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REVIEW

Balloon Angioplasty Versus Stenting for the Treatment of Failing Arteriovenous Grafts: A Meta-Analysis☆

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WHAT THIS PAPER ADDS

This is the first systematic review to compare the outcomes of plain balloon angioplasty with stenting for treatment of failed or malfunctioning chronic haemodialysis arteriovenous grafts. The superiority of stenting over plain balloon angioplasty found in this study may clearly influence the current therapeutic strategy regarding the best treatment option when such grafts fail.

Purpose: To assess the outcomes of plain balloon angioplasty versus stenting for the treatment of failed or malfunctioning chronic haemodialysis arteriovenous grafts (AVGs).

Methods: A systematic search of the literature was undertaken using the PUBMED, EMBASE, and Cochrane databases from January 2000 to September 2016 for articles comparing balloon angioplasty versus stenting in the management of failed or malfunctioning chronic haemodialysis AVGs. Results are reported as OR and 95% CI.

Results: The search identified eight studies (1051 patients). Balloon angioplasty alone was used in 521 patients (49.6%) and stenting in 530 patients (50.4%). At the time of the endovascular re-intervention, the mean life of AVGs was 807.7±115.4 days for the balloon angioplasty and 714.2±96.3 days for the stenting group (p=.92). All AVGs were located in the arm. Most procedures (98.1%) were performed across the venous anastomosis, while 88% of the patients in the stenting group received a stent graft. The technical success rate was significantly higher in the stenting group (OR 0.16, 95% CI 0.08–0.31, p<.001). At 12 months, loss of primary and secondary patency was significantly higher in patients undergoing plain balloon angioplasty compared with stenting (OR 3.54, 95% CI 2.18–5.74, p<.001, and OR 1.82, 95% 1.17–2.82, p=.008, respectively).

Conclusion: Stenting is associated with better technical success and patency rates compared with plain angioplasty in treating failed or malfunctioning chronic haemodialysis AVGs, and thus it should be considered as the first line therapeutic option.

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INTRODUCTION

Despite the almost universal agreement that autogenous fistulas should be the access of choice for haemodialysis, a significant proportion of patients continue to undergo haemodialysis with the use of a prosthetic arteriovenous graft (AVG).[1,2] The majority of AVGs fail some time after implantation because of neointimal hyperplastic stenosis at the venous anastomosis that reduces blood flow and decreases the efficiency of haemodialysis, increasing the risk of access thrombosis. In the Dialysis Access Consortium (DAC) Study, 77% of new AVGs developed stenosis or thrombosis within the first year.[3]

In recent years, endovascular techniques have evolved rapidly for treatment of patients with failing AVGs. The effectiveness of balloon angioplasty has been demonstrated in numerous studies, but because of the elastic recoil and recurrence of intimal hyperplasia, the patency remains poor.[2,4,5] Stent placement has been proposed in the treatment of mainly anastomotic lesions to improve patency during follow-up,[6] but the use of stents as a first line treatment remains under debate.[7]

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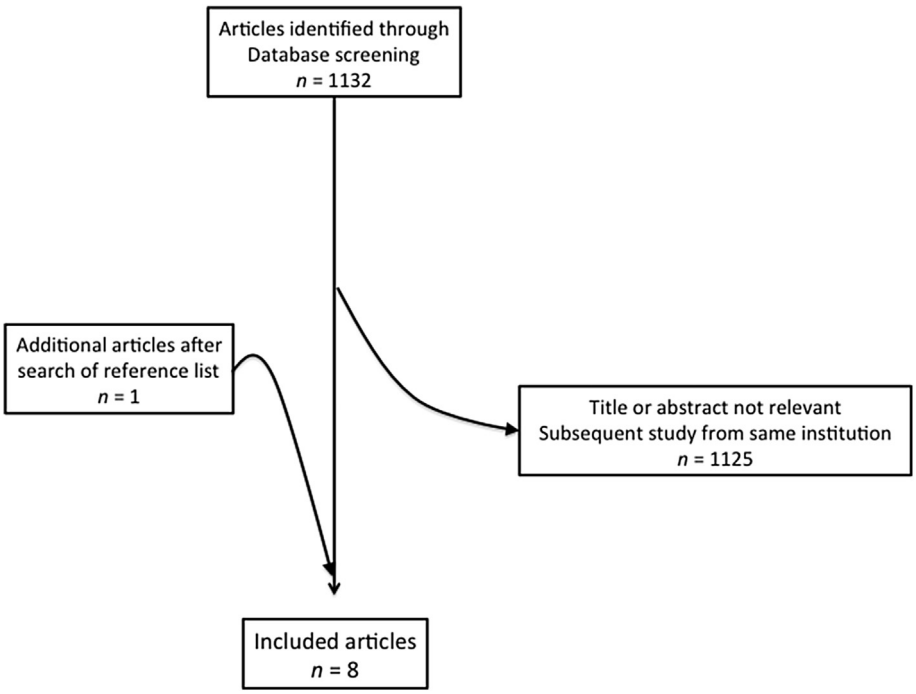

Figure 1. Literature search strategy.

In the absence of clear evidence on the best treatment option, the aim of this study was to evaluate the existing literature in respect of the outcomes of plain balloon angioplasty versus primary stenting in the treatment of failing AVGs.

METHODS

Eligibility criteria

The objectives, the methodology of the systematic review and analysis, and the inclusion criteria for study enrollment were pre-specified. Standard Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed and documented in advance in a formal protocol.[8] Ethics approval was not required. Data extraction and methodological assessment were performed by two independent investigators (G.K., K.S.). Studies considered for inclusion and full text review fulfilled the following criteria: (1) to report on endovascular treatment of failed arteriovenous grafts, (2) to include at least five patients treated either with only plain balloon angioplasty or stenting with or without balloon predilatation, and (3) to provide data on patency. Reports on drug coated balloons or cutting balloons were not included in the analysis. The same reviewers (G.K., K.S.) evaluated the eligibility of studies for inclusion in this review independently in an non-blinded standardised manner. Disagreements were resolved by discussion with the senior author (A.D.).

Search

An electronic search of the English language medical literature from 2000 to September 2016 was conducted using MEDLINE, EMBASE, and Cochrane databases to find studies relevant to endovascular treatment of AVG stenosis or thrombosis. Search terms included “arteriovenous graft” OR “hemodialysis graft” OR “dialysis-access graft” AND “failing” OR “stenosis” OR “endovascular” OR “balloon angioplasty” OR “stenting.” Related articles suggested by the PubMed search engine and reviews on this subject were searched for additional relevant articles. Further articles were also identified via examination of the references cited in the initially identified reports. The following data were extracted from each study: publication year, country of origin, number of patients, age, gender, AVG age, location, site of stenosis, technical success, 30 day outcome, and primary and secondary patency during follow-up.

Quality assessment

The quality of observational studies was assessed using the Newcastle-Ottawa Quality Assessment Scale (NOS) for case control studies or cohort studies (as applicable).[9] This tool evaluates three main methodological domains of cohort studies: a. selection methods (representativeness of the exposed cohort, selection of the non-exposed cohort, ascertainment of exposure and demonstration that outcome of interest was not present at the start of the study), b. comparability of cohorts on the basis of the design or analysis, and c. assessment of outcomes (ascertainment of outcome, adequacy of follow-up). The scale uses a star system, with a maximum of nine stars; studies achieving at least six stars were considered to be of higher quality.

The quality of randomised trials was assessed using the van Tulder scale.[10] This scale is designed to make assessments on 11 components including randomisation, allocation concealment, baseline characteristics, patient blinding,

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