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Management of Arteriovenous Fistula Aneurysms: A Retrospective Study of 25 Cases Over Four Years

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Abstract **Original Research Article**

Objective: Arteriovenous fistula (AVF) aneurysms are a common complication in patients undergoing hemodialysis. This study evaluates the incidence, clinical presentation, and management strategies for AVF aneurysms over a four-year period. ***Methods:*** We conducted a retrospective analysis of 25 patients diagnosed with AVF aneurysms between 2020 and 2024. Clinical data, imaging findings, surgical techniques, and outcomes were analyzed. ***Results:*** Surgical repair was performed in 18 patients (72%), while seven (28%) were managed conservatively. Postoperative complications occurred in three patients (12%). Patency rates at 6 and 12 months were 88% and 76%, respectively. ***Conclusion:*** Timely intervention is crucial in managing AVF aneurysms. Both surgical and conservative approaches offer good outcomes depending on aneurysm characteristics.

Keywords: Hemodialysis vascular access; Arteriovenous fistula aneurysm; Aneurysmorrhaphy; Endovascular treatment; Vascular access patency.

INTRODUCTION

Arteriovenous fistula (AVF) aneurysms are a significant complication in hemodialysis patients, characterized by excessive venous dilation, progressive wall weakening, and potential rupture risks [1]. With the increasing global prevalence of end-stage renal disease (ESRD), maintaining functional vascular access is a priority in dialysis care.

Although aneurysm formation is often asymptomatic, it can lead to severe complications such as skin thinning, ulceration, hemorrhage, and thrombosis [2]. Traditional treatment includes surgical revision, while emerging endovascular techniques provide alternative approaches [3].

This study presents a four-year retrospective analysis of AVF aneurysms, comparing conservative and surgical management strategies.

MATERIALS AND METHODS

Study Design

A retrospective cohort study was conducted between January 2020 and December 2024, analyzing 25 patients diagnosed with AVF aneurysms at our vascular surgery center.

Inclusion and Exclusion Criteria

Inclusion: Patients with clinically significant AVF aneurysms (>20 mm in diameter), requiring intervention.
Exclusion: Patients with non-functional AVFs.

Data Collection

Demographics: Age, sex, comorbidities (diabetes, hypertension).
Aneurysm Characteristics: Size, location, symptoms.
Management Approach: Conservative vs. surgical (aneurysmorrhaphy, interposition grafting).
Outcomes: Patency, complications, dialysis access survival.

Statistical Analysis

Continuous variables were expressed as means ± standard deviations, while categorical variables were presented as percentages. Differences between treatment groups were analyzed using the chi-square test.

RESULTS

Patient Characteristics

The mean age of patients was 62 ± 9 years, with 68% being male. Diabetes mellitus was present in 56%, and hypertension in 76% of cases. The mean duration of AVF use before aneurysm diagnosis was 48 ± 12 months.

Table 1 summarizes the demographic and clinical characteristics of the 25 patients.

Table 1: Patient Demographics and Clinical Characteristics

Characteristic	n (%)
Mean Age (years)	62 ± 9
Male Gender	17 (68%)
Diabetes Mellitus	14 (56%)
Hypertension	19 (76%)
Duration of AVF Use (months)	48 ± 12

Aneurysm Characteristics

The cephalic vein was the most frequently affected location (72% of cases), followed by the basilic vein (20%) and brachial vein (8%). The mean aneurysm diameter was 28 ± 5 mm. Symptomatic presentation included pain (48%), bleeding (32%), and skin thinning (20%).

Table 2: Aneurysm Location and Symptoms

Location	n (%)	Symptoms
Cephalic vein	18 (72%)	Pain (9), Bleeding (6), Skin thinning (3)
Basilic vein	5 (20%)	Pain (2), Bleeding (2), Skin thinning (1)
Brachial vein	2 (8%)	Pain (1), Bleeding (1)

Management Approaches

Surgical repair: 18 patients (72%).

Aneurysmorrhaphy: 12 cases (Fig.1); Interposition graft: 6 cases.

Conservative management: 7 patients (28%). Compression, banding, and monitoring.

Patency rates post-treatment were: 6 months: 88%; 12 months: 76%.

Complications were minimal, with three cases (12%) of post-operative infection or thrombosis.

Figure 1 : Operative view of the arteriovenous fistula aneurysm (A), aneurysmorrhaphy (B) and final result (C)

DISCUSSION

Prevalence and Risk Factors

AVF aneurysms are increasingly recognized due to the widespread use of long-term hemodialysis. The prolonged exposure of venous walls to high flow and pressure accelerates venous dilation and wall weakening. Risk factors include older age, diabetes mellitus, hypertension, and prolonged AVF duration [4].

Our study found that diabetes (56%) and long-term AVF use (>4 years in most cases) were the most significant predisposing factors. These findings align with previous studies reporting diabetes and hypertension as key contributors to venous wall degeneration [5].

Surgical vs. Conservative Management

The indications for surgical intervention include skin thinning, pain, risk of rupture, and dysfunction due to turbulent flow [6]. Aneurysmorrhaphy, the preferred technique in our study, preserved the native fistula while reducing aneurysmal size. Interposition grafting was reserved for cases with severe wall damage or extensive dilation [7].

Conservative management was offered in asymptomatic patients. However, aneurysm progression in this group often led to secondary surgical intervention, raising concerns about the long-term viability of a purely observational approach [8].

Comparison with Literature

Our results align with published patency rates for surgical management of AVF aneurysms, with reported success rates between 70% and 85% at 12 months [4].

Although endovascular approaches (stent grafts) have been explored, their role remains controversial due to cost, potential thrombosis, and long-term patency concerns [2]. Future comparative trials are needed to define the optimal management strategy.

Clinical Implications

- Early detection and intervention are crucial to prevent rupture and thrombotic complications [3].
- Surgical revision remains the preferred treatment, offering high patency and reduced complications [6].
- Conservative management should be carefully selected, as many patients eventually require surgery [5].

CONCLUSION

This study highlights that AVF aneurysms require timely intervention to prevent serious complications. Surgical revision remains the gold standard, providing superior outcomes compared to conservative management. Future research should explore the long-term efficacy of endovascular treatments.

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