EVAR STANDARD EM COLOS LARGOS – SOLUÇÃO RAZOÁVEL?

STANDARD EVAR IN LARGE NECKS – IS IT A REASONABLE SOLUTION?

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RESUMO

Introdução: A reparação endovascular de aneurismas da aorta abdominal (EVAR) tem vindo a expandir-se para anatomias progressivamente mais complexas. A morfologia do colo proximal representa o maior determinante da durabilidade do EVAR, sendo o diâmetro uma das características que mais influencia a selagem proximal ao longo do tempo.

Métodos: Foi realizada uma pesquisa nas bases de dados MEDLINE no sentido de identificar publicações focadas na relação entre o diâmetro do colo aórtico e a incidência de complicações relacionadas com o aneurisma.

Resultados: Seis estudos foram incluídos nesta revisão, contemplando 6602 doentes: 1616 com colos largos e 4986 com colos pequenos. Cinco estudos, incluindo 6446 doentes reportaram taxas mais altas de *endoleaks* 1 A em pacientes com colos largos com *hazard/odds ratios* a variarem entre 2.3-4.1. Um estudo relatou um maior risco de rotura pós-implante em pacientes com colos proximais >30mm (HR, 5.1; 95% CI, 1.4-19.2). Quatro estudos investigaram a relação entre o diâmetro dos colos proximais e a mortalidade relacionada com AAA, mas nenhuma associação foi verificada. A sobrevida global reduzida em doentes com colos mais largos foi descrita em quarto estudos (sobrevida a longo prazo variou entre 61.6 e 68% para doentes com AAA com colos largos e 75-90 % nos doentes com AAA com colos mais estreitos). Esta diferença relacionou-se sobretudo com mortalidade de causa cardiovascular.

Conclusão: A evidência disponível relativamente a este tópico sugere que doentes com colos proximais mais largos se associam a maior risco de *endoleak* tipo 1A, rotura pós-implante e mortalidade global. Assim, este subgrupo de doentes deve ser considerado como tendo um risco superior para EVAR e isso ser tomado em conta aquando do processo de decisão. É possível que estes doentes beneficiem de estratégias endovasculares que permitam aumentar a zona de selagem proximal, como endopróteses fenestradas ou ramificadas ou técnicas de *parallel grafts*, consoante as características anatómicas e celeridade com que têm de ser tratados, ou cirurgia aberta, se as o risco anestésico-cirúrgico for favorável. A realçar ainda que este subgrupo de doentes parece beneficiar de um seguimento imagiológico mais regular após tratamento com EVAR *standard* assim como um tratamento mais agressivo de comorbilidades cardiovasculares.

Palavras-chave
Correção endovascular de aneurisma da Aorta Abdominal; Diâmetro do colo; Complicações

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ABSTRACT

Introduction: *Endovascular aneurysm repair (EVAR) has expanded into progressively more challenging anatomies. Proximal neck-morphology represents the major determinant of EVAR durability. Neck-diameter constitutes one of the most important anatomical neck features and influence proximal sealing over time.*
The purpose of this study is to investigate the influence of wide proximal necks on outcome after standard EVAR.

Methods: *MEDLINE databases were searched to identify publications addressing the relation between aortic neck diameter and incidence of AAA-related complications.*

Results: *Six studies were included in our review, addressing 6602 patients: 1616 with large necks and 4986 with small necks. Five studies, including 6446 patients, reported higher rates of type 1A endoleak in patients with large necks with hazard/odds ratios ranging between 2.3–4.1. One study found a higher risk of post-implant rupture in patients with necks>30mm (HR: 5.1; 95% CI, 1.4–19.2). Four studies reported on the influence of wide necks on AAA-related mortality without finding any association. Reduced overall survival was seen in patients with large necks in 4 studies (long term survival ranged between 61.6 and 68% for wide neck patients and 75–90 % for small neck patients), mostly attributable to cardiovascular causes.*

Conclusions: *Patients with wide proximal necks are at greater risk for type 1A endoleak, post-implant rupture and overall-mortality. This subgroup of patients may be considered for more complex proximal seal strategies with fenestrated/branched devices or open repair, although there is no evidence of superiority of alternative strategies to standard EVAR in large necks. This subgroup should be offered more stringent imaging follow-up and aggressive treatment of medical comorbidities.*

Keywords
Endovascular aneurysm repair; Neck Diameter; Complications

INTRODUCTION

Endovascular aneurysm repair (EVAR) became preferred treatment modality for infrarenal abdominal aortic aneurysms (AAA). Technical and technological refinements have been progressively introduced over the last decades, generally leading to improved early and late outcomes. Still, a low but persistent risk of rupture and high rate of secondary interventions remain the main drawbacks and lifelong imaging surveillance is therefore mandatory[1-3].
As durability of EVAR is limited compared to patients submitted to open AAA repair, it becomes paramount to identify critical anatomical constraints that may influence long-term failure of EVAR.
The most limiting factor for EVAR is adverse proximal neck anatomy[4].Even though some reports have advocated safety with EVAR in large necks in the short-term, other have highlighted a higher risk of rupture and proximal endoleaks in patients with large proximal necks[5-8].
The purpose of this study is to investigate the influence of wide proximal necks on outcome after standard EVAR.

METHODS

MEDLINE databases were searched for relevant articles published between 2000 and May 2019. The key words "proximal aortic neck", "wide neck", and "EVAR" and "abdominal aneurysm" were used in combination with the Boolean operators AND or OR. Only articles with follow-up data, longer than 30-day/in-hospital data, were included. Reports containing fewer than 10 patients were excluded. Primary endpoint was freedom from rupture and type 1A endoleak. Secondary endpoints were aneurysm-related and overall-survival.

RESULTS

Six observational studies comparing outcomes between large and small diameter necks were included, with a total of 6602 patients: 1616 with large necks and 4986 with small necks.
Definition of "wide neck" differed among the included studies: one study defined wide neck as > 31mm[9], two studies as > 30mm[8,10], two studies as > 28mm[11,12] and one study as 25mm[13].
Mean follow-up period ranged between 2.7–3.9 years.

TYPE 1A ENDOLEAK AND POST-IMPLANT RUPTURE

AbuRahma et al, (N=688), with a mean follow-up of 25.2 months for patients with neck diameter <31mm and 31.8 months for patients with neck>31mm, described a freedom

from type 1A endoleak at 3 years of 88% in large neck group and 97% in small neck group, P=0.19. In multivariable analysis, patients with necks > 31 mm were at greater risk for type 1A endoleaks [OR: 4.1 CI95% 1.4-17.4][9].Howard et al (N=3166), described a lower freedom from type 1A endoleaks at 3 and 5-years (values not available - only KM curve) and also described that neck >25 mm represented an independent risk factor for type 1A endoleak [HR: 2.3, P=0.007][13].

Oliveira et al, in a multicentric study of patients treated with the Endurant stent-graft (N=427), with a median follow-up of 3.1 and 4.1 years for large necks and small necks, respectively, reported an overall incidence of type 1A endoleak of 9.5% in the large neck group and 2.8% in the small neck group, P=.01. In multivariable analysis, the authors described that large neck increased by 3-fold the risk for type 1A endoleaks [HR: 2.67 IC95% .96-8.3, P=.05][10].

Recently, in a different study also including patients treated with the Endurant stentgraft but included in the ENGAGE registry (N=1257; median follow-up of 4 years), Oliveira et al, described a freedom from type 1A endoleak of 92.4% in the large diameter group and 96.6% in the small neck group (P=.09). After adjusting for neck length, AAA diameter, and device oversizing, patients with neck diameter >30 mm were at greater risk for development of type 1A EL (hazard ratio, 3.0; 95% confidence interval, 1.0-9.3; P = .05)[10]. Kaladji et al (N= 908), over a follow-up period of 38 months, reported higher rates of proximal endoleaks (13% vs. 3.9%, P < 0.0001) in patients with grafts with main body >32mm, compared to smaller grafts[11]. Contrarily, Jim et al (N=156) reported no difference on endoleak occurrence among patients with necks > 28mm through five years of follow-up[12].

Regarding post-implant rupture, Oliveira et al described similar rates of post-implant rupture in patients with necks larger or smaller than 30mm (1.4% vs 1.7%, P=.82) in their smaller study[8]. In another report with the ENGAGE population, however, these authors reported 3.1% rate of post-implant rupture for necks>30mm and 0.7% for necks<30mm (HR, 5.1; 95% CI, 1.4-19.2; P = .016)[10].

AAA-RELATED AND OVERALL-SURVIVAL

Regarding AAA-related mortality, Howard et al reported no differences regarding aneurysm-related mortality among patients with necks > or < 25mm, P=.245[13]. Oliveira et al reported a freedom from aneurysm-related mortality of 99% (n = 58; SE= 0.01) in the >30-mm neck group and 98.3% (n = 795; SE= 0.005) in the < 30mm neck group (P=0.64)[10]. Also Jim et al, reported freedom from aneurysm-related mortality of 91.2% and 98.7% (P=NS) for patients necks > or < 28mm, respectively[12]. Kaladji et al described twenty AAA-related deaths during follow-up: 3.5% in patients treated with devices >32 mm and 1.9% in patients with smaller devices, P=0.19[11].

In regard to overall survival, Howard et all reported a 64.6% survival rate at five years for the large neck group and 76.5% for the small neck, group, P=0.03[13]. AbuRahma et al, described an overall survival at three years of 68% for necks >31mm and 90% for necks<31mm, P<0.001. In multivariable analysis, neck >31mm increased by 6 fold the risk of death [HR: 6.1 CI95% 2.2-16.8][9].

Oliveira et al reported a survival rate at four years of 61.6% for necks>30mm and 75.2% for necks <30mm, P=0.009, which remained after correcting for sex and AAA diameter[10]. Kaladji et al found no difference in overall-related mortality, with survival rates of 65% in patients treated with grafts > or < 32mm, P=0.95[11].

DISCUSSION

The durability of EVAR depends on persistent seal at proximal and distal landing sites. With the endograft-related improvements, better outcomes following EVAR have been observed over the last years[14,15].Consequently, standard EVAR has been pushed into progressively more challenging aortic-neck anatomies[16].

The included studies in the present review seem to point towards a higher risk of type 1A endoleak[10,13] in patients with large necks. However, the impact of neck diameter on long-term outcomes after standard EVAR have been conflicting. Aburahma et al, did not find an increased risk of EL1A among a group of 688 patients[17].Similarly, in a previous ENGAGE-based study Bastos Gonçalves et al also could not find an increased risk of neck-related adverse events (defined as a composite of postoperative EL1A or undetermined endoleak, device migration, need for proximal neck secondary intervention, or postimplantation rupture) in those 398 patients treated with a 32- or 36-mm-diameter endograft (P = .40). However, only 38% of the cohort had reached the 2-year follow-up[6]. Also Jim et al (N=156), reported no difference on endoleak occurrence among patients with necks > 28mm through five years of follow-up[12]. On the other hand, Oliveira et al in a multicentric study described a higher rate of type 1A endoleak [HR: 2.67 IC95% .96-8.3, P=.05] in patients with necks with >30mm[10]. These findings were confirmed in the ENGAGE population: patients with > 30mm necks were at increased risk for neck-related events (odds ratio [OR], 3.8; 95% confidence interval [CI], 1.6-9.1), type 1a endoleak (OR, 2.7; 95% CI, 1.0-8.3), and neck-related secondary interventions (OR, 3.2, 95% CI, 1.1-9.2)[8]. Also Kaladji et (N= 908), over a follow-up period of 38 months, reported higher rates of proximal endoleaks in patients with grafts with main body >32mm, compared to smaller grafts[11].

Recently, Mc Farland et al (N=500) stated that patients using large device (34 to 36mm) had greater incidence of type 1A endoleak (14.8% vs 3.3%, P<.001) compared with patients with smaller devices. These authors also described a greater risk for proximal fixation failure (composite endpoint of type 1A endoleak and stent graft migration > 10mm) – OR 2.5 CI95% 1.12-5.08 in patients requiring large devices[18].

With regard to overall survival, patients with larger necks seems to be at greater risk of death compared to small-neck patients[9,13]. However, no difference seems to exist concerning AAA-related mortality[10,13]. Oliveira et al, in a paper focusing on anatomical predictors for late mortality after EVAR found that neck>30mm (HR, 2.16; 95% CI, 1.05-4.43) was an independent morphologic risk factors for cardiovascular mortality[19]. As arterial aneurysmal disease and atherosclerosis share most of the previously established risk factors, it is not surprising that cardiovascular diseases are still one of the main causes of death among these patients[20,21]. In line with this findings, a recent meta-analysis concluded that patients with large necks are more likely to be older males, with increased prevalence of COPD, coronary artery disease and chronic kidney disease compared to patients with smaller necks. As such, due to the described cardiovascular comorbid burden, these patients are less likely to be fit for open repair and endovascular repair remain the first treatment option. As such, these patients may benefit from a more aggressive control of their comorbidities after EVAR[22].

In conclusion, patients with large proximal necks are at greater risk for proximal endoleak, rupture and overall-mortality compared to patients with smaller necks. Consequently, open surgery or more complex endovascular repair with long proximal sealing may be better alternatives in this subgroup of patients, as long as they are fit for surgery and anatomically suitable for complex endovascular repair. However, no study to date has directly compared outcomes of patients with large neck treated with standard EVAR and alternative methods, and therefore it is not possible to recommend against standard EVAR. Based on our results, we can nonetheless suggest more intensive follow-up surveillance protocols with special attention for sealing sites evolution over time. Due to higher cardiovascular comorbid burden, aggressive risk factor control should also be considered in patients with wide proximal necks.

ETHICAL RESPONSABILITIES

Protection of patients and animals:

The authors state that for this investigation no experiments were performed on humans and / or animals.

Confidentiality of the data:

The authors state that they have followed the centre's established protocols on the publication of patient data.

Right to privacy and informed consent:

The authors declare that no patient data is available in this article.

Conflict of interest:

The authors declare no potential conflict of interest.

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