

Repair of Aneurysmal Arteriovenous Fistulae: recommended clinical approach based on systematic review and meta-analysis

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ABSTRACT

Objectives: Aneurysms arising from arteriovenous fistulae are a common finding among dialysed patients and pose a risk of acute bleeding. The aim of this study was to perform a systematic review and meta-analysis evaluating the surgical options for the treatment of aneurysmal arteriovenous fistulae.

Methods: A systematic review and meta-analysis of articles published between January 1973 and March 2019 describing the surgical treatment of arteriovenous fistulae aneurysms.

Results: A total of 794 records were identified. After duplicate and low quality studies were removed, 72 full text articles were reviewed and from these 13 were included in the meta-analysis. The total number of patients was 597. Aneurysms were located in the upper arm in 289 (59%) cases and the smallest diameter of a treated aneurysm was 15 mm. The most frequent indication for treatment was bleeding prevention in 513 (86%) cases. Aneurysmorrhaphy was the surgical method of choice in all 13 studies. The pooled primary patency at 12 months was 82% (95% CI 69%-90%, 12 studies, $I^2=84\%$, $p < .01$). The 12 month primary patency rates were similar for aneurysmorrhaphy with external prosthetic reinforcement (85%, 95% CI 71%-93%, two studies, $I^2=0\%$, $p=0.33$) and aneurysmorrhaphy performed using a stapler (74%, 95% CI 61%-83%, four studies, $I^2=0\%$, $p=0.48$) and without a stapler (82%, 95% CI 60%-94%, six studies, $I^2=92\%$, $p < .01$).

Conclusions: Aneurysmorrhaphy of arteriovenous fistulae is a procedure with acceptable short and long term results, with a low complication and aneurysm recurrence rate.

INTRODUCTION

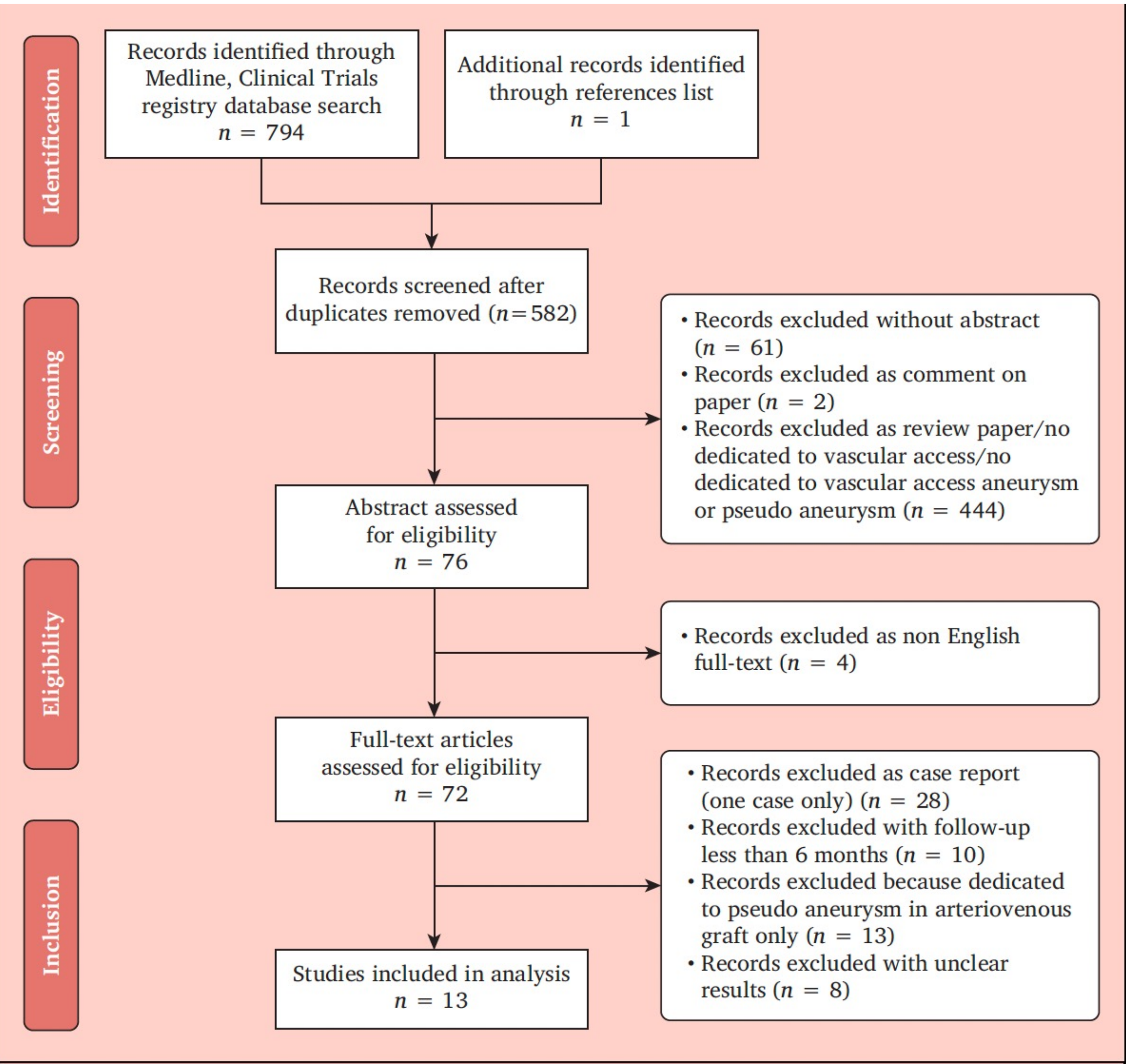
Aneurysm formation is a complication of vascular access arteriovenous fistula (AVF) characterised by an enlargement of all three layers of the vessel wall with a diameter of more than 18 mm and has a prevalence of more than 40% in the dialysis population. According to current clinical guidelines, treatment is usually only indicated for symptomatic aneurysms. Several different treatment options for AVFA with various different results have been described in the literature. Unfortunately a comparative prospective or retrospective study evaluating the various different treatment options for AVFA has not yet been published and so recommendations for clinical practice regarding the optimal treatment for aneurysm repair are still lacking.

The aim of the present systematic review and metaanalysis was to perform and describe the character of surgically treated aneurysms, and to compare the results of the different surgical techniques.

METHODS

A systematic review of literature was conducted according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement.

RESULTS



The aneurysms were treated by aneurysmorrhaphy in all 13 studies. In five studies aneurysmorrhaphy was performed using stapler. In two studies the repaired AVFs were reinforced with external mesh prosthesis.

Dialysis was performed through a central catheter or through the repaired AVFAs immediately after surgery depending on the technique. In the majority of studies when cannulation was performed immediately after surgery, the non-repaired part of AVFAs was used for cannulation

The pooled primary patency rate at 12 months was 82% (95% CI 69%-90%). There were similar 12 month primary patency rates between aneurysmorrhaphy with external prosthetic reinforcement (85%, 95% CI 71%-93%, $p=0.33$) and aneurysmorrhaphy performed using a stapler (74%, 95% CI 61%-83%, $p=0.48$), and without using a stapler (82%, 95% CI 71%-93%, $p < .01$).

Overall 20 (3%) cases developed early post-operative complications in the first 30 days after surgery. The most frequent complication was a haematoma, which occurred in 14 cases (2%). Two patients developed acute thrombosis (0.3%) and one patient after aneurysmorrhaphy reinforced with an external prosthesis (n . 95) developed infection of the graft (1%). Late post-operative complications (more than 30 days) occurred in 42 cases (7%) and were reported in six studies. There were three late infections of the exoprosthesis (3%), seven late thromboses (1%) and one case of skin necrosis. The pooled complication rate was 11% (95% CI 7%-18%, 13 studies $I^2=67\%$, $p < .01$). Complication rates were similar between aneurysmorrhaphy with external prosthetic reinforcement (7%, 95% CI 1%-46%, two studies, $I^2=67\%$, $p=0.08$) and aneurysmorrhaphy performed using a stapler (4%, 95% CI 1%-12%, five studies, $I^2=0\%$, $p=0.79$) and without a stapler (15%, 95% CI 8%-27%, six studies, $I^2=81\%$, $p < .01$).

CONCLUSION

Based on the present systematic review and metaanalysis, all symptomatic aneurysmal arteriovenous access fistulae should be treated surgically by aneurysmorrhaphy. Aneurysmorrhaphy as a salvage technique using the remaining healthy venous wall of the repaired access is a safe procedure with long term patency, low complication and recurrence rates.



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