

Surgery for Chronic Renal Failure Patients: Trends, Outcomes and Complications

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Background: Vascular access surgery is needed for chronic renal failure patients who require regular hemodialysis to sustain their lives. Access surgery could be central line, graft fistula and native arteriovenous fistula (AVF), the latter has the best outcome in terms of least complication and durability. Therefore, hemodialysis through an AVF should be the main target in hemodialysis centers.

Objective: To evaluate the trends of access surgery, its outcome and complication rate.

Design: A Retrospective Descriptive Study.

Setting: Hemodialysis Centers, Ministry of Health, Kingdom of Bahrain

Method: Three hundred six chronic renal failure patients were receiving regular hemodialysis until 15 May 2014 were included in the study. All the necessary data were collected through the Dialysis Access Nurse Coordinator. A specific modulated questionnaire was designed for this study.

Result: Three hundred six chronic renal failure patients are on regular hemodialysis until 15 May 2014. One hundred thirty-two (43.1%) were more than 60 years, and one hundred twenty-six (41.2%) were between 40 and 60 years. One hundred eighty-nine (61.8%) were receiving dialysis through AVF, eighty-five (27.7%) through central lines and thirty-two (10.5%) through graft fistulae. Fifty-seven (18.6%) patients were started on hemodialysis by fistula first. Twenty-eight (9.2%) patients had vascular access related complications; the most common was aneurysm.

Conclusion: The trends and outcome of the hemodialysis access surgeries in the studied population are consistent with the Kidney Disease Outcome Quality Initiative (KDOQI) guidelines. The main complication was arteriovenous aneurysm formation.

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Creation of a vascular access in chronic renal failure patients who need regular dialysis is mandatory to maintain their lives. A vascular access that could be connected to a hemodialysis machine can be a central line, an AVF or a synthetic graft fistula. Among them, the AVF carries

the lowest complication rate and the best functional outcome; therefore, it should be the main target in vascular access surgery procedures¹⁻³. Creating a native fistula in patients predicted to have dialysis in the near future, fistula first, is a valuable goal for nephrologists to avoid central line complications⁴.

It was observed that an increasing number of renal failure patients need vascular access surgery. An access clinic, as well as an access nurse coordinator have been established to manage and follow-up the ever increasing number of these patients.

The aim of this study is to evaluate the trends of access surgery, its outcome and complication rate.

METHOD

Three hundred six chronic renal failure patients were receiving regular hemodialysis until 15 May 2014 were included in the study.

All the necessary data were collected through the Dialysis Access Nurse Coordinator. A specific modulated questionnaire was designed for this study.

RESULT

Three hundred six chronic renal failure patients were on regular hemodialysis until 15 May 2014. One hundred thirty-two (43.1%) patients were more than 60 years old, and 126 (41.2%) were between 40-60 years. One hundred eighty-nine (61.8%) were receiving dialysis through AVF, 85 (27.7%) through central line and 32 (10.5%) through graft fistula. Fifty seven (18.6%) patients were started on hemodialysis by fistula first, see tables 1 and 2, figures 1 and 2. Twenty-eight (9.2%) patients had vascular access related complications; the most common was aneurysm, see table 3, figures 3 and 4.

Table 1: Characteristics of Hemodialysis Patients

Characteristics	Number and Percentage	
Age	<20 years old	7 (2.3%)
	20-40 years old	41 (13.4%)
	40-60 years old	126 (41.2%)
	>60 years old	132 (43.1%)
	Total	306 (100%)
Gender	Male	163 (53.3%)
	Female	143 (46.7%)
	Total	306 (100%)
Fistula First	No	249 (81.4%)
	Yes	57 (18.6%)
	Total	306 (100%)
Vascular Access	A-V Fistula	189 (61.8%)
	Central Line	85 (27.7%)
	Graft Fistula	32 (10.5%)
	Total	306 (100%)

Table 2: Rate of Failure

Failure of Fistula	Number and Percentage
Primary Failure	37 (12.1%)
Secondary Failure	17 (5.6%)
Total	54 (17.7%)

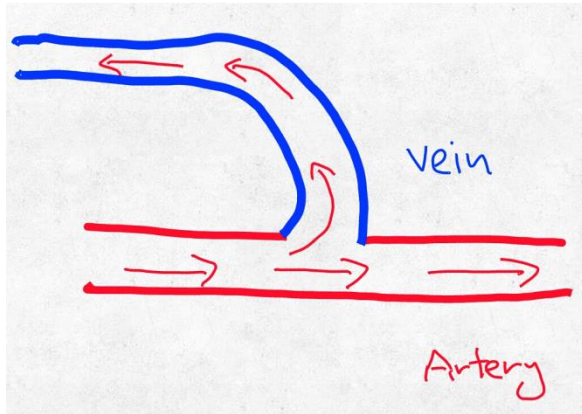


Figure 1: AV Fistula at Time of Creation

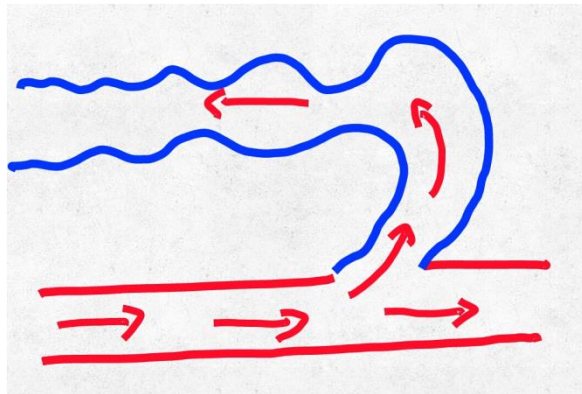


Figure 2: AV Fistula after 6-8 Weeks from Creation

Table 3: Prevalence of the Complications among Hemodialysis Patients

Complication	Number and Percentage
Infection	1 (3.6%)
Steal Syndrome	8 (28.6%)
Aneurysm	10 (35.7%)
Venous Hypertension	6 (21.4%)
Others	3 (10.7%)
Total	28 (100%)

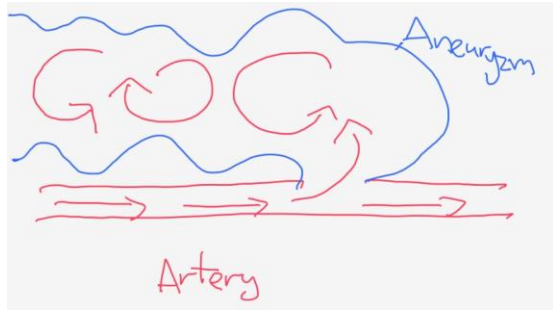


Figure 1: Aneurysm Formation



Figure 4: An Aneurysm in a Native AV Fistula

DISCUSSION

End-stage renal disease patients need to have regular hemodialysis or peritoneal dialysis to maintain their lives. In hemodialysis, a vascular access is needed to connect the patient to the hemodialysis machine. AVF is the best available access because it has the lowest complication among other access surgeries, particularly infection⁵⁻⁷. It also has a higher patency rate than graft fistula⁸. In AVF, an anastomosis is done between a vein and an artery. In six to eight weeks time, the vein increases in diameter, its wall becomes thicker and the rate of flow increases and it then becomes suitable for puncturing for dialysis.

In this study, the majority of the patients 189 (61.8%) were dialyzed through AVF. This is lower than the KDOQI guidelines published in 2006 which recommended that at least 66% of the hemodialysis should be through a native AV fistula⁵.

A study conducted in Qatar by Fituri et al revealed that 57% of the patients had dialysis through a native AV fistula⁹. Moreover, the prevalence of AVF in most European, Japanese and Australian patients was between 67-91%, while in the United States it was only 47%¹⁰. Fifty-seven (18.6%) patients had fistula first.

Primary fistula failure was defined as “failure of fistula to mature and thus never been used”, while secondary failure was defined as “failure of fistula to be functional after at least 6 weeks of hemodialysis usage”¹¹. Primary fistula failure was encountered in 17 (5.6%) patients, which is

lower than the range of primary fistula failure (12.7%-18.3%) reported in Rooijens et al meta-analysis¹². While secondary failure of fistula was encountered in 37 (12.1%) patients; this figure is lower than that found in an Iranian study (18.1%) conducted by Roozbeh et al in 2006¹².

Twenty-eight (9.2%) patients had complications. We found that aneurysms are the most common complications, which have been seen in 10 (35.7%) patients. This is consistent with a study in Iran by Derakhshanfar et al in which aneurysms were also found to be the most common complication with a rate of 51%¹³.

The patency rate could not be evaluated in this study, because a prospective study design is needed for accurate assessment.

CONCLUSION

In this study, vascular access surgery is consistent with the KDOQI internationally accepted guidelines. AV aneurysm formation is the major complication in the studied population. Prospective study design is needed to elicit the causes of vascular access failure as well as to evaluate the patency rates of vascular access. The presence of an access nurse coordinator and an access clinic are important elements for better vascular access surgery in busy centers.

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