



Continuing arteriovenous fistula creation by nephrologist and its outcome during COVID pandemic—Analysis of 376 cases

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Abstract

There has been a significant reduction of elective surgeries including creation of arteriovenous fistulas (AVF) during the ongoing pandemic by the surgeons. Here, we report the retrospective observational data of AVF creation by nephrologists in a single center, during a period of 8 months. A total of 376 fistulae were created in 310 patients. Patients were followed up at 2, 6, and 12 weeks. Twenty-eight patients required fistula creation twice, 16 patients thrice, and two patients underwent fistula creation four times. Of the total, 259 (68.8%) fistulae were radio-cephalic while 99 (26.3%) and 18 (4.79%) were brachio-cephalic and brachio-basilic, respectively. A total of 207 (67%) patients were already on hemodialysis whereas 103 (33%) were planned for elective initiation after fistula maturation. Of the 211 (69%) patients who completed 3 months of follow-up, 31 (15%) expired and 7 (3.3%) were lost to follow-up. Primary failure was observed in 70 (33.2%) fistulae. Fifteen (7.1%) patients were noted to be COVID positive during the follow-up. A total of 279 (90%) patients were alive at last follow-up. Amongst 20 dialysis staffs with 10 nephrologists, only two have developed COVID. Both were having mild illness and recovered completely. This study demonstrates that AVF creation can be performed safely with careful screening and by using adequate personal protective equipment.

There has been a significant reduction in elective surgeries including creation of arteriovenous fistulas (AVF) during the COVID-19 pandemic. Here, we report the retrospective data of AVF creation by nephrologist, during a period of 8 months from 1st March 2020 to 31st October 2020. AVF creation is the cost-effective modality of vascular access compared to arteriovenous graft (AVG) or central venous catheter (CVC).

All fistulas were created by nephrologist under local anesthesia after B-mode ultrasound and Doppler assessment of arteries and veins in both upper extremities. The cut-off diameter for both artery (radial and brachial) and vein (cephalic and basilic) were 2 mm. All patients were screened for history of fever, cough, rhinorrhea, loose

stools, breathlessness, and contact with COVID positive patients. Screening was done twice, first at the time of ultrasound evaluation and then on the day of surgery. COVID reverse transcription polymerase chain reaction (RT-PCR) was only performed in suspect patients identified during the screening. Side-to-side anastomosis with 6–0 proline between artery and vein was performed. Every day, all nephrologist, nursing personals, and other staffs involved in fistula creation were screened for symptoms. Patients were followed up at 2, 6, and 12 weeks for assessment of AVF (Figure 1).

A total of 376 fistulae were created from 1st March 2020 till 31st October 2020 in 310 patients. Of them, 204 (66%) were males and 69 (22.3%) patients were having underlying diabetes mellitus. Of the total, 259 (68.8%) fistulae were radio-cephalic while 99 (26.3%) and 18 (4.7%) were brachio-cephalic and brachio-basilic, respectively.

Informed consents from the patients were taken.

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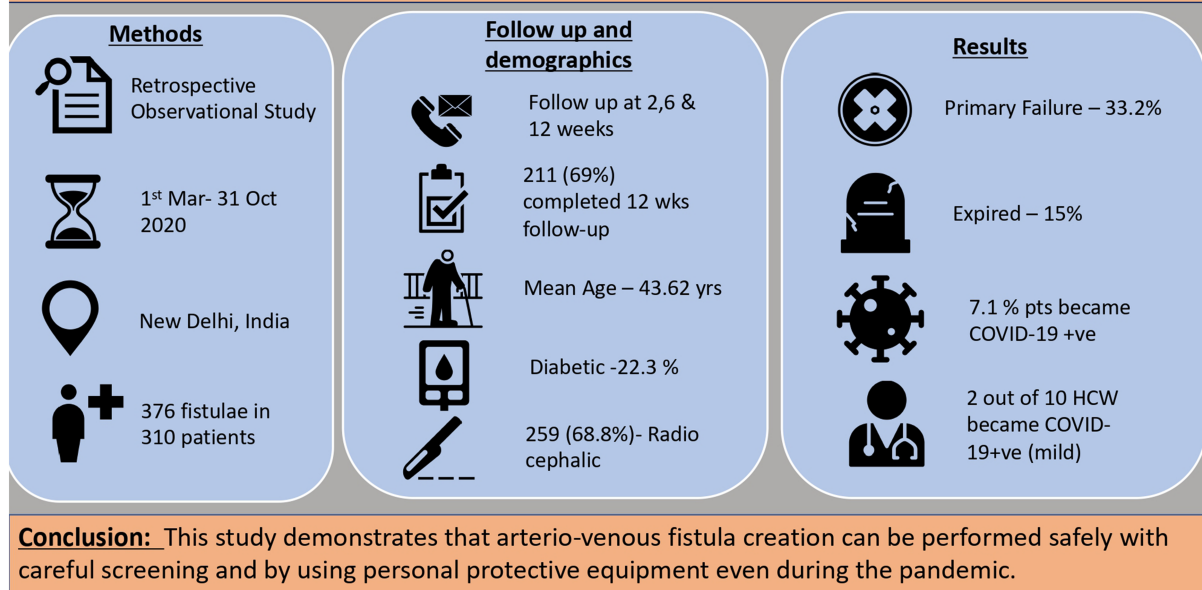


FIGURE 1 Study abstract is the captain

All the brachio-basilic fistulae were one-stage procedure only. Those brachio-basilic fistulae which were unfit to be cannulated were referred to Department of Vascular Surgery for second-stage procedure. Amongst these, 339 (90.1%) fistulae were left sided. Right side was selected whenever all the left-sided veins (cephalic or basilic) were unsuitable due to reasons of decreased size, thrombosis, or difficult course. A total of 207 (67%) patients were already on hemodialysis while 103 (33%) were planned for elective initiation after fistula maturation. A total of 205 patients had prior venous catheters and two had prior AVF. Of the 205 patients with prior venous catheters, seven had tunneled catheters whereas the rest 198 had non-cuffed catheters. A total of 28 patients required fistula creation twice (23 of them had prior radio-cephalic AVF followed by creation of brachio-cephalic fistula and five had prior brachio-cephalic fistula followed by creation of brachio-basilic fistula), eight patients required thrice (five had prior radio-cephalic and brachio-cephalic fistula followed by creation of brachio-basilic, three had prior radio-cephalic and brachio-cephalic fistula followed by creation of opposite side radio-cephalic), and two patients underwent fistula creation four times (one patient had left-sided radio-cephalic, brachio-cephalic, and brachio-basilic fistula followed by creation of right radio-cephalic fistula, and the second patient had left-sided radio-cephalic and brachio-cephalic and right-sided radio-cephalic fistula followed by creation of left-sided brachio-basilic fistula). Of the 211 (69%) patients who completed 3 months of follow-up, 31 (15%) expired and 7 (3.3%) were lost to follow-up. Primary failure was observed in 70 (33.2%) fistulae. Primary failure of fistula refers to those cases in which fistula never develops to the point that it can be used or fails within the first 3 months of usage.¹ In our study, we diagnosed primary failure

clinically along with Doppler findings. Any AVF that failed to satisfy the “rule of 6” was considered as primary failure.² There was a non-significant increase in primary failure rate in brachio-cephalic fistulas 17/49 (34%) as compared to radio-cephalic 47/160 (29%) ($p = 0.479$) similar to the study by Arnaoutakis et al.³ There was a higher proportion of patients with previous AVF in the brachial group (35.4% vs. 3.5%, $p < 0.001$). Some unknown etiology of previous AVF failure might be the cause for the increasing failure in the brachial group. Nineteen (9%) patients developed local site infection, and two (0.6%) patients had fistula rupture requiring admission. Fifteen (7.1%) patients were noted to be COVID positive during the follow-up. Of 15 COVID positive patients, five expired (three had mature AVF and two didn't complete follow-up). Rest of the 10 patients who survived, six had mature AVF, whereas one had primary failure and three didn't complete follow-up. In our cohort, there was no association between fistula maturation and COVID status. However, with only 15 positive patients, no definite conclusion could be made. A total of 279 (90%) patients were alive at last follow-up. Amongst 20 staff with four nephrologists and six residents involved in fistula creation and assessment, two had developed COVID over a period of 8 months. Both were having mild illness and recovered completely. Contact tracing performed was suggestive of COVID-19 exposure outside the workplace.

With onset of global pandemic of COVID-19, there is significant reduction in number of new AVF creations. Fistula is considered Achilles for hemodialysis patients. The American College of Surgeons has recommended postponing AVF and AVG placement for dialysis in end-stage kidney disease (ESKD), chronic kidney disease (CKD) 4, and CKD5 patients.⁴ Contrary to this, our observation shows that early

AVF creation is safe and is not associated with increase in failure rate with COVID infection. Furthermore, due to low socio-economic status, non-tunneled catheters are performed more compared to tunneled catheters which in turn may lead to increased catheter-related complications where the COVID pandemic is ongoing >1.5 years. Amongst hospitalized COVID-19 hemodialysis patients, mortality is observed to be 30%.⁵ Hence, it is essential to reduce number of hospital admissions in this patient sub-group. In systemic reviews of cohort studies, patients with catheters as vascular access have the highest risk of death, infection, and cardiovascular events whereas risk is least with functional AVF.⁶ In addition to catheter related blood stream infection (CRBSI) risk, this can lead to multiple hospital visits, admissions, and escalation of number of interventions such as removal and re-insertions of catheters, increasing risk of exposure to COVID-19. Creation of AVF is not aerosol generating procedure and can be safely performed under local anesthesia. Single setting arteriovenous assessment and fistula creation reduces risk of exposure to the patient. A drawback of our study was no detailed evaluation with thrombophilia workup nor any vascular interventions were done because of financial and logistical issues respectively because of the pandemic.

This is the largest experience of AVF creation by nephrologists which is not associated with significant hazards to healthcare workers or patients if done with strict screening using adequate personal protective equipment (PPEs). Hence, nephrologists need to continue creating AVF during these adverse situations. Similar to non-COVID period, involvement of vascular surgeons, cardiologists, and interventional radiologists is also essential in decreasing the primary failure rate.

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