ORIGINAL ARTICLE

Safety and Efficiency of Endovascular Treatment of Open Versus Endovascular Repair of Abdominal Aortic Aneurysm

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ABSTRACT

Background: To evaluate the safety and efficiency of endovascular treatment or repair (EVAR) of abdominal aortic aneurysm (AAA), we have accomplished ample search of English literature involving case studies on retrograde Open Surgery(OS) or EVAR of AAA.
Aim: To compare the safety and efficiency of endovascular treatment or repair (EVAR) versus open surgery (OS) of abdominal aortic aneurysm (AAA).
Methods: We systematically analyze 50 articles in accordance with inclusion criteria. A total of 1888 patients with 1321 undergoing OS and 567 undergoing EVAR were reported in literature.
Result: No significant difference reported in both procedural success rates (P>0.05). Operating time, ICU span, abstaining time, and duration of total postoperative stay, blood loss, and blood transfusion requirements during the procedure were significantly lower in the EVAR group. Significant dissimilarities were renowned in the rates cardiac, renal, pulmonary, and visceral complications, which were all greater in OS group of AAA patients than in the other group (P, 0.01). In EVAR group, Low-limb ischemia, conversely, was additional communal (P <0.05). The mortality rate for 30-days, was significantly high in the OS group than EVAR group (P <0.05).
Conclusion: EVAR is a feasible, safe and less invasive treatment for aortic diseases. Patients quickly recovered with fewer complications i.e., such as artificial vessel occlusion, low-limb ischemia, and endoleak. Researcher should carry out advance research to resolve the complications. Hence EVAR for AAA is more efficient than OS.
Keywords: Endovascular repair, abdominal aortic aneurysm, retrograde open surgery

INTRODUCTION

Abdominal aortic aneurysms develop slowly over many years and often have no symptoms. It develops when the wall of the artery becomes weakened and distended like a balloon. Aneurysms usually are discovered before they produce symptoms, such as back pain, If an aneurysm expands quickly, tears open (ruptures), or blood leaks along the wall of the vessel (aortic dissection), symptoms may develop suddenly. Since a ruptured aneurysm is extremely dangerous and can cause life-threatening bleeding, aneurysms are best corrected by an operation before this happens.

The first endovascular repair (EVAR) technique for AAA was reported by Parodi et al. In last two decades EVAR of AAA developed quickly and practiced widely now a day. Patients that present with an AAA and abdominal or back pain, even of an atypical nature, are at increased risk of rupture and intervention is recommended. Should aneurysm rupture occur, more than half of patients die prior to hospitalization. Of those who reach the operating suite, the outcome is dependent on the presenting clinical condition, but typically carries a mortality of approximately 50%. For those, who present with an asymptomatic AAA, management is defendant on the size of the aneurysm.

Major post operative complications were endoleaks, most common post EVAR were graft related and ruptures after open repair were anastomotic suture sites1. In EVAR treated patients it's been showed association with systemic inflammatory response and prolongation of hospitalization[2]. Aneurysms shrinkage is also reported in some studies 3Spontaneous fistulation of an abdominal aortic aneurysm (AAA) into the inferior vena cava (IVC) is an unusual and infrequently encountered complication in clinical practice but pre operative diagnosis reduces the chance of morbidity and mortality 4. Due to the complications mortality among AAA are about 50%. It has been observed in a study that pre operative left ventricle ejection fraction (LEVF) level was associated with post AAA. Low LVEF reduces the survival in AAA repair patients5.

In this study we analyzed available studies which were published with AAA patients treated by OS or EVAR, to compare the efficiency and safety of each treatment. Also this study will provide a reference for selecting an AAA treatment strategy.

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The objective of the study was to compare the safety and efficiency of endovascular treatment or repair (EVAR) versus open surgery (OS) of abdominal aortic aneurysm (AAA)

METHODS

We systematically analyze 50 articles in accordance with inclusion criteria. A total of 1888 patients with 1321 undergoing OS and 567 undergoing EVAR were reported in literature. Various keywords in English were used to collect widespread dataset. This includes case studies and original articles. This search was performed through MEDLINE, and PUBMED. The keywords used were a) Open surgery b) abdominal aortic aneurysm c) endovascular repair. The options “a” and “c” were used to determine the cases of AAA. Article selection was performed on 1) AAA patient’s article which includes types of treatment also; 2) article containing AAA patients receiving EVAR or OS; 3) newest and modest articles with desired cases. Non clear classification articles as per topic were excluded from study.

Data extraction: Lovegrove et al and Eggebrecht et al. were used as standard protocol for data extraction. The first one reffering to articles to abdominal aortic aneurysm and second one for articles referring to aortic dissection. As per our goals for analysis, we modified a standardized protocol which include predefined variables in regard to clinical features, ceremonial data, preoperative hitches was used for article extraction. Data extraction was performed independently by all authors, Consensus with further discussion were achieved when any ambiguity occur.

Statistical analysis: The statistical analysis followed a standardized protocol defined by Eggebrecht et al. in their retrograde case reports. Events rate were calculated as event numbers over number of treated patients. The results were presented as mean+standard deviation. The two methods were compared through chi square test (two-tails) and student t test (two-tails). P value < 0.05 was considered statistically significant. The post-operative complications were also compared in two groups i.e., AAA and OS and its significance were calculated by applying t test. All statistical analysis was performed on a statistical software SPSS version 16.0.

RESULTS

A total of 1888 patients with 1321 undergoing OS and 567 undergoing EVAR were reported in literature. The mean age of all patients in OS group was 60.43 years and 65.80 years in EVAR group. The patients in OS group are younger than EVAR, and the age difference is significant (P value = 0.0358). Except diabetes and aneurysm rupture, the two groups are almost same (p value > 0.05). Characteristics with regard to procedural and peri-operative data in both groups were given in table 1.

No significant difference reported in both procedural success rates (P>0.05). Among the patients treated with for EVAR, endoleak is the most common complication after AAA treatment (P value <0.005). Anastomotic leak, renal complications, pulmonary complications and Cardiac complications are significantly different in both groups (P value < 0.05). Stroke, Multiple organ failure and Procedural related complications are not statistically different among EVAR and OS (P value > 0.05). Over all Post-operative complication comparison was generated through various studies and is shown in table 2.

In another multicenter study; it was observed that patients treated with EVAR had less blood loss (310±19mL versus 1590±124 mL; P < .0001), fewer homologous transfusions (6% versus 32%; P < .0001), and shorter lengths of stay (2.0±0.1 days versus 9.8 ± 1.4 days; P < .0001). Complications were 14% as compared to open surgery 57% (P <.0001), endoleak in 20% were observed. (Jon S. Matsumura., 2003). In addition Post-operative mortality was compared in patients with EVAR and OS. The results are shown under figure 1.

Average mortality after EVAR was 17.50±13.59 and average mortality after OS was 27.40±22.26 (p-value 0.178). But there was no statistical significant difference between mortality of both groups. A comparison of post operative mortality after EVAR and OS is given in table 3.

Table 1: Comparison of patient’s pre-operative characteristics

	OS	EVAR	
Variables	**Available data**	**Available data**	**p-value**
Smoke	68/150	96/172	0.0601
Coronary heart disease	300/1008	250/875	0.5708
Hypertension	520/900	502/901	0.3918
Diabetes	202/1050	76/712	0.000*
Renal disease	40/410	24/370	0.1178
Pain	210/610	18/36	0.0725
Aneurysm rupture	111/714	one/79	0.000*

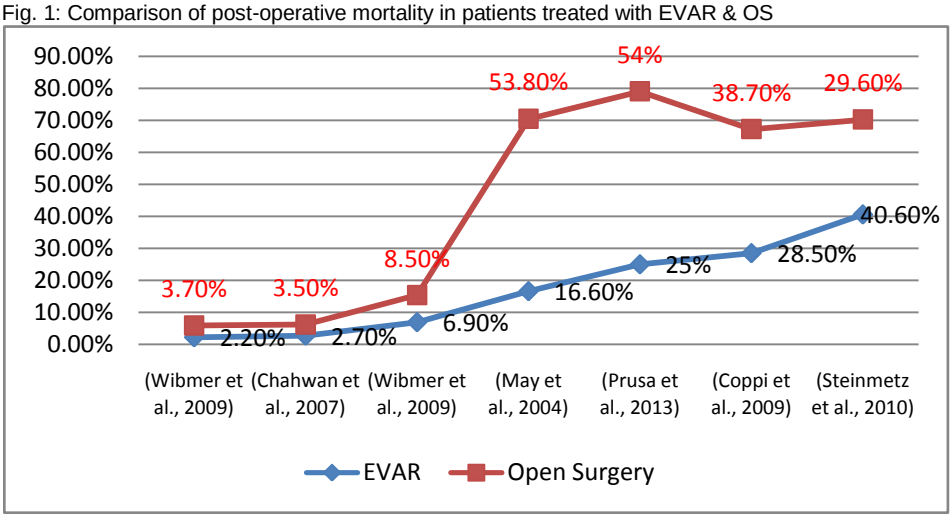
Table 2: Comparison of post-operative complication

Complications		References
EVAR	Open Surgery	
4%	26%	7
31%		13
50%	33.7%	10
14%		14
20-40%		8
52.3%		15
35%		2

Table 3: Comparison of post-operative mortality after EVAR & OS

Mortality		References
EVAR	Open Surgery	
25%	54%	1
40.6%	29.6%	16
6.9%	8.5%	17
2.2%	3.7%	
30%		13
28.5%	38.7%	10
2.7%	3.5%	12
16.6%	53.8%	18

Fig. 1: Comparison of post-operative mortality in patients treated with EVAR & OS



DISCUSSION

The patient life is seriously intimidated by the AAA. In patients with ruptured aneurysm, mortality remain high, hence this situation requires proper, in time, early diagnosis and treatment. Some of the elderly or organic dysfunctional patients die without treatment. Because in the situation; it is extremely dangerous to receive treatment. The pre and post-operative complications are debatable in patients treated for AAA either with EVAR or OS. But it's been evident from researches that EVAR is associated with reduced in-hospital mortality as well as reduce complications.6 In our study the mean age significantly different among both groups, but Greenhalg et al,. 2004 reported the difference as non-significant (P value>0.05). The preoperative complication except diabetes went similar in both groups; However, preoperative pulmonary disease is low in OS as compared to EVAR, reported by Prinssesn et al., 2004 Among other complications like aneurysm developing, bleeding etc, endoleaking could lead to mortality in patients treated with EVAR. In obese patients EVAR is more effective than open surgery7. In our results it was observed that endoleak was more common in EVAR than in OS. It was observed that endoleak is due to anticoagulant drugs usage and it is suggested that warfarine anticoagulant drug is an independent risk factor for the development of endoleak and persistant sac expansion8. Post implantation syndrome (PIS) is a common complication it was observed in 35% of the patients.

Short term follow up studies reveals that complete exclusion of aneurysm was possible after EVAR and the morbidity and mortality have also been reduced due to this procedure particularly in emergency setting and in patients with high risk 9. Mortality is another aspect of safety and effectiveness of treatment. The trends show that

mortality is low in EVAR as compared to open surgery but statistically significance is not found among these results10. It has also been observed that, it not only reduce aneurysm related death but in comparison to open surgery it reduces post operative morbidity, utilization of ICU, hospital stay and eventually cost11,12 also support the same advantages of EVAR with the addition that in EVAR blood loss is reduced as compared to open surgery.

CONCLUSION

EVAR is better than open surgery in many aspects like reduced blood loss, less hospital stay and less mortality. It can therefore conclude that EVAR is safe and efficient as compared to open surgery for the treatment of AAA.

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