

# Peritoneal dialysis in Edinburgh

## Peritoneal Dialysis (PD) for patients with acute renal failure

Since 1962, peritoneal dialysis was used especially in patients who were not haemodynamically stable enough to receive haemodialysis. For patients who needed haemodialysis but arrived late in the evening, PD was often used through the night until they could be started on haemodialysis in the morning. For PD, a rigid Teflon cannula was inserted over a trochar into the peritoneum and a litre of dialysis fluid was passed into the peritoneum and later drained out. PD was continued for 2 or 3 days, and the catheter was then taken out and the patient assessed. If necessary, a cannula was put in again, and PD was repeated. A lot of PD was performed for acute renal failure in the 1970s, partly because of the limited resources available for haemodialysis.

“For patients with acute renal failure there were only 4 beds for haemodialysis in the RIU, so one Christmas PD was performed on every sidewalk of the medical corridor since there were not enough haemodialysis beds” (Dr A Cumming)

The use of PD in patients with acute renal failure decreased when haemofiltration became available in the mid-1970s.

In the 1980s, an LKB machine with an “automatic cycler” that moved fluid in and out of the machine automatically became available. It was frequently wheeled around the hospital for ARF patients and was occasionally used to treat patients with CRF.

## Continuous Ambulatory Peritoneal Dialysis (CAPD) for patients with CRF

In the 1980s, CAPD was the new simple chronic dialysis technique that used large volumes of dialysate and long dwell times in the peritoneal cavity. Dr Allan Cumming was given the task of setting up CAPD at the RIE by Professor Robson and Dr Lambie. The unit at Newcastle was the only unit in UK that was ahead of Edinburgh in starting CAPD. Dr Cumming visited Newcastle to acquire information and technique on how to perform CAPD. Dr Cumming performed the first 100 or so of the CAPD catheter insertions. It was an invasive surgical

procedure on the abdomen. By 1985 surgeons took over the job.

CAPD equipment was marketed by 2 companies: Travenol, a Dutch/USA company (which later became Baxter), and Fresenius, a German company. Fresenius had more superior connector technology. They had specially designed connectors that limited the entry of bacteria, and the connectors could be disinfected with a spray. Fresenius won the first Edinburgh contract.

Patients were trained for 2 weeks in the hospital ward so that they could perform CAPD themselves.

The first CAPD took place in 1980 on an elderly patient. The patient did well on CAPD, and died 5 years later from an unrelated disease. The second patient was an unstable diabetic, who also did well on CAPD. By February 1981, the technique was performed on 21 patients for a total of 195 patient months (Cumming et al, 1981).

Advantages of CAPD included the reduction of dietary and fluid restrictions and shunt problems, increased mobility and independence and a reduction in dialysis related symptoms (Cumming et al, 1981).

The number of patients on CAPD expanded, and at one time there were over 100 patients on CAPD, largely due to the pressure on haemodialysis. CAPD became a long-term treatment for a number of patients. However many later went back onto haemodialysis as CAPD was not suitable as a long-term treatment. Now there are more patients on haemodialysis than CAPD.

### **CAPD aluminium toxicity in Edinburgh (November, 1981)**

Dialysis fluid used for CAPD is specially treated to remove aluminium (by reverse osmosis and water softeners). Ideally the aluminium level should be maintained below 1 micromol/L. The dialysis fluid provided by Fresenius company usually has an aluminium concentration of  $0.7 \pm 0.4$  micromol/L (Cumming et al, 1982).

All CAPD patients treated in Edinburgh had their plasma aluminium monitored because of the problem of aluminium toxicity in haemodialysis, although at that time nobody thought that there could be such a problem in CAPD.

Some of the patients were symptomatic, with symptoms of heavy metal poisoning (cramp-like abdominal pain, nausea and vomiting, anorexia, weight loss and

general malaise). A total of 14 out of 19 patients had a rise of plasma Al from  $2.0 \pm 1.2$  micromol/L to over 10 micromol/L (without any increase in the consumption of aluminium hydroxide, Alucaps<sup>®</sup>, the phosphate binder) (Cumming et al, 1982). Fortunately this was picked up through routine plasma aluminium checks, so it was a short episode, so patients did not go as far as developing dialysis dementia, which was a symptom of chronic aluminium poisoning in HD patients.

The aluminium level in the dialysis fluid was checked and it was found to be contaminated with aluminium. The supplier found that 4 batches of CAPD dialysis fluid had high aluminium concentrations (mean of  $34.0 \pm 13.9$  micromol/L), over thirty times the normal concentration. It was later found that those 4 batches of fluid were picking up aluminium from an aluminium filter in the production line.

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	Prior to 1980	1980s	1990s	2001
<b>Acute renal failure</b>	IPD mainly used for unstable patients from 1962 onwards (till early 1980s)	IPD used for unstable patients till early 1980s	IPD not used	IPD not used
<b>Chronic renal failure</b>	IPD (used to a small extent since mid 1960s)	CAPD	CAPD/automated PD	CAPD/automated PD