

# Outcomes Analysis of the Pluripotential Antecubital Vein Dialysis Fistula

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## Introduction

The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF KDOQI) guidelines recommend native vein arteriovenous fistula (AVF) as the first option for patients requiring hemodialysis access.<sup>1</sup> The forearm fistula should be considered first. However, some patients are limited to upper arm fistulas for a variety of reasons including poor forearm vasculature or prior failed forearm accesses. It is recommended that patients with large upper arm veins undergo cephalic vein fistula (CVF) or basilic vein transposition (BVT) fistula.<sup>2</sup> We focused on patients requiring upper arm hemodialysis access presenting with borderline superficial upper arm vein diameters, resulting in a more complex treatment plan.

Pluripotential antecubital vein fistula (PAF) may be shown to be a reliable treatment option for these patients by allowing arterialization of both the cephalic and basilic veins simultaneously. Gracz et al was the first to describe a PAF in 1977.<sup>3</sup> Since then, several modifications to this original report have been published. We studied a single surgeon's outcomes of PAFs specifically for patients with borderline basilic and cephalic vein diameters. To our knowledge, this is the first report using this strategy for borderline vein diameters.

## Methods

- Retrospective analysis of a single surgeon's (MW) experience with 115 PAFs created from April 2004 to November 2011, using a prospectively maintained patient database.
- Patients were selected on the basis of (1) not being a candidate for lower arm fistula, (2) having borderline vein diameters of both the cephalic and basilic veins, defined as 3-4mm, and (3) not having severely calcified arteries.
- Primary outcome was time to fistula release (TR). This was defined as the time from the date of PAF creation to the date that the fistula was released for hemodialysis access.
- The criteria for release were based on a vein diameter of greater than 6mm, a vein depth less than 6mm, greater than 8cm of usable length, and physical exam demonstrating an acceptable thrill.
- Additional surgical procedures after original placement of the PAF were recorded. These were separated into second stage procedures and maintenance interventions. Maintenance interventions were defined as procedures performed to maintain patency of the fistula, and included percutaneous transluminal angioplasty (PTA), PTA with stent, and mechanical thrombectomy. Maintenance procedures were used to calculate primary assisted patency.
- Second stage procedures were definitive procedures that decreased the venous outflow pathway to a single vein. These were not used to compute patency rates.
- One-year primary patency and one-year primary assisted patency were defined according to Society for Vascular Surgery reporting standards.<sup>4</sup> Analysis of patency was limited to patients who had documented one year follow-up.

## Surgical Technique

We define PAF broadly as a surgically created fistula in the antecubital fossa using a native vein and artery designed to arterialize multiple venous outflow pathways with the intention that either a combination or the best venous outflow will be used to access the fistula. PAF configurations in this analysis were AVFs created in the antecubital fossa between the antebrachial vein/deep perforating vein branch and the brachial/proximal radial artery with an end to side anastomosis (figure 1). This technique closely resembles that described by Konner<sup>5</sup> and Miller.<sup>6</sup> Dual outflow was intended to flow preferentially through both the upper arm cephalic and basilic veins (figure 2). The deep venous system was not disrupted and there was no retrograde component draining into the forearm.

Second stage procedures were all performed by the same surgeon (MW) with the exception of one (GL). Second stage procedures were defined as superficialization (S), branch ligation (BL), BVT, and mixed basilic vein transposition (mBVT). mBVT was carried out in similar fashion as BVT, except the transposed basilic vein was anastomosed end-to-end to the distal cephalic vein stump preserving the original anastomosis.<sup>6</sup> All second stage procedures resulted in reduction of multiple venous pathways to single vein outflow.

Figure 1. PAF Configuration<sup>6</sup>

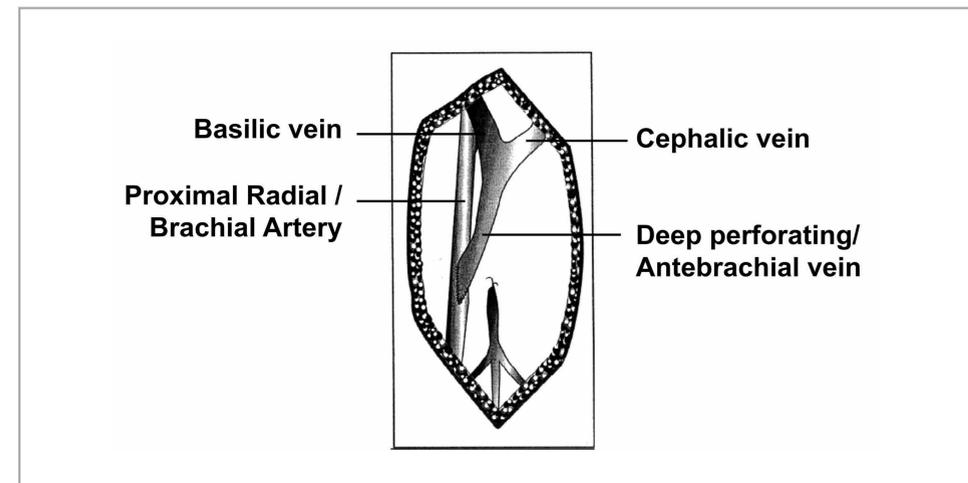
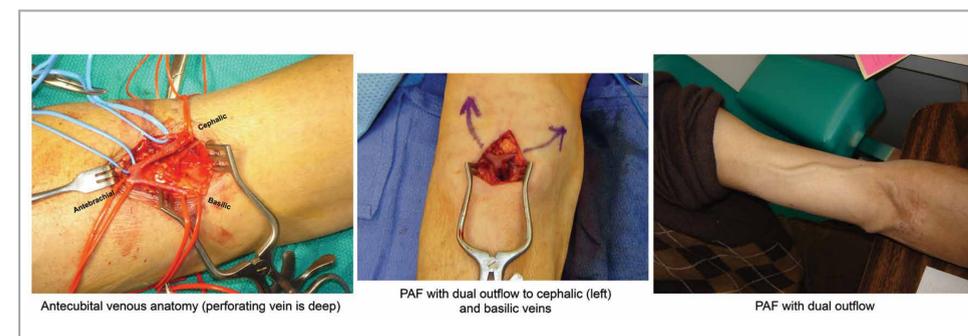


Figure 2. PAF



## Results

Table 1.

DEMOGRAPHICS	
Age (years, mean±stdev.)	62±16 (18-91)
Females	70 (60.8%)
Coronary Artery Disease	73 (63.5%)
Hypertension	95 (82.6%)
Diabetes	54 (47%)
Congestive Heart Failure	23 (20%)

Table 2. Time to Release (TR)

Configuration	N (%)	Mean (days, mean±stdev.)
PAF	19 (19.6)	64±26
CVF	31 (32.0)	106±59
BVT	47 (48.5)	163±101

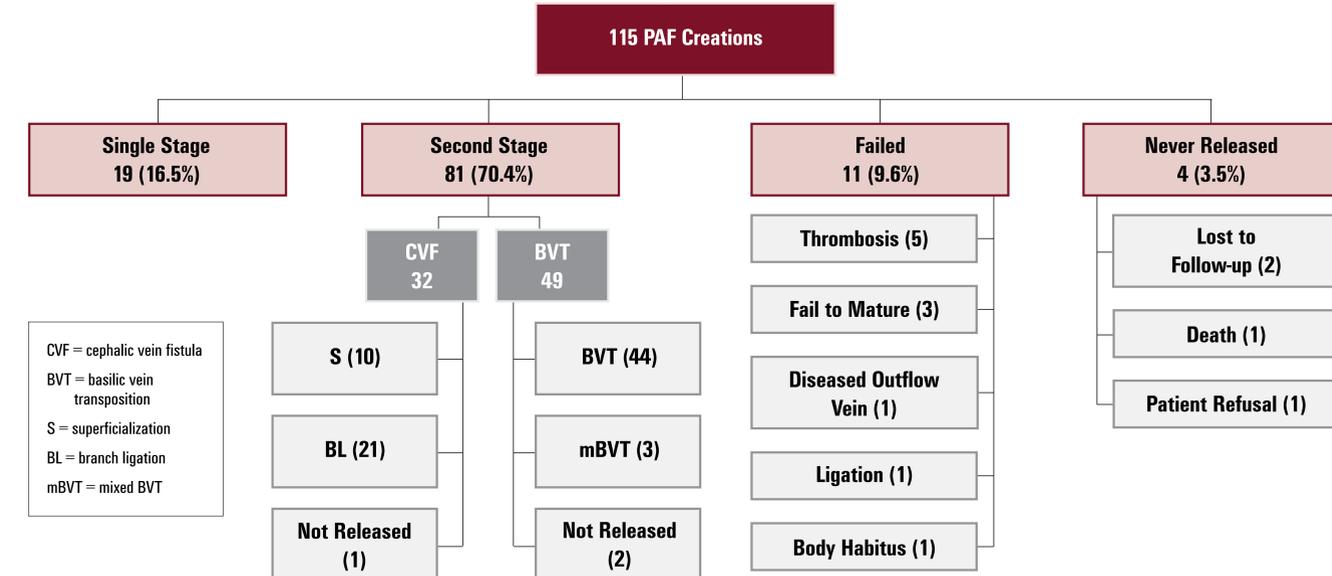
Figure 4. Overall Yield and Patency

97/115 PAFs had a TR and thus successful PAF (84.3%)

One-year follow-up was documented in 66/97 (68%)

- One-year primary patency was 35/66 (53%)
- One-year primary assisted patency was 100%

Figure 3.



## Conclusions

- PAF is a useful technique for borderline vein diameters, and resulted in a usable access 84.3% of the time.
- While nearly half the patients required maintenance procedures, one-year primary assisted patency was 100%.

## References

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This study was approved by the Beaumont Health System Institutional Review Board, The Human Investigation Committee.