



RESEARCH ARTICLE

HEMODIALYSIS ACCESS PROCEDURES IN PEDIATRIC PATIENTS WITH END STAGE RENAL DISEASE- OUTCOME ANALYSIS.

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Key words:-

HD catheter, av fistula, primary patency.

Abstract

Background: Arteriovenous fistulae (AVF) are the dialysis access modality of choice for patients with end stage renal disease (ESRD). Many children have poor vein caliber which renders them unsuitable for performing AV fistula and those end up in chronic tunneled hemodialysis catheter. The longer maturation time in children than that in adults and the technical difficulties imposed by small diameters of the vessels are other challenges in operation on pediatric patients.

Methods: Data collected from pediatric patients with endstage renal failure in whom HD access procedure was performed retrospectively and followed up and the following data were analyzed. study performed in Govt Omandurar Multi Super Speciality Hospital, Chennai. Affiliated to, The Tamilnadu Dr.M.G.R Medical University. Etiology of renal failure, time on dialysis, CKD history, and transplantation and type of HD access procedure, patency and functioning at 6 months for both were recorded. Patients of age 0 to 15 were included in this study, age was the only inclusion criteria.

Results: children with growth less than 50th percentile tend to have poor vein caliber with ending in chronic HD catheter. Pre operative and prior venepuncture was present in (80%) patients in whom further AV fistula was not feasible. Patients with renal failure secondary to obstructive uropathy were favoring creation of AV fistula. Patients with no prior history of ICU admission for volume overload had better feasibility of AVF creation. Average time of HD (Hemo Dialysis) catheter patency in 6 months was 92%. Primary patency of AV fistula was 85% in 6 months. Maturation rates and secondary failure was not evaluated in this study.

Conclusion: anatomic factors like vein diameter, prior venepuncture highly influence the type of HD access procedure. at 6 months chronic tunneled catheter had better patency than AV fistula. Proper education of the medical fraternity dealing with pediatric renal failure patients regarding these factor will help in long term functioning of the fistulas and patency of the HD catheter and survival.

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Introduction:-

Arteriovenous fistulae (AVF) are the dialysis access modality of choice for patients with end stage renal disease (ESRD) [1,2]. They are associated with a six-fold reduction in the risk of systemic sepsis [3] and lower all cause and cardiovascular mortality than tunneled central venous catheters (TCVCs) [4,5]. For this reason both the UK Renal Association and the Fistula First Initiative in the United States have set targets that two-thirds of incident haemodialysis (HD) patients should commence dialysis via an AVF [5,6].

Methods:-

Data collected retrospectively and followed up and the following data were analyzed. Etiology of renal failure, time on dialysis, CVC history, and transplantation and type of HD access procedure, patency and functioning at 6 months for both were recorded. Patients of age 0 to 15 were included in this study, age was the only inclusion criteria.

Etiology of renal failure was identified for each patient and then divided into one of five general categories: structural, glomerulonephritis, nephrotic syndrome, metabolic, and other. The creation of each fistula was performed by one of two surgeons, and the type of access created was surgeon-dependent. Vein mapping was performed on all patients and evaluated by each surgeon for suitability of vein size, and in general, the minimum size cutoff was 2.0 mm for forearm veins and 2.5 mm for upper arm veins.. All AVFs were performed with a standard end-to-side anastomosis with a continuous running monofilament suture. To decrease the vasospastic response from arterial clamping and vessel dissection, tourniquet occlusion was used for inflow control in selected cases. Loupe magnification was used in all surgical cases. An operating microscope was used by one of the two surgeons on a case-by-case basis as determined by artery size. Patients were seen routinely at 2 and 6 weeks postoperatively for an initial wound check and clearance for use of the fistula

For chronic tunneled hemodialysis catheter procedure, vein mapping was done to assess the feasibility of AV access and those patients who were not suitable for AV fistula were selected for catheter insertion. Surgery was performed under general anesthesia. And image intensifier was used to confirm the position and perform a fluorogram if necessary and aiding in positioning of the access wire. Hemodialysis was initiated on the same day of the procedure.

Results:-

The mean age of the patients in our study was 10.4y. Male and female were equal in number, totally 35 patients who underwent AV fistula were studied and included in the study. They were evaluated for patency in the 2nd and 6th week by physical examination. all the patient underwent brachiocephalic fistula with 3 patients undergoing brachio basilic with primary transposition . There were 3 AV fistula failure within 2 weeks and 2 within 6 months. Failure rate of AV fistula at 6 months interval was 15%. 12 patients had HD catheter insertion and at the end of 6 months and 1 patient had catheter occlusion necessitating removal. Patency rate at 6 months interval remained at 92%.

Factors favoring AV access procedures were

1. patients in whom HD not yet initialized, and with stable CKD. (15%)
2. absence of prior ICU admission for volume overload. (40%)
3. CKD secondary to obstructive uropathy (20%)
4. age >8 years. (25%)

Factors favoring HD catheter insertion.

1. clinically unstable patients with recurrent episodes of volume overload (5%)
2. associated cardiac pathology (5%)
3. multiple ICU admission for volume overload (15%)
4. secondary CKD following systemic illness. (20%)
5. patients with previous multiple access failure (50%)

infection rates in both group remained negligible with aseptic measures during procedure. hygienic practices in maintaining the HD catheter, directly influence the longevity of the catheter patency.

At the end of 6 months, HD catheter had better functioning capacity than AV fistula access,

Discussion:-

The primary patency rates in pediatric populations at 6 months to 2 years have been reported to be as approximately 50%-65%, which is similar to the results in adults [6,10-12]. A few recent studies are available showing the excellent outcomes in children [13]. Wartman et al. evaluated the outcomes of 101 AVFs and demonstrated primary and secondary patency rates at 2 years as 83% and 92%, respectively (14).

Although these documented outcomes are acceptable, some have considered the incidence of primary failure to be sufficiently high to be a barrier for AVF placement in children and adolescents. The longer maturation time in children than that in adults and the technical difficulties imposed by small diameters of the vessels are other reasons for a reluctance to create AVFs in children [11].

Based on such factors, CVCs have remained as the most commonly used access in children on chronic HD. As is With the success of Fistula First Breakthrough Initiative, the prevalence of native AVF was on the rise and the general perception with regard to AVFs had changed (14).

This study showed an acceptable incidence of primary failure. By undertaking careful preoperative evaluation and providing postoperative care, the risk of primary failure can be lowered. proper vein selection is required especially in small children. The patency rates achieved in this study were comparable to those in adult patients [17]. Thus, placement of AVFs in children and adolescents should be actively considered when a permanent vascular access for long-term HD is required.

Even though endovascular or surgical treatment was required to achieve maturation and early patency, mid- and long-term patency were maintained without the need for frequent interventions. During the first year after AVF creation, active surveillance and timely intervention are important to achieve a favorable outcome.

AVF creation should be considered primarily even in patients with plans for transplantation if a living donor is not available.

Weak arterial inflow and small vein diameter are inevitable in children. Several methods, such as the use of microsurgical techniques, have been attempted to overcome these difficulties and increase patency in small children. Bagolan et al. [10] reported that adoption of microsurgical techniques significantly lowered the primary failure rate. Even though we achieved comparable results to that study without using a microscope, we think microsurgical techniques are worth adopting in some subgroups of patients, such as those with low body weight [10,19,20].

Antiplatelet medications and cessation of anti-hypertensive medications were other methods recommended [16]. However, there are few evidences supporting the routine use of antithrombotic therapy. Preoperative duplex is one of the preferred methods to improve AVF maturation rates and highly recommended these days. It may improve outcomes of AVF, although not mandatory [21]. Further study with duplex results is needed to prove the importance of preoperative vein mapping in pediatric patients.

Many patients with failed AVFs were non-compliant to instructions and precautions due to age or mental retardation accompanying the original disease. During the early postoperative period, especially in a pediatric population, close supervision is required so as to not compress the AVF site by bending the arm for a long time. To achieve successful postoperative care and patient education levels, a multidisciplinary team that includes vascular surgeons, nephrologists, and HD nurses is important [15].

Limitations:-

Small study sample. Lack of statistical analysis. No long term follow up, absence of hypercoagulable work up. Were the limitations in this study.

Conclusion:-

Creation of AVF for HD in children has peculiar challenges different from adult AV fistulas. while anatomic factors like vein diameter, prior venepuncture, highly influence the type of access procedure possible. general condition of the patient and associated comorbidities highly influence the favorable type of HD access. maintaining asepsis during

the procedure and during hemodialysis helps in maintaining the patency of the hemodialysis catheter. proper education of the medical fraternity dealing with pediatric renal failure patients regarding these factors will help in long term functioning of the fistulas and HD catheter patency.

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