Original Research

Study On Efficacy of colour doppler ultrasound(CDUS) In dysfunctional hemodialysis arterio-Venous fistula

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ABSTRACT:
Background: For patients receiving persistent haemodialysis, maintaining effective vascular access is a critical concern. The preferred vascular access for hemodialysis is an arteriovenous fistula (AVF) made from native veins. At equivalent flow rates, the AVF is linked to a lower incidence of problems and longer survival than prosthetic grafts or central venous catheters. Thus, the purpose of the current study was to evaluate the efficiency of colour Doppler ultrasound (CDUS) in the treatment of arterio-venous fistulas associated with dysfunctional hemodialysis. **Materials &Methods:** The goal of the current study was to evaluate the efficacy of color Doppler ultrasound (CDUS) in treating arterio-venous fistulas associated with dysfunctional hemodialysis. Twenty patients in all were enrolled. Prior to US inspection, each patient had their dialysis access evaluated clinically. The patient is often positioned supine, with the arm relaxed and extended out to the side, with the area being assessed closest to the sonographer, for DU exams. Arterio-venous fistula in a dysfunctional hemodialysis patient using color Doppler ultrasonography (CDUS). Additionally performed for evaluation was digital subtraction angiography. SPSS software was used to record and evaluate each outcome. **Results:** The stenotic region has a 1.5 mean diameter. The mean prestenotic and interstenotic velocities were 71.5 and 246.2, respectively. Comparing CDUS to DSA (digital subtraction angiography), the sensitivity and specificity of CDUS for the detection of substantial stenosed vessel segments were 95.6 percent and 97.2 percent, respectively.**Conclusion:** The monitoring of the blood flow through the AVF and the identification of potential reasons for vascular access dysfunction are both made feasible by CDUS, a non-invasive diagnostic tool for early diagnosis of problems of AVFs.

Key words: Hemodialysis, Colour Doppler Ultrasound

INTRODUCTION

Maintaining reliable vascular access is a crucial problem for patients receiving continuous haemodialysis. The emergence of haemodialysis access stenosis and concomitant thrombosis is one of the major reasons of morbidity and frequent hospital hospitalizations. The usable life of haemodialysis fistulae and grafts can be increased by rapidly identifying and treating stenoses to prevent access thrombosis. A preferred method of access surveillance is to measure access flow rates using an ultrasonic dilution technique. A flow decrease with serial readings suggests the onset of a flow limiting stenosis. Then, vascular access can be evaluated in order to detect these stenoses using a variety of imaging modalities, such as color Doppler ultrasonography, contrast-enhanced magnetic resonance angiography (CE-MRA), multi-detector computed tomography angiography, and digital subtraction angiography (DSA). 1- 3 Anarteriovenous fistula (AVF) created using native arteries is the preferred vascular access for hemodialysis. The AVF is associated with a lower incidence of issues and a longer survival than prosthetic grafts or central venous catheters at comparable flow rates. However, because advanced age and co-morbidities like diabetes mellitus and vascular disease are becoming more common among dialysis patients, nephrologists and vascular surgeons are finding it harder and harder to find native vessels suitable for the creation of a well-functioning, persistently patent AVF. The use of Doppler ultrasound (DUS) by surgeons doing vascular access surgery has extended the number of circumstances in which AVFs can be constructed with native vessels by enabling preoperative mapping and identification of eligible vessels.4- 7 The current investigation was

carried out to find out if colour Doppler ultrasonography (CDUS) is helpful in treating dysfunctional hemodialysis arterio-venous fistulas.

MATERIALS & METHODS

The goal of the current study was to evaluate the efficacy of color Doppler ultrasound (CDUS) in treating arterio-venous fistulas associated with dysfunctional hemodialysis. Twenty patients in all were enrolled. Prior to US inspection, each patient had their dialysis access evaluated clinically. The patient is often positioned supine, with the arm relaxed and extended out to the side, with the area being assessed closest to the sonographer, for DU exams. In cases of steal syndrome, examinations included the afferent artery, the anastomosis site, the draining veins up to the subclavian vein, and the arterial tree distal to the AVF. Gray-scale and color photographs were used to assess all vessels in both transverse and longitudinal planes. Arterio-venous fistula in a dysfunctional hemodialysis patient treated with color Doppler ultrasound (CDUS).Additionally performed for evaluation was digital subtraction angiography. SPSS software was used to record and evaluate each outcome.

RESULTS

Twenty patients in all were enrolled. The patients were 41.9 years old on average. cases made up 80% men, with the other cases being women. Out of 20 patients with issues identified by Color Doppler ultrasound, brachiocephalic, radiocephalic, and brachiobasilic fistulas were present in 55%, 25%, and 20% of the patients, respectively. Ten percent of the patients had a prior history of AVF. 40 percent of the patients had stenosis, compared to 5 percent who had venous thrombosis or aneurysmal dilatation. Ten percent of the patients experienced pseudo-aneurysmal development, while five percent of the patients experienced infection. The stenotic region has a 1.5 mean diameter. Mean pre-stenotic and interstenotic velocities were respectively 71.5 and 246.2. Comparing CDUS to DSA (digital subtraction angiography), the sensitivity and specificity of CDUS for the detection of substantial stenosed vessel segments were 95.6 percent and 97.2 percent, respectively..

Table1: Color Doppler ultrasound detected complications

Color Doppler ultrasound detected complications	Number of patients	Percentage
Brachiocephalic fistula	11	55
Radiocephalic fistula	5	25
Brachiobasilic fistula	4	20
Total	20	100

Table2: Mean diameter of Stenoticarea, Pre-stenotic velocity and Mean inter stenotic velocity

Variable	Mean	SD
Mean diameter of the stenotic area	1.5	0.5
Mean Prestenotic velocity	71.5	21.6
Mean interstenotic velocity	246.2	47.6

Table3: Sensitivity and specificity of CDUS for detection of significant stenosed vessel segment in comparison to DSA(digital subtraction angiography)

Variable	Value
Sensitivity	95.6%
Specificity	97.2%
Positive predictive value	91.6%
Negative predictive value	94.8%
Accuracy	94.8%

DISCUSSION

For their long-term survival and quality of life, hemodialysis (HD) patients with chronic end-stage renal failure depend on adequate dialysis administered through an appropriately positioned vascular access. An arteriovenous fistula (AVF), which has a longer patency than artificial arteriovenous grafts, is the preferred initial HD access. However, arteriovenous grafts continue to be extremely important in clinical practice for individuals for whom AVFs are not a possibility and possibly for specific demographics, such as elderly people. Creating and maintaining a healthy AVF has become a serious problem for nephrologists and vascular surgeons. Complications with HD vascular access are regarded to be one of the major causes of morbidity in patients with end-stage renal disease. Anastomotic or outflow venous stenosis is the most frequent cause of thrombosis, which results in access failure. Numerous salvage actions are required in order to restore functionality or build a new access. With early detection of access dysfunction and subsequent correction, the rate of access failure may be decreased. AVFs can be easily accessed by Doppler ultrasound (DU), as they are

designed to be superficial. DU is essential in a VA assessment that is patient-centered. It is portable, reasonably priced, and non-intrusive, and it provides morphologic and functional information on the access flow. In addition to other aspects of vascular access treatment, it can provide vascular mapping, maturation assessment, and surveillance.8–10 To assess the effectiveness of colour Doppler ultrasonography (CDUS) in treating arterio-venous fistulas linked to dysfunctional hemodialysis, the current study was carried out.There were a total of 20 patients enrolled. The patients were, on average, 41.9 years old. Men made up 80% of the cases, with women making up the remaining 20%. Brachiocephalic, radiocephalic, and brachiobasilic fistulas were found in 55%, 25%, and 20% of the 20 individuals with problems detected by Colour Doppler ultrasound, respectively. 10% of the patients have previously experienced AVF. In contrast to the 5% of patients who had venous thrombosis or aneurysmal dilatation, 40% of the patients had stenosis. The relationship between artery sizes and AVF results in radial-cephalic fistulas has been researched. It was demonstrated that immediate (on the day of surgery) and early (within the first 8–12 weeks following surgery) AVF failures were quite prevalent when small-caliber (1.5–1.6 mm) arteries were used to construct the fistula. Malovrh et al. showed immediate and early failure rates of 55 and 64%, respectively, when the arteries used had diameters of 1.5 mm, however substantially lower rates (8 and 17%, respectively), were noted when the artery diameters were >1.5 mm. Parmar et al. found a 46% early failure rate for arteries smaller than 1.5 mm, but failures were not detected for vessels larger than 1.5 mm.7- 11In the current study, 5% of patients had an infection, whereas 10% of patients developed pseudo-aneurysms. The typical diameter of the stenotic area is 1.5. Comparing CDUS to DSA (digital subtraction angiography), the sensitivity and specificity of CDUS for the detection of significant stenosed artery segments were 95.6 percent and 97.2 percent, respectively. Mean pre-stenotic and interstenotic velocities were, respectively, 71.5 and 246.2.Wong et al. observed premature failures in all of the AVFs created using arteries with diameters smaller than 1.6 mm. Radial diameters of AVFs that failed were 1.9 mm, while preoperative diameters of patent fistulae were 2.7 mm. A 2 mm minimum diameter was linked to an 8% early failure rate and an 83% 1-year primary patency rate, according Silva et al.'s research.7-11

CONCLUSION

A non-invasive diagnostic instrument called CDUS enables for the monitoring of the blood flow through an AVF and the identification of potential vascular access malfunction causes.

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