are challenging to prevent, particularly in high-risk cases with concomitant pathology, improving surgical technique can significantly reduce most cases. In the analysis of 214 patients who underwent open planned surgical treatment for AAA between January 2012 and December 2021 *(Ibrahim A. et al., 2022)* [22], in-hospital mortality within 30 days was 1.9%. Using multivariate logistic regression was identified chronic obstructive pulmonary disease (COPD) was identified as the only predictor significantly associated with mortality (p=0.015).

This study found a postoperative mortality rate of 4%, within the range reported in the literature for planned open treatment of AAA (1-8%). For example, a recent sizeable comparative analysis *(Brown C.S. et al., 2022)* [7] of 67 073 surgical procedures performed for AAA between 2003 and 2019 found that mortality rates ranged from 1.3% to 8.2%. Only 4.9% of the 223 hospitals performing surgical procedures during this period performed ≥15 of them per year. The authors of the analysis observed a trend of decreasing mortality with increasing annual volume of surgery, with each additional case associated with a 0.012% decrease in mortality (p=0.05).

To achieve acceptable outcomes, the minimum abdominal aortic aneurysm repair volume for a specific surgical team should be between 9 and 13 operations per year *(Sharma G. et al., 2021)* [8] and at least 18 operations per year for the hospital. Vascular Surgery Services of Mother Teresa University Hospital Centre in Tirana's average annual number of surgeries is 12.1. The mortality rates for centers with a low volume of surgeries should be treated with caution since much of the variability in these results will be statistical noise rather than actual differences

in the quality of treatment at the center level.

These findings are consistent with a similar analysis of the centralization of surgical treatment for AAA in Catalonia, Spain *(Tripodi P. et al., 2020),* [23] which found a significant reduction in overall mortality after complete centralization (4.7% versus 2.0%, p<0.001), particularly for open operations (8.7% versus 3.6%, p=0.005). To achieve the best long-term outcome, open surgical treatment of ABA should be performed in centers with a high volume of aortic surgery and tailored to the individual patient *(Chaikof E.L. et al., 2018; Tshomba Y. et al., 2022)*. [9, 16]

Endovascular aneurysm repair has become a priority in vascular surgery and the primary method of AAA treatment due to its ability to reduce procedure time, surgical complications, and length of hospital stay *(Blackstock C.D & Jackson B.M, 2020; Alberga A.J. et al., 2022)*. [2, 6]

As a result, it has significantly replaced open intervention techniques in the treatment of AAA *(Witheford M et al., 2022; Dansey K.D et al., 2021)*. [3, 14]

A retrospective cohort study *(Kinio A. et al., 2021)* [17] compared perioperative data and complications of open operations for AAA performed at Ottawa Hospital from 2014 to 2017 (n=49) and from 2005 to 2007 (n=53). The study found that the number of open AAA surgeries decreased by 61%, anesthesia time and time in the operating room increased, and complications in anatomically similar patients increased. These results suggest a decline in the level of preparedness of the specialized institution for the open treatment of AAA and the postoperative care of such patients due to a decrease in the number of surgeries performed.

Treatment of recurrent AAA is usually tricky, and perioperative mortality in such cases is significantly increased compared with primary treatment *(Sakalihasan N. et al., 2018; Kessler V. et al., 2022; Park J.K. et al., 2021;)* [1, 4, 18]

This study found slightly higher postoperative complication rates (15.2%) than reported in the literature, but they did not contribute to increased mortality. The 5-year survival rates at the Vascular Surgery Service of Mother Teresa University Hospital Centre in Tirana were high, ranging from 60% to 75%.

The issue of mycotic abdominal aortic aneurysm (AAA) has been discussed in the literature. However, due to its rarity, limited studies are available to establish a consensus on its treatment and management *(Dang Q. et al., 2020; Premnath S. et al., 2021; Touma J et al., 2022)*. [19, 20, 21]

According to the 2016 Dutch Audit of Surgical Aneurysms, 26 cases of mycotic AAA were identified, representing 0.7% of all reported AAA cases *(Dang Q. et al., 2020)* [19]. Monthly mortality among these patients was 7.7%, with one patient dying within the first day after surgery, representing 9.1% of cases. Re-hospitalization within a year was observed in 36.4% of the cases. In a retrospective review of treatment for patients with an infectious nature of AAA from 2002 to 2020, open surgical procedures were performed in 66 patients with a median follow-up of 26.5 months (13-66 months).

In-hospital mortality was 27.9% *(Touma J. et al., 2022)* [21]. A retrospective analysis of case histories reported that 17 open surgeries for mycotic AAA were performed at a single tertiary vascular center from 2001 to 2018. The 1-year overall survival rate was 94.1%, the 3-year survival rate was 81.8%, and the 5-year survival rate was 75.0%.

The overall and recurrence-free survival curves showed no statistically significant differences depending on the type of intervention *(Premnath S. et al., 2021)*. [20] Although the small number of patients in this study does not allow for significant statistical conclusions, it is evident that individually planned surgical treatment with adequate antibiotic therapy can achieve acceptable results in this group of patients.

Despite reliable data supporting the need for screening to prevent rupture and reduce mortality in patients with AAA, the condition continues to pose a severe risk *(Kapila V. et al., 2021)*.[15]

Screening is economically effective, even with an AAA prevalence of 0.5% *(Kessler V. et al., 2022)* [4].

However, *Dansey K.D. et al. (2021)* [14] analyzed the US National Inpatient Sample from 2004 to 2015 and identified 46,191 patients scheduled for AAA surgery, of whom 59% did not meet the screening criteria. Among these, 27 653 (63%) were over 75 years old, 10 603 (24%) were under 65 years old, and 16 103 (36%) were women.

The authors recommended that consideration be given to broadening the screening criteria to include individual women and a broader age range. *Kapila V. et al. (2021)* [15] recommend screening men and women aged 65-80 years and first-degree relatives, while *Dansey K.D. et al.* (2021) [14] recommend screening smoking men over 55 years of age and all patients with a family history of AAA.

Given the patient characteristics in the current study, it would be reasonable to consider the feasibility of screening those over 55 years of age. If modern surgical treatment of AAA can be performed more safely, the benefits of screening and subsequent surgical intervention may be more significant than traditionally thought.

Conclusions

Abdominal aortic aneurysms are found more frequently in men within the age group of 55 to 75 years and represent 3-5% of patients who receive specialized surgical treatment in vascular centers. The present study indicates a delay in diagnosing abdominal aortic aneurysms after the onset of clinical and imaging signs. The transabdominal method was found to be the most commonly employed surgical treatment. However, the retroperitoneal route was observed to be the safest regarding possible complications. No significant difference was observed between the two methods regarding the possibility of recurrence. In the case of inflammatory and mycotic aneurysms, the

transabdominal route yielded better immediate and long-term outcomes. Patients with abdominal aortic aneurysms who underwent surgery by retroperitoneal method showed a marked reduction in pain syndrome severity, lower rate of postoperative complications, fewer hospitalization days, and lower cost per case. There was no significant difference in perioperative and postoperative mortality between both methods in one-month follow-up and one-year follow-up.

Based on these findings, surgical treatment may be recommended for abdominal aortic aneurysms larger than 4.5 cm and in the presence of clinical symptoms. Observation tactics with visual monitoring every 3 or 6 months may be considered if the aneurysm is smaller than 4.5 cm and there are no clinical complaints. Any physician in the area, whether general surgeon or urologist, cardiologist or pathologist, encountering a patient over 55 years of age with arterial hypertension, diabetes mellitus, a history of smoking, and unspecified abdominal pain of indefinite or stabbing nature should recommend an abdominal ultrasound in addition to the appropriate investigations indicated by the treatment protocol. A strategy of continuous monitoring of the patient by improving functional vital signs is advisable only in cases where the risk of lethal outcomes after and during surgery is too high. In all other cases of abdominal aortic aneurysms, surgical treatment should be strongly recommended. Finally, given the clinical benefits of using surgical treatment of asymptomatic aneurysms to reduce mortality, it is necessary to conduct an economic assessment of the feasibility of abdominal aortic aneurysms screening in the population over 55 of the age of both sexes.

COI Statement: This paper has yet to be submitted in parallel. It has yet to be fully or partially presented at a meeting, podium, or congress. It has yet to be published or submitted for consideration beforehand.

This research received no specific grant from any funding agency in the public, commercial, or non-profit sectors. There are no relevant or minor financial relationships with external companies from authors, their relatives, or next of kin.

Disclosure: The authors declared they have no conflict of interest. No funding was received for this study.

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