

## Observational Study

# Peritoneal Dialysis, current status and challenges in India

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Continuous ambulatory peritoneal dialysis (CAPD) as a renal replacement therapy is practised in India since 1991. Patients with CKD 5 with multiple comorbidities are accepted for CAPD. As dialysis fluid and permanent peritoneal catheters are manufactured in India, this form of renal replacement therapy can be utilised for infants, children, adults and geriatric population. The absolute contraindications are a non-functioning peritoneum and patients with serious cognitive dysfunction. A swan neck catheter with two cuffs is preferred in view of low exit site infection, infective complications such as peritonitis and malnutrition should be prevented by appropriate training and nutritional counselling. We had two patients who lived on CAPD for more than 15 years. Adequacy of dialysis should be ensured by looking at different parameters including Kt/v and physical wellbeing of the patient. Continuous quality improvement (CQI) is mandatory to prevent dropouts.

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**Key words :** Low middle income country, renal replacement therapy, continuous ambulatory peritoneal dialysis.

CKD carries enormous economic burden on Low Middle Income Country (LMIC). CKD 5 patients require Renal Replacement Therapy (RRT) which can be offered as a home based therapy in remote places utilizing Continuous Ambulatory Peritoneal Dialysis (CAPD). The absolute requirements for CAPD are a functioning peritoneal cavity, a permanent access and dialysis fluid in different strength and volume in a safe flexible, disposable bag. Renal replacement therapy using CAPD can be offered to any age group and gender who are mentally sound. PD does not require complex machinery and electric power, and the training for the patients and relatives are simple and straight forward. The absolute contraindication for CAPD are only a few - like patients unwilling to do the procedure, non-functioning peritoneum, and cognitive impairment. Ever since CAPD was started in India in 1991 at Chennai by Abraham *et al*, there had been an increase in the treatment procedure in other parts of India and in other countries of South Asia<sup>1,2</sup>. The local manufacturing of the dialysis fluid and permanent peritoneal catheters, trained professionals including dialysis nurses and technologists, and lately reimbursement policies by various state governments have enabled the growth of CAPD. Peritoneal dialysis has been the choice of RRT in developing countries over last two decades<sup>3</sup>. With its ambulatory nature and freedom from complicated and expensive technology CAPD is the ideal renal replacement therapy for resource limited India. On the other hand, CAPD expansion is limited due to reimbursement issues to the profes-

sionals, inadequate government policies, lack of awareness and suboptimal pre dialysis care.

### Aims of Chronic Peritoneal Dialysis :

- Reduce morbidity and improve survival
- Improve quality of life compatible with reasonable lifestyle
- Prevention of economic hardship of individuals and communities
- Adequate socioeconomic support
- Adequate removal of uremic toxins – prevention of uremia
- Control of Extracellular Fluid Accumulation
- Prevention / management of anemia, calcium, phosphorus abnormalities, dyselectrolytemia and malnutrition,

### Four Reasons for Leaving PD :



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Peritoneal equilibration test (Fig 1) is done at the end

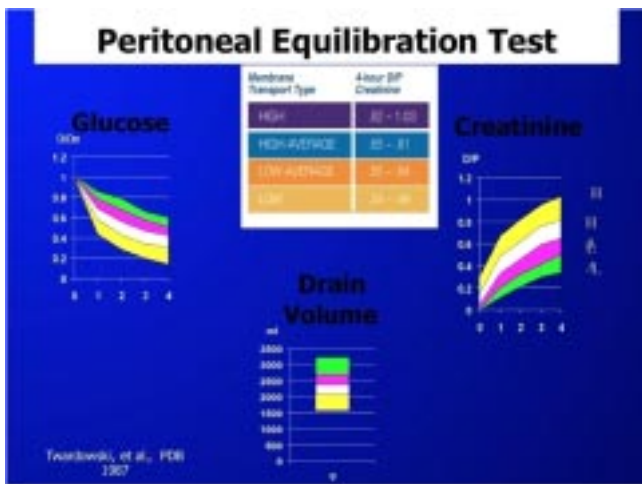
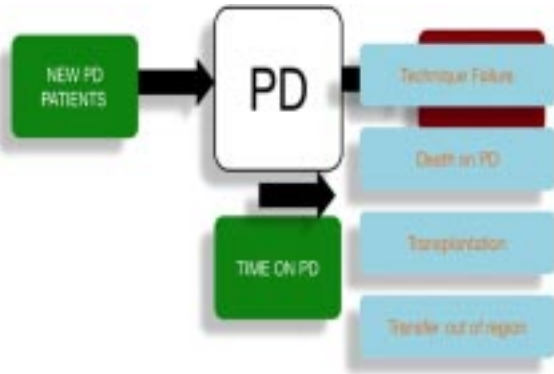


Fig 1 —

of four weeks to know the peritoneal membrane characteristics of individual patients by D/P creatinine AND Glucose absorption<sup>1</sup>. The patients are categorized into high transporters, high average, low average and low transporters. High transporters do well with short dwell exchanges and APD is the treatment of choice. High average and low average transporters are managed by CAPD. Low transporters do well with fluid removal with inadequate solute removal and hence are best treated by Hemodialysis.

**CAPD in INDIA :**

Continuous ambulatory peritoneal dialysis was initiated in Indian subcontinent in 1991. However the growth of CAPD was restricted by several factors, including patient fears regarding taking responsibility for their own treatment. The most important barrier was the high direct costs engendered by the need to import the fluid bags and the taxes levied by central government. Prices came down substantially in the late 1990s and early 2000s<sup>4</sup> as taxes were removed and by implementing local manufacture of dialysis fluid and lately by cost effective permanent peritoneal dialysis catheters and nationwide networking for

supplies. Those changes facilitated expansion of PD programs to all corners of the country.

PD is considered to be the preferred RRT in regions in which ESKD treatment programs are not well-developed and government funding for infrastructure development is limited.

The added advantages – dialysis brought to remote areas and the ambulatory nature of the treatment (requiring less frequent visits to the nephrologist)—make PD ideal for India. However, despite PD having been available for almost 25 years, the modality’s penetration remains below 20%. Furthermore, patients are selected for PD not as a matter of choice, but because they are unfit for other modalities of RRT. In a large hospital, only 8% of PD patients were initiated on PD directly; 92% were shifted after being on HD for a mean duration of about 6 months. Of those, two thirds were switched because they tolerated HD poorly, 30% because of comorbid conditions and vascular access problems, and 3% because of lifestyle issues. Patients initiated on CAPD were more likely to have diabetes and coronary artery disease. Currently about 7500 patients in India are on CAPD.

**Complications of CAPD :**

Complications (Fig 3) related to peritoneal dialysis

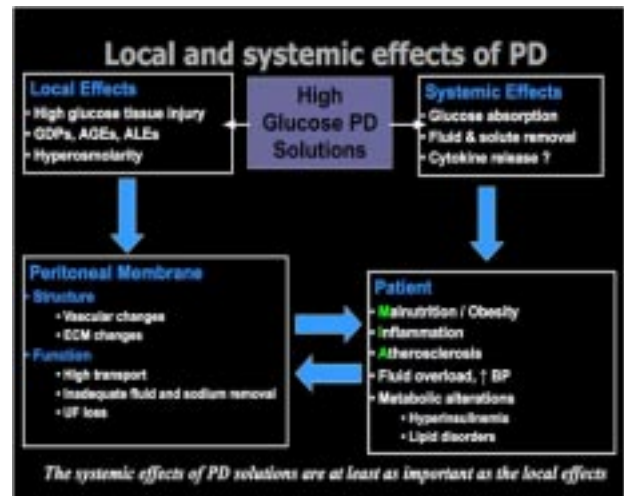


Fig 2 —

(CAPD) catheters are hereby classified as early and late. Early complications arise within the first month after catheter implantation. Complications arising soon after catheter implantation are frequently related to the procedure itself, congenital anatomic abnormalities, and/or to increased intra-abdominal pressure (IAP) generated by infusion of dialysate into the peritoneal cavity. Common complications are Pain, Bleeding at catheter implantation and intraperitoneal bleeding, Bowel perforation, Pericatheter leaks<sup>5</sup>, Obstruction, Infections, Herniae, Hydrothorax, Genital edema

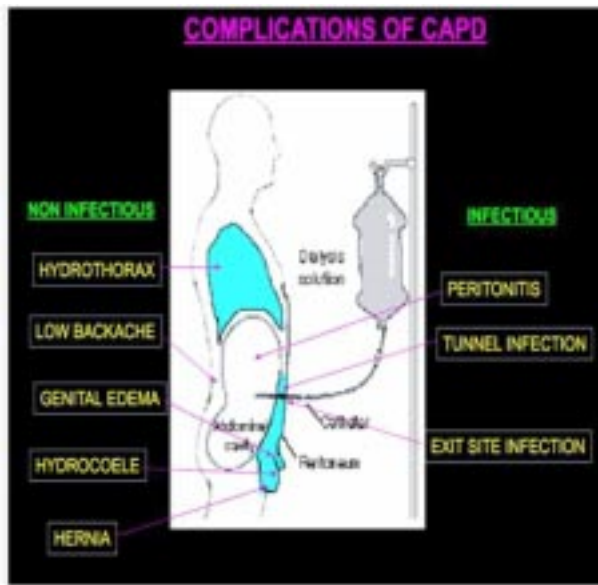


Fig 3 —

**Infective Complications :**

Exit site infections (ESI) (Figs 5&6), tunnel infections (TI) and peritonitis are the catheter related infections. ESI incidence has remarkably come down by the use of Swan neck configuration (Fig 4) of the catheters manufactured in India, with exit site facing downwards. The treatment of ESI includes appropriate identification of organism, and antibiotic therapy for ten days to two weeks. Anterior nares culture for staph aureus carrier state, removal and replacement of the catheter in the refractory ESI. TI usually accompanies exit site infections, however in the absence of exit site infections, TI can be diagnosed by using an ultrasound examination of the tunnel (Figs 7&8). If TI is not appropriately treated, this may lead to spread of infection to the peritoneal cavity requiring removal of the catheter and switch over to HD. Peritonitis is rare with disposable double bag technique and most of the instances the organisms are either gram positive or gram negative bacteria which can be successfully treated by intraperitoneal antibiotics. The diagnosis of peritonitis based on (1) abdominal pain, (2) Cloudy effluent, (3) WBC >100 cells with over 50% polymorph nuclear neutrophils (culture positivity) two among the above three is sufficient to make the diagnosis of CAPD peritonitis. One should always be cautious about CAPD procedure and each peritonitis episode the treating team should do a root cause analysis and re-training of the patient with regard to technique. The treatment of peritonitis is identification of the cloudy effluent, immediate intraperitoneal antibiotic therapy<sup>6,7</sup> after sending the first cloudy bag for microbiological examination. Gram stain result can be obtained within a short interval to guide the antibiotic therapy.

**Swan Neck Catheter :**

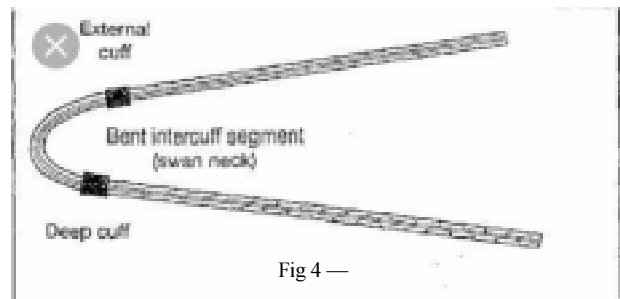


Fig 4 —

**Normal Exit Site**



Fig 5

**Early Infected Site**



Fig 6

**USG ABD Showing Tunnel Infection**



Fig 7

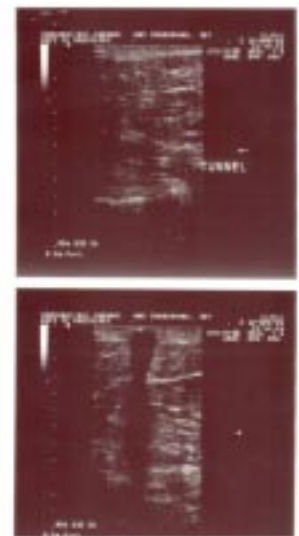


Fig 8

**Non-infectious Complications Of Peritoneal Dialysis :**

- Hernias
- Genital edema and abdominal wall leak
- Hydrothorax

**Other complications to know about :**

Encapsulating peritoneal sclerosis, Haemoperitoneum.

**Why HD is common in India over CAPD :**

More than 90 per cent of the patients are unplanned

quick starters due to presentation to the hospital at a late CKD stage with either anuria or eGfr well below 5ml/min requiring urgent RRT. These patients are urgently initiated on HD using a temporary jugular or femoral access and they have hardly any knowledge of CAPD due to predialysis education and they continue on HD. Firstly, the option of CAPD is rarely offered to patients by a nephrologist. The reasons could be lack of exposure and training in CAPD. HD involves capital expenditure in the form of procurement of machines, water treatment plant etc. and hence financial issues also could cloud the decision making process against CAPD. Secondly, there is a misconception and fear about high infection rates in CAPD. Implementation of disposable double bag systems and patient education and training in CAPD has led to remarkable reduction in peritonitis rates. Thirdly, CAPD is being perceived as the second class form of dialysis since the survival rate was poor in the initial era. It was due to the fact that only the sickest patient received CAPD as a last attempt and the mortality remained high. Lately, with predialysis education, trained nurses and technologists, appropriate nutritional counselling, cardiovascular care, maintenance of residual renal function, patients live longer with good quality of life on CAPD.

#### **Reason for selection of capd over HD :**

Home-based therapy of CAPD offers several advantages including preservation of patient autonomy, less number of visits to hospital and improved quality of life with social and professional rehabilitation. The procedure is simple and can be quickly learnt by the patient so that he or she can perform the dialysis herself. CAPD can be undertaken at home with minimal supervision and lesser disruption to normal lifestyle. Patients waiting for transplantation who resides far away where no form of RRT is available, CAPD is a valuable option. As there is scarcity of good quality water, the water consumed per week for three sessions of HD comes to 360 litres whereas in CAPD the water consumption is much lower at 56 litres per week. The survival of patients during the initial years of dialysis seems to be better with CAPD than HD. The 'down but not out' kidneys seem to preserve their last vestiges of function better while on CAPD than in HD. Various direct and indirect cost calculation in India has given conflicting accounting between the cost of HD and CAPD. While calculating the cost one should also factor travelling cost for HD and time lost per week, post dialysis unwellness hospitalization cost should be taken into consideration between HD and CAPD.

#### **Vercoming the Challenges In PD in India :**

The formation of peritoneal dialysis society (PDSI) of India in 1997, annual congress of PDSI, CAPD training for young nephrology trainees, Indian journal of peritoneal dialysis (IJP), special training for nurses and technologies during the annual congress are all positive moves in propagating and spreading CAPD in south Asian region. To overcome the challenges to establish CAPD as a better choice of RRT, apart from nephrologists, government of India should take initiatives in helping more number of patients to be able to access therapy. The government can abolish the VAT/GST taxes on PD fluid bag. Similar to HD, peritoneal dialysis can also be brought under insurance scheme. The government should realise that PD is the safe, efficient, practical and patient friendly RRT for India.

#### **Conclusion :**

CAPD is safe, efficient and patient-friendly form of RRT which can be done as a home therapy as contraindications are very limited and advantages are many. It is a lifesaving form of renal replacement therapy for diverse age group from neonates to old age and without any gender differences although countries like Thailand, Philippines and Vietnam are economically behind us, but the number of PD users and the government schemes are way ahead.

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