



# American Journal of Anesthesia & Clinical Research

Clinical Study

## Logistic Challenges in Renal Access Salvage - ②

**Kristy Kehoe, Kirsty Hudson, Joanna Janczyk, Sharon Yen Ming Chan, Ben Cooper and Bryce Renwick\***

*Department of Vascular Surgery, Aberdeen Royal Infirmary, Scotland, UK*

**\*Address for Correspondence:** Bryce Renwick, Consultant Vascular and Endovascular Surgeon, Aberdeen Royal Infirmary, Scotland, UK, ORCID: [orcid.org/0000-0002-1714-0718](https://orcid.org/0000-0002-1714-0718);  
E-mail: [brycie@doctors.net.uk](mailto:brycie@doctors.net.uk); [b.renwick@nhs.net](mailto:b.renwick@nhs.net)

**Submitted: 28 February 2018; Approved: 08 March 2018; Published: 10 March 2018**

**Cite this article:** Kehoe K, Hudson K, Janczyk J, Ming Chan SY, Renwick B, et al. Logistic Challenges in Renal Access Salvage. *Am J Anesth Clin Res.* 2018;4(1): 001-003.

**Copyright:** © 2018 Renwick B, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



## ABSTRACT

**Objective:** To elicit the efficacy of hybrid thrombectomy procedures for renal access salvage.

**Background:** Fistula thrombosis is a well recognised complication of patients undergoing haemodialysis. Salvage of thrombosed fistulae requires urgent intervention. Hybrid thrombectomy and fistuloplasty procedures require the coordinated efforts of the anesthetic, interventional radiology and vascular surgical teams.

**Methods:** All emergency renal access referrals made to a renal access unit over a 12 month period were analysed. 21 patients in total underwent a combined or hybrid thrombectomy of thrombosed fistula.

**Results:** We found that prosthetic graft thrombosis accounted for the majority of thrombosed fistulae and moreover, were much more likely to re-thrombose following salvage relative to primary vein fistula. The number of patients subsequently undergoing dialysis on the same fistula successfully at 3 and 6 months dropped significantly.

**Conclusion:** When combined with significant re-intervention rate, these findings are suggestive of a need for enhanced renal access surveillance, more so in prosthetic grafts.

**Keywords:** Hybrid thrombectomy; Renal Salvage; Haemodialysis

## INTRODUCTION

Provision of durable and effective Haemodialysis (HD) access is a key component of the vascular surgical service. Whenever possible, HD should be provided through Arteriovenous Fistulae (AVF) to avoid the complications of Central Venous Catheters (CVCs). The use of CVCs is associated with increased incidence of bacteremia, line thrombosis and central venous stenosis and comes with a significant human and economic cost [1].

While the majority of radiocephalic and brachio-cephalic fistulae mature and run without incident, a significant minority will develop problems [2]. Patients may have one of a few patterns of fistula problem. The first type is the slowly failing fistula presenting with poor clearance on dialysis and high fistula pressures. If identified early, these can be treated on an outpatient basis, usually with fistulography and fistuloplasty. The cause is usually venous outflow tract stenosis [3]. The second type of problem is more difficult to treat; the acutely thrombosed fistula. This may be the consequence of untreated outflow tract stenosis, intercurrent illness, dehydration changes to dry weight or idiopathic. These patients require urgent surgical thrombectomy, usually under general anaesthesia, followed by fistulography to identify and treat the cause [4].

A further complicating factor is represented by patients with prosthetic HD grafts. These are patients in whom peripheral veins have been exhausted and a synthetic AV conduit has been placed. Such grafts are only utilized in patients with deficient venous anatomy. These grafts are known to have an especially high rate of thrombosis, although are still eminently preferable to CVC use [3].

Such hybrid thrombectomy and fistuloplasty procedures require the coordinated efforts of the anaesthetic, interventional radiology and vascular surgical teams. We estimate that every hybrid fistula salvage engages the emergency teams for 2-3 hours, with a knock-on delay effect for patients requiring limb salvage or carotid procedures. As a busy renal access unit in a university teaching hospital, we sought to examine the staffing and logistical impact of maintaining problem fistulae. The performance of the main Scottish renal units is recorded by the Scottish Renal Registry and, whilst our department maintains a reasonable rate of native renal access, we sought to improve avenues of fistula salvage [5]

## MATERIALS AND METHODS

All emergency referrals to the acute vascular team are diarized and were analyzed over a 12 month period. Patients referred with an established fistula with an acute problem were identified. Patients requiring urgent primary renal access and those with non-maturing tissue grafts were not included. All clinical information and vascular lab ultrasonography results were notarized. Clinical outcomes were obtained for all such patients.

## RESULTS

During the 12 month study period, a total of 21 hybrid fistula salvage approaches with combined interventional radiology and surgical input were noted. 10 men and 11 women were accounted for with an average age at time of procedure of 61.5 years.

Of these patients, 13 involved prosthetic grafts, in keeping with a higher thrombosis rate in this cohort of patients described across the literature (see figure 1).

The average age of fistula at time of thrombosis was found to be 3 years and 2 months. 1/3<sup>rd</sup> of patients affected by thrombosed fistula in this study were dialysing on their very first fistula. 5 patients within the study had a history of 5 or more attempts at fistula formation (see figure 2).

Our immediate success rate was found to be 81%, with 4 cases abandoned on the table. The one and six month success rates, defined

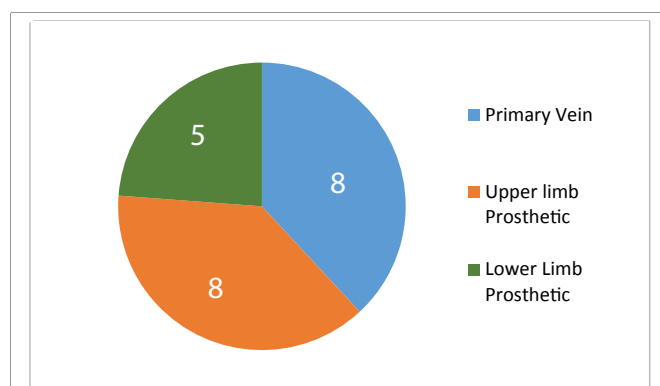


Figure 1: Distribution of graft type requiring salvage.



as an adequately dialysing fistula, dropped significantly to 57% and 33% respectively (see figure 3).

Of note, the proportion of patients who had suffered a previous thrombosis within the graft of interest was found to be 66.7%. Moreover, 47.6% of patients who underwent thrombectomy in

this study have since required additional thrombectomy. Of those requiring repeat intervention, 90% involved prosthetic grafts.

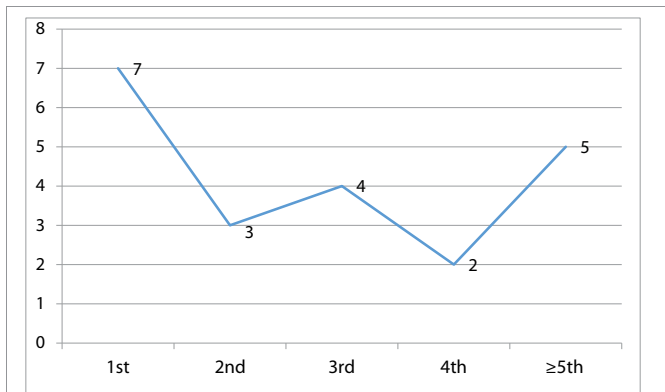
### DISCUSSION

These results show the impact to the vascular receiving team posed by patients with problematic fistulae. As well as the impact on dialysis efficacy, a problematic fistula causes knock-on effects to the renal teams, vascular lab, vascular receiving team, interventional radiology service and theatre teams. We estimate that a complicated fistula requires 30 minutes of vascular lab time, whilst a fistuloplasty can occupy 1-2 hours of interventional radiology time. If combined surgical thrombectomy is required then this can require the services of the surgical and anaesthetic teams for 2-3 hours.

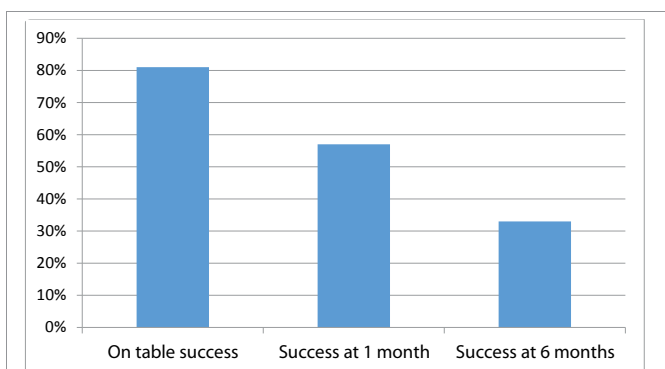
According to the Scottish Renal Registry report, during 2012-16 a total of 280 patients started renal replacement therapy within our renal unit [3]. Whilst the majority of fistulae run smoothly, a minority of patients can be expected to have a higher risk of complications. These patients are those with a history of multiple temporary dialysis lines, previous fistula re-intervention, and those with prosthetic interposition AV grafts. In light of our findings, an enhanced surveillance of high-risk fistula patients is probably justified. We believe a focused ultrasound surveillance program of these patients is indicated. This will hopefully identify patients in a pre-thrombotic phase of fistula problems such that they avoid the need for surgical thrombectomy and can be treated by primary fistuloplasty.

### REFERENCES

1. Frankel A. Temporary access and central venous catheters. *Eur J Vasc Endovasc Surg.* 2006; 31: 417-422. <https://goo.gl/AQ8a4r>
2. Fokou M, Teyang A, Ashuntantang G, Kaze F, Eyenga VC, Chichom Mefire A, et al. Complication of arteriovenous fistula for haemodialysis: *Ann Vasc Surg.* 2012; 26: 680-684. <https://goo.gl/wS8vVw>
3. Padberg FT Jr, Calligaro KD, Sidawy AN. Complications of arteriovenous hemodialysis access: Recognition and management. *J Vasc Surg.* 2008; 48: 55-80. <https://goo.gl/JyNpCY>
4. Inston N, Al Shakarchi J, Khawaja A, Jones R. Maintaining patency of vascular access for haemodialysis. *Cardiovasc Eng Technol.* 2017; 8: 240-243. <https://goo.gl/MrBrzp>
5. NHS Scotland. Scottish renal registry report. 2016: <http://www.srr.scot.nhs.uk/Publications/Other.html>



**Figure 2:** Line graph demonstrating distribution of fistula thrombosis event by the chronology of fistulas in each patient, y-axis demonstrates the number of patients within the cohort, x-axis the chronology of the fistula complicated by thrombosis.



**Figure 3:** Success rate of fistula at intervals following intervention.