

## **Peritoneal Dialysis Using Guide Wire Inserted Femoral Vein Catheter**

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Acute renal failure is one of the common life threatening problems seen in childhood. Adequate and timely dialytic support is crucial. The convenience, simplicity and relative safety of peritoneal dialysis (PD) make it the preferred mode of dialytic therapy(1,2). The method of peritoneal access developed by Weston and Roberts(3) using a semi-rigid catheter surrounding a stylet is widely utilized for temporary peritoneal access. Complications related to the procedure like hemorrhage, viscus perforation and dialysate leak are more frequent when the procedure is used in infants and small children(4). A surgically placed Tenckhoff catheter can overcome some of the problems but its insertion needs expertise and general anesthesia and hence involves a delay in institution of dialytic therapy(5). Another method is to

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insert a catheter over a guide wire so as to prevent stylet induced injuries. This method initially described in adults(6), has also been used in neonates and infants(7). These specialized catheters are not freely available in our country. In this report we describe our experience with the use of a guide wire inserted femoral vein catheter for peritoneal dialysis in infants and young children.

### **Subjects and Methods**

A total of 25 peritoneal dialyses were done in 15 infants and children (age <5 yrs) by this method during July to October 1994.

#### *Technique of Catheter Insertion*

The abdomen was cleansed and appropriately draped. An area in the midline, about one-third of the distance from the umbilicus to the symphysis pubis was infiltrated with 1% xylocaine. A sixteen gauge angiocath was used to enter the abdomen and needle was removed. A guide wire (0.035" diameter) was placed through the angiocath into the abdomen. A femoral vein catheter (Medcomp-pediatric) was threaded over the guide wire into the abdomen and directed to either iliac fossa, the catheter was secured with adhesive tape and dialysis initiated (Fig. 1). Peritoneal dialysis was done using dialysate containing acetate and dextrose concentration of 1.7%. Exchange volume was 30-50 ml/kg. Pre-warmed dialysis fluid was delivered by gravity and the drainage effected by siphoning. Dwell time was 20-30 minutes and the total duration of one exchange was 45 minutes. A total of 25 to 35 exchanges were given in one dialysis session. Record of local puncture site bleed, intraperitoneal hemorrhage, dialysate leak, inadequate drainage and catheter blockade was kept. If

the catheter got blocked and failed to function even after flushing, the guidewire was passed through the catheter which was removed and replaced with a fresh catheter. Cell count was performed in the dialysate effluent in the last exchange and also sent for culture. Peritonitis was defined when 2

of the following 3 were present: abdominal tenderness, dialysate with more than 100 cells /cu mm with >50% of the cells being polymorphs and a positive effluent culture. After finishing the PD, the catheter was pulled out and puncture site covered with sterile gauze.

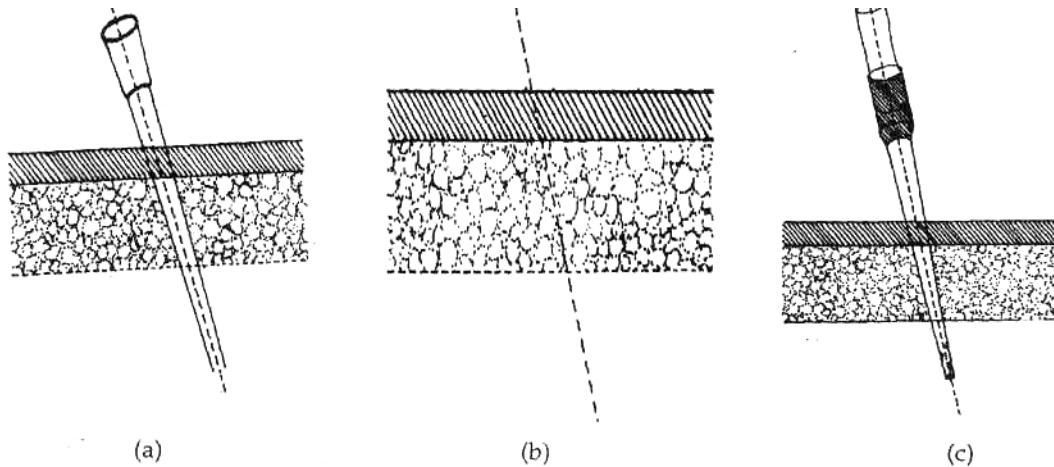


Fig. 1. (a) Guide wire being passed through angiocath; (b) Angiocath removed with guide wire in place; (c) Femoral vein catheter threaded over guide wire.

## Results

A total of 25 PD procedures were done in 15 infants and children, of which 7 were males and 8 females. Mean age was  $34.7 \pm 18.4$  months (range 1 to 58 months); 3 were infants. Seven children were less than 3 years of age and 8 were in the age group of 3-5 years. Weight of children was  $7.3 \pm 3.5$  kg (range 2.5 to 14 kg). Indications for dialysis in addition to uremia were encephalopathy (n=6), hyperkalemia (n=2), metabolic acidosis (n=2) and fluid overload (n=1). Fourteen children had acute renal failure (ARF) and one child had autosomal recessive polycystic kidney disease. Causes of ARF were gastroenteritis (n=5), hemolytic uremic syndrome (n=4), obstructive uropathy (n=3), and acute glomerulonephritis and inspissated bile syndrome in 1 case each. Nine children received only one session of PD, 3 were given 2 sessions, 2 patients needed 3

sessions and one child required 4 sessions. The mean number of exchanges per PD session was  $27.03 \pm 3.7$  (range 25-35). The catheter could be inserted easily in all patients. There was no puncture site or intraperitoneal bleed. None of the patients had dialysate leak. In 6 procedures there was inadequate drainage, of which 4 improved after flushing and 2 required catheter replacement. One child had peritonitis due to *E. coli* which resolved with antibiotic treatment. PD was successful in improving encephalopathy and correcting metabolic abnormalities and fluid balance in all patients. Percentage reduction of serum creatinine was  $43.6 \pm 7.0\%$  (range 37.0-55.7%). Two patients died. One had hemolytic uremic syndrome and the other had rapidly progressive glomerulonephritis. None of the deaths could be related to the PD procedure.

## Discussion

At first, the procedure for introducing PD catheter required penetration of abdominal wall with a 17-French paracentesis trocar(8) McDonald(9) subsequently inserted the catheter through a 14-French trocar. However despite the smaller trocar, opening was still of large diameter and resulted in hemorrhage and dialysate leaks. Subsequently Weston and Roberts(3) devised the stylet catheter which could be introduced with minimal trauma. This method gained popularity and is widely used. It is quite safe in older children. Complications such as massive intra-peritoneal hemorrhage and intestinal perforation resulting in death have however been reported(4).

The method of introducing catheter into the peritoneal cavity using a guide wire as described above is quite simple and safe. Catheter could be placed successfully in all the cases. There was no need to create ascites before insertion, no stab incision was given and thus no stitches were required. As the guide wire is passed first and then the catheter threaded over it, viscus perforation or injury to blood vessel is avoided which could occur with a stylet. The catheter fits tightly through the abdominal wall and peritoneum, thus there is no problem of dialysate leak. Only two patients had dialysate outflow obstruction necessitating change of catheter. One patient showed peritonitis. Incidence of peritonitis increases if the catheter is kept for longer period(10). If prolonged PD is needed a fresh catheter can easily be inserted after reinsertion of guide wire through the old catheter.

The cost of guide wire and catheter is approximately Rs. 400, which is almost the same as that of stylet-catheter. To conclude,

PD using guidewire inserted femoral vein catheter is simple, effective and safe in infants and young children.

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