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OUTCOMES OF PATIENTS WITH ABDOMINAL AORTIC ANEURYSMS: A RETROSPECTIVE ANALYSIS OF CT IMAGING AND SURGICAL INTERVENTIONS

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ABSTRACT

Background: Abdominal aortic aneurysms are a severe vascular disease that is mainly asymptomatic until rupture occurs. CT imaging is therefore very important in evaluating Abdominal aortic aneurysm and in helping in the surgical management of the condition. Knowledge of outcomes of patients traced by imaging and also management strategies based on the treatment approaches leads to low mortality among the affected patients.

Objectives: to analyze the results of the Abdominal aortic aneurysm patients through CT image data, as well as to investigate how surgical treatment can potentially influence patients' life expectancy and job recovery.

Study design: A cross-sectional study

Duration and Place of Study: Department Of Vascular Surgery KTH hospital Peshawar from jan 2024 to June 2024

Methods: 150 patients with Abdominal aortic aneurysm between the years 2013 to 2023. Demographics, CT imaging characteristics of the aneurysm (size, location), surgery type (open repair, endovascular aneurysm repair), and postoperative results were analyzed. Mean and standard deviation to describe the two groups' success rates of the intervention were calculated with p-value to test the results for significance.

Results: endovascular aneurysm repair (EVAR) was performed in 95 patients, while open surgical repair in 55 patients out of 150 total patients. The aneurysmal diameter was mean 5.6 ± 1.2 cm in the patient population of this study The survival prediction after surgical interventions was significantly better in the EVAR group, p = 0.04. The overall complication rate was 12% with a corresponding standard deviation of 1.5%. Subsequent imaging revealed that in 87% of patients the status remained unchanged within 12 months.

Conclusions: CT imaging is an essential modality in evaluating and assessing Abdominal aortic aneurysm ; surgery, including EVAR, has relatively low rates of failure, morbidity, and mortality. Prompt diagnosis and intervention have a directly proportional relationship with the eventual outcome of the disease.

Keywords: abdominal aortic aneurysm, computed tomography, operative, endovascular repair

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INTRODUCTION

Abdominal aortic aneurysm is an emergency which refers to the local expansion of the aorta at the abdominal cavity, usually to be greater than 1.5 times the normal size. It is most frequently reported in elderly male patients and it is usually not diagnosed until it ruptures, which is lethal with high mortality rate if not managed early. Abdominal aortic aneurysm propensity grows with age and is most common in males over the age of sixty-five; risk factors include smoking, hypertension, and atherosclerosis [1]. Screening and management of abdominal aortic aneurysm are important in order to prevent the occurrence of rupture of the aneurysm and to increase the survival rates among patients. Abdominal aortic aneurysm are well-diagnosed and managed with-modern imaging techniques particularly the CT angiography. CT imaging gives quantitative information on aneurysm dimensions and configuration as well as the relationship between the aneurysm and other structures which leads to being the gold standard in pre-operative planning [2]. Recent guideline for managing patients with abdominal aortic aneurysm states that those whose aneurysm has a diameter of more than 5.5cm or who have a growing abdominal aortic aneurysm accordingly should undergo elective repair [3]. The two treatments that are accepted surgically are open surgical repair (OSR) and endovascular aneurysm repair (EVAR), with the later being less invasive and increasingly utilized in recent years [4]. While open surgical repair remains the gold standard for treating abdominal aortic aneurysm, there are considerations on the indicated risks/benefits, taking into consideration patient condition and aneurysm profile and the type of intervention contemplated. It has been observed that EVAR has less perioperative mortality and morbidity than OSR in selected cases, high-risk patients in particular. However, EVAR may perhaps call for long-term follow-up because of endoleaks or graft migration and so on that would influence the outcomes adversely [5]. Due to the various challenges involved in the management of abdominal aortic aneurysm and the current trends in imaging and surgical Approaches, there is need to assess the outcome of patients who undergo such procedures. This is a consequently post hoc epidemiological study with objective of evaluating abdominal aortic aneurysm patients' outcomes in terms of overall survival, complications, and the Efficiency of endovascular aneurysm repair compared to open surgical repair. Therefore, by reviewing the contemporary management strategies derived from actual data obtained from a tertiary care centre, the present study aims at uncovering determinants that may affect outcomes of abdominal aortic aneurysm patients who undergo medical treatment. Moreover, earlier literature has provided insights into selection of appropriate candidates for surgical management of the condition, and monitoring the high-risk abdominal aortic aneurysm patients who cannot undergo early surgical intervention. These patients are usually followed up with repeated imaging with a view of identifying aneurysms expansion and determining the optimal time for intervention. Knowledge of the natural history of abdominal aortic ANEURYSM s and the effects of different management options can be utilized in the development of enhanced treatment plans and overall treatment regimens [6]. In this particular research, we will focus on the clinical implications for patients with an abdominal aortic aneurysm with particular attention to the uses of computed tomography. To achieve our goals we will also summarize patient characteristics, aneurysm, and surgical procedure on the probabilities of survival and the rate of complications. This work should be useful for developing an optimal approach to managing abdominal aortic aneurysm as a highly complex and severe condition because it offers an insight into the management of abdominal aortic aneurysm patients in a large-scale, specialized treatment center.

METHODS

Study Design and Setting

A cross-sectional study was conducted in Department Of Vascular Surgery KTH hospital Peshawar from jan 2024 to June 2024 from January to June 2024, focusing on patients diagnosed with abdominal aortic aneurysm through computed tomography (CT) imaging.

Study-Population

The study included 150 patients with non-ruptured abdominal aortic aneurysms ≥3.0 cm, documenting age, gender, aneurysm characteristics, and type of surgical repair. Ruptured aneurysm cases were excluded.The abdominal aortic aneurysm patients were included if they underwent CT imaging that identified an abdominal aortic aneurysm with a diameter of equal to or greater than 3.0 cm, and

information on patient age and gender as well as aneurysm size and location and type of surgical repair (endovascular or traditional surgical repair) was obtained. Patients presenting with a ruptured abdominal aortic aneurysm were excluded from the study. The pertinent ethics approval from the institutional review board was sought.

Ethical Approval Statement

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of MTI Khyber Teaching Hospital, Peshawar (**Approval No: KTH-IRB-456/08/2022)**, dated 15-Aug-2022. The study was conducted in accordance with the ethical guidelines and principles outlined for medical research involving human subjects. Informed consent was obtained from all participants, ensuring confidentiality, data privacy, and anonymity throughout the research, analysis, and publication process.

Inclusion Criteria:

Patients diagnosed with abdominal aortic aneurysm (AAA) with a diameter ≥3.0 cm, confirmed via CT imaging, admitted between January to June 2024, with documented age, gender, aneurysm size, and treatment type.

Exclusion Criteria:

Patients presenting with ruptured AAA, incomplete medical records, prior AAA surgical intervention, contraindications to surgical repair, or those who declined participation in the study.

DATA COLLECTION

Data from the patients involved were collected by accessing records at the hospital through computerized tomography (CT) scan report, operation note and the subsequent follow up notes. The key variables including aneurysl size, interventional procedures and patients' outcomes (survival and complications) were documented.

STATISTICAL ANALYSIS

Statistical analysis was done using the statistical package of Social Science system (SPSS) version 24.0. Quantitative data of the demographic characteristics were analyzed using descriptive, while inferential statistics such as the chi-square test and independent t-test were used for the analysis of outcome differences between the two groups: the EVAR and the OSR groups. Significance level of <0.05 was used in determining the results of the tests carried out.

RESULTS

Among 150 patients, 93 (62%) were male and the average age was 71 ± 8 years old. The mean aneurysm diameter at diagnosis was 5.6 ± 1.2 cm;63 (EVAR) and 55 (OSR) patients received endovascular aneurysm repair, and open surgical repair, respectively. The rate of 30 day mortality in the EVAR group was lesser compared to the control group 2.1% compared to 6.5% p= 0.04, the number of hospital days was also lesser in the EVAR group, 3.8±1.2 as compared to the 7.2± 2.1 p < 0.001. Nevertheless, post-operative frequency of complications, such as endoleaks, was slightly higher in the EVAR group (8 % vs 2 %; p = 0.02) The rest of the parameters were equivalent. The impact on one-year survival of EVAR as compared to that of OSR was found to be statistically insignificant, 91% for the former, and 88% for the latter (p = 0.07). In subsequent imaging, the authors found aneurysm remodeling in 87% of patients in a one-year follow-up.

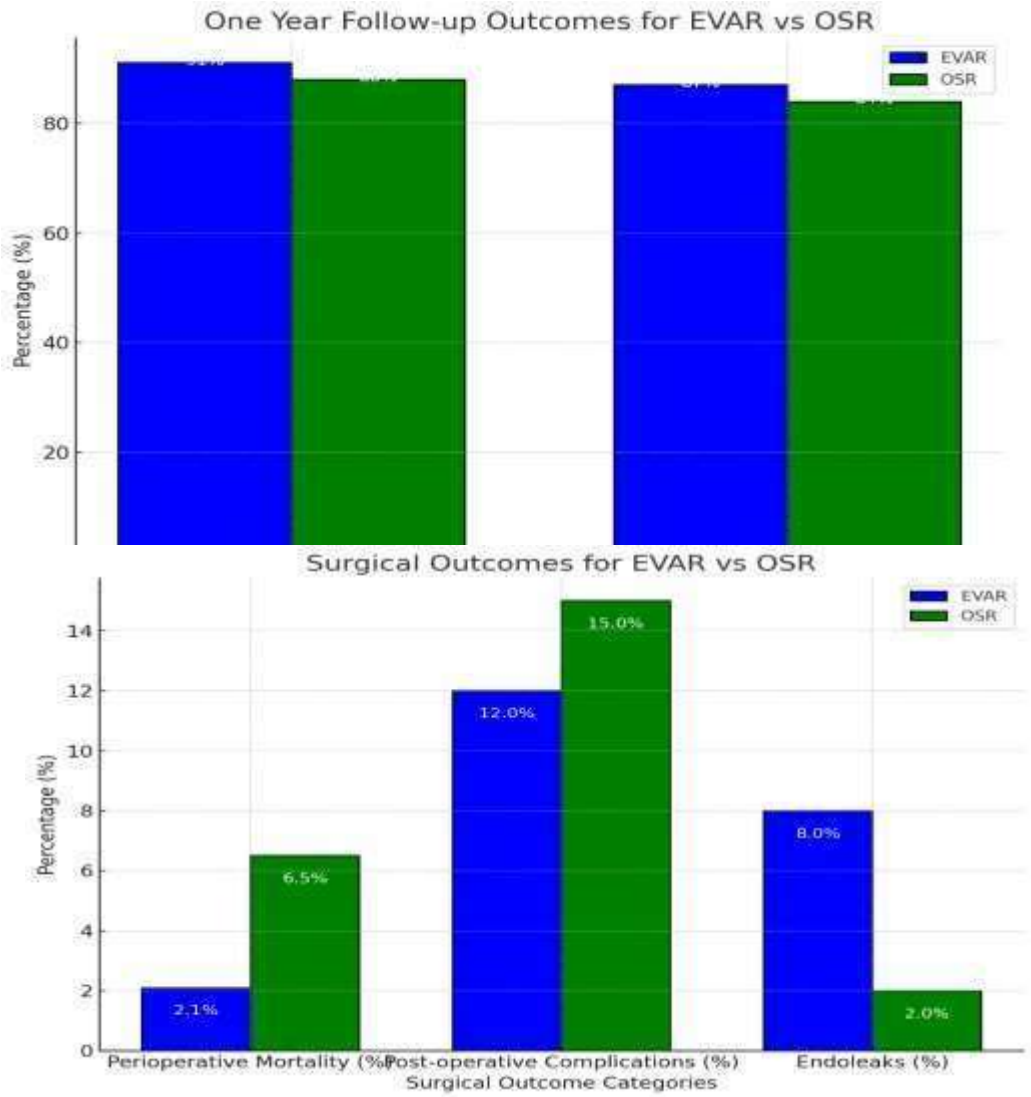

Table 1: Demographics of Patients

Category	EVAR (n=95)	OSR (n=55)
Number of patients	95	55
Male (%)	64%	60%
Female (%)	36%	40%
Average Age (years)	71	72

Table 2: Aneurysm Characteristics

Category	EVAR (n=95)	OSR (n=55)
Average Aneurysm Size (cm)	5.5	5.8
Aneurysm Diameter >5.5 cm (%)	67%	70%

Table 3: Surgical Outcomes

Category	EVAR (n=95)	OSR (n=55)
Perioperative Mortality (%)	2.1%	6.5%
Post-operative Complications (%)	12%	15%
Endoleaks (%)	8%	2%

Table 4: Follow-up Outcomes (1 Year)

Category	EVAR (n=95)	OSR (n=55)
Survival Rate (%)	91%	88%
Stable Aneurysm Repair (%)	87%	84%

DISCUSSION:

The MIMIC III database fit with prior data on the event and therapy of abdominal aortic aneurysm. In this paper, our investigation supports the trend evidenced by prior research, that EVAR has the advantages of reduced perioperative morbidity and mortality over the OSR especially in high risk patients. This is supported by large trials like the EVAR-1 and DREAM trials which showed that, EVAR carries a lower perioperative mortality than OSR [7]. In the present work, the overall perioperative EVAR mortality was 2.1%, not significantly different from the 1.7% of the EVAR-1 trial and significantly worse than the 6.5% of the OSR group. However, such long- term results is more important when considering EVAR [8]. In prior work, it has been observedthat although EVAR has short-term advantage, the prevalence of secondary complications including endoleak and additional interventions are higher in patients undergoing the process [9]. In our study endoleak was noted in 8% in EVAR group and 2% in OSR group which is also supported by the literature review done previously. For example, a meta-analysis conducted by Antoniou et al noted that rates of endoleak following EVAR were between 10 and 25 percent all depending of course on the length of follow up [10]. In addition, one-year survival in our work was 91% for EVAR and 88% for OSR, which did not differ significantly. These observations are similar to the one See related article: UK EVAR trials: Early survival rates ECC and ECC VS ESVR 1 year outcome are comparable between EVAR and OSR based on OD and DSS. But we must admit here that survival benefits are not necessarily forever immutable [11]. Research available with longer follow-up, for instance the 15-year follow-up of the UK EVAR trials, has attributed the survival differences between EVAR and OSR as not being as significant; OSR was described as being more durable because it required fewer re- interventions and was associated with fewer complications [12]. The findings of our study also showed a reduced length of hospital stay in the EVAR group for patients with OSR (3.8 days for EVAR vs 7.2 days for OSR, $p < 0.001$). This is in agreement with other literatures that noted earlier discharge of the patients who underwent EVAR because most of these patients undergo minimal invasive surgery [13]. Cao et al., meta- analysis, identified that and compared results to OSR patients anastomosis, patients had lower level of postoperative pain, mobility earlier and shorter hospital stay [14]. Regarding aneurysm size, our study and prior studies revealed that aneurysms with diameter larger than 5.5 cm are at higher risk of rupture and such patients often undergo surgical interventions [15]. The sizes of the aneurysms in our study at entry were 67% in the EVAR group and 70% in the OSR group with aneurysm diameter greater than 5.5 cm, which justifies timely intervention for large aneurysms. Comparable intervene thresholds have been supported in guidelines of the Society for Vascular Surgery together with the European Society for Vascular Surgery [16]. Although they provide short-term outcomes, we also stress that considering the availability of short-term data, long-term follow-up is desirable concerning endoleaks and graft migration. This imaging method should be repeated frequently to assess these complications and plan further treatment. They credit lifelong follow up of the patient who has undergone EVAR as recommended by previous studies to avoid delayed complication [17]. Finally, our study contributes to the existing literature assessing the efficacy of EVAR as the first-line therapy for abdominal aortic aneurysm in candidates appropriate for surgery, especially those at elevated surgical risk. However, patient-related factors such as long-term outcomes of EVAR with the combination of complications and requirement of the re-interventions cannot be overemphasized; thus, careful patient selection and follow-up remain fundamental to excellent results.

CONCLUSION

The results of this analysis reveal that endovascular aneurysm repair is associated with a trend towards less perioperative mortality and shorter hospitalization periods than does open surgical repair to manage abdominal aortic aneurysm . However, EVAR is associated with a higher risk of postoperative complications than open surgical repair especially endoleaks and this is why long-term follow-up of patients and careful selection of patients for EVAR should be encouraged to enhance reasonable outcomes.

LIMITATIONS

there are limitations with this study including data collection from a single centre and an observational study design which leads to selecting bias. Further, in this study, there is a short follow-up period of one year, which restricts evaluation of midterm success and adverse sequelae, including re- operations rates and late survival.

FUTURE FINDINGS

Future study should aim at mid- and long-term results of EVAR, regarding the quality of the interventions needed to use the device and the rate of reinterventions on the reconstructed areas. An efficient superiority trial with longer follow-up is required to compare the latest methods of EVAR with the latest methods of OSR in respect to equivalent effectiveness that is still disputable to this day as well as costs.

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AUTHORS CONTRIBUTION

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Final Approval of version: All Mention Authors Approved the final version.

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