CAPD IN HONG KONG

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INTRODUCTION

While haemodialysis is a sure way of keeping renal failure patients alive, its widespread use in developing countries is limited by the lack of technical expertise and financial resources, Continuous ambulatory peritoneal dialysis (CAPD), introduced in 1978 (1), provides an alternative in the management of end-stage renal failure. Our experience in treating 63 patients with CAPD from Jan 1983 to Nov 1984 is reviewed here.

MATERIALS AND METHODS

From Jan 1983 to Nov 1984, 63 patients were treated with CAPD at the renal unit at Tung Wah Hospital under the Department of Medicine, University of Hong Kong. As the treatment was self financed with variable degrees of subsidy from the government, the only criteria for selection was that the patients should be able to afford the cost of the treatment which averaged $3000 Hong Kong dollars per month. Family support, the quality of life immediately before the final illness and the patient's ability to handle the procedure were also given consideration. Of the 63 patients, 30 were males and 33 females. The mean age was 43.8 year with

a range from 17 to 83 years. The nature of the original kidney disease was glomerulonephritis (n = 15, biopsy proven), diabetic nephropathy (n = 10) and undetermined in most cases. Before the institution of dialysis, the patient and his/her family were interviewed by us and by a social worker and in individual cases a psychiatrist as well. Access to the peritoneal cavity was established with an indwelling Tenckhoff catheter with one or two cuffs. Peritoneal dialysis was started as soon as the patient returned to the ward and continued for at least 48 hours. Thereafter the patient would be maintained on intermittent peritoneal dialysis (IPD) which involved 40 litres of exchange twice weekly until it was the patient's turn for training. The solutions used were 1.5% dextrose or 4.25% dextrose (Dianeal). For CAPD, in all except 4 patients who required 4 exchanges daily, three 2—1 exchanges were carried out daily and the patients were advised not to use hypertonic solutions if at all possible. The transfer set, connected to the Tenckhoff catheter by a titanium adaptor, was changed at the renal unit once a month. Patients were allowed liberal diets except for fluid and salt intake. They were followed up every 4—6 weeks and told to report to the centre as soon as a mishap in connection occurred and at the earliest sign of peritonitis. Diabetic patients were stabilized on insulin in hospital and most patients used the intraperitoneal route for insulin administration.

RESULTS

All patients came through training, although in individual cases (eg. the 83-year-old) a relative was trained instead of the patient. The biochemistry of the patients were satisfactory although only 3 exchanges were used. The mean serum creatinine was 898 umol/1 and the mean serum albumin was 30 g/1 (Table 1). Compared to patients on IPD or haemodialysis, the mean serum creatinine of CAPD patients was significantly lower. The mean serum albumin in CAPD patients was lower. The mean serum albumin in CAPD patients was lower than that of haemodialysis patients (p = 0.0000). CAPD patients had significantly higher serum calcium and significantly lower serum urate concentrations than IPD patients. CAPD patients also had a higher serum cholesterol concentration than the other two groups of patients.

Figure 1 shows a serial study of our patients on CAPD. An increase in haemoglobin and albumin was noted, which reached statistical significance at 7 months. An increase in cholesterol was noted and reached statistical significance as early as 4 months after CAPD. The improved nutritional state was also reflected by an increase in mean skin fold thickness which reached statistical significance by 10 months after CAPD.

Residual creatinine clearance was measured in 52 patients. Twenty-two patients had residual creatinine clearances ranging from 1.5 to 5.8 ml/min. Their steady-state plasma creatinine was below 1000 umol/1.

Complications encountered were mainly related to the catheter and to peritonitis. Exit site infections occurred in 15 patients with Staphylococcus being responsible in 11 (73%) patients. Three quarters of exit site infections occurred in the first 6 months after commencement of CAPD (Figure 2). Seven catheters were renewed in 6 patients.

Culture-positive peritonitis occurred at an overall frequency of 1 per 15.7 patient-month during our experience of 581 patient-months. The pathogens were listed in Table 2. It is obvious that Stapyloccocus was the main culprit. Some patients appeared more prone to peritonitis than others and there was also a clustering of the infections within the first 6 months. Peritonitis was severe enough to require termination of CAPD in 3 patients and there were 2 deaths directly related to peritonitis. A total of 39 admissions for peritonitis suspected or proven resulted in hospitalization for 232 days.

Ten patients received renal transplantation and the graft functioned in 9. There was no peritonitis during immediate postoperative period before the Tenckhoff catheter was removed. Actuarial survival of CAPD technique was calculated and presented in Figure 3. Patients who were transferred to other forms of dialysis because of complications were counted as cases of technique failure. Those who were transplanted or were electively transferred to other forms of treatment were regarded as lost to follow up and patient deaths during CAPD were included as technique failure.

Other medical complications included tuberculosis and hypertension. Thirty patients required the use of antihypertensive agents for blood pressure control. Tuberculosis occurred in 5 patients and extrapulmonary tuberculosis was frequent (2).

TABLE 1: COMPARISON OF BIOCHEMICAL DATA AMONG IPD, CAPD AND HD PATIENTS

	PID		CAPD		HD
Hb (gm/dl)	7.59 ± 0.25 (n = 62)	p = ns	8.13 ± 0.18 (n = 63)	p = ns	6.99 ± 0.32 (n = 18)
Urea (mmol/1)	32.8 ± 1.6 (n = 62)	p = 0.0000	20.1 ± 0.9 (n = 63)	p = 0.0000	34.1 ± 1.5 (n = 18)
Creatinine (umol/1)	1200 ± 54 (n = 62)	p = 0.0000	898 ± 44 (n = 63)	p = 0.001	1243 ± 73 (n = 18)
Calcium (mmol/1)	1.95 ± 0.04 (n = 61)	p = 0.01	2.09 ± 0.04 (n = 63)	p = ns	2.19 ± 0.06 (n = 18)
Urate (mmol/1)	0.60 ± 0.02 (n = 58)	p = 0.0000	0.40 ± 0.01 (n = 63)	p = ns	0.43 ± 0.02 (n = 18)
albumin (gm/dl)	31.0 ± 0.7 (n = 61)	ns	30.0 ± 0.7 (n = 63)	p = 0.0000	38.7 ± 1.0 (n = 18)
Cholesterol (mmol/1)	4.14 ± 0.18 (n = 49)	p = 0.04	4.60 ± 0.13 (n = 61)	p = 0.01	3.37 ± 0.19 (n = 18)

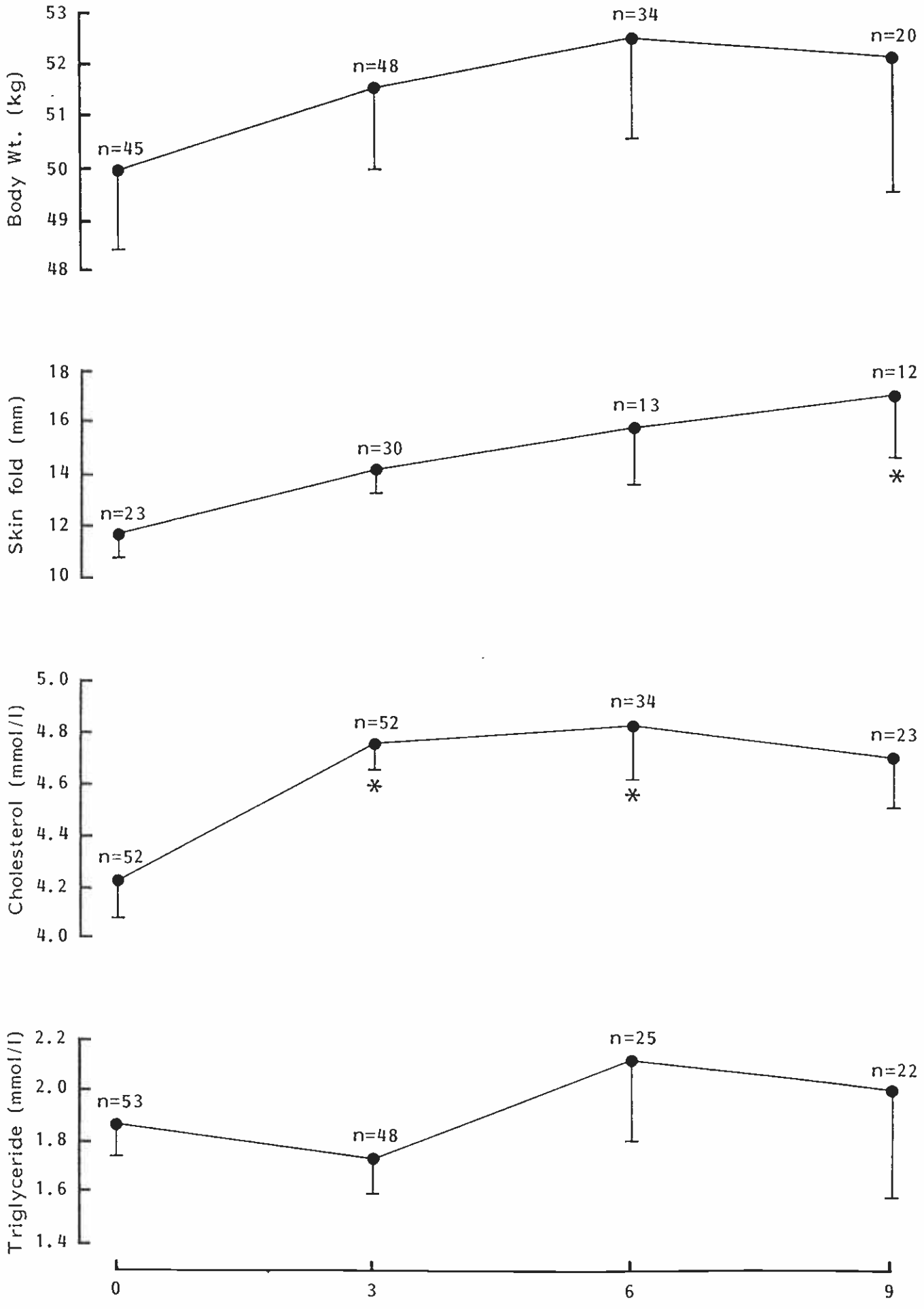

Figure 1a: Serial changes in some anthropometric and biochemical data in CAPD patients

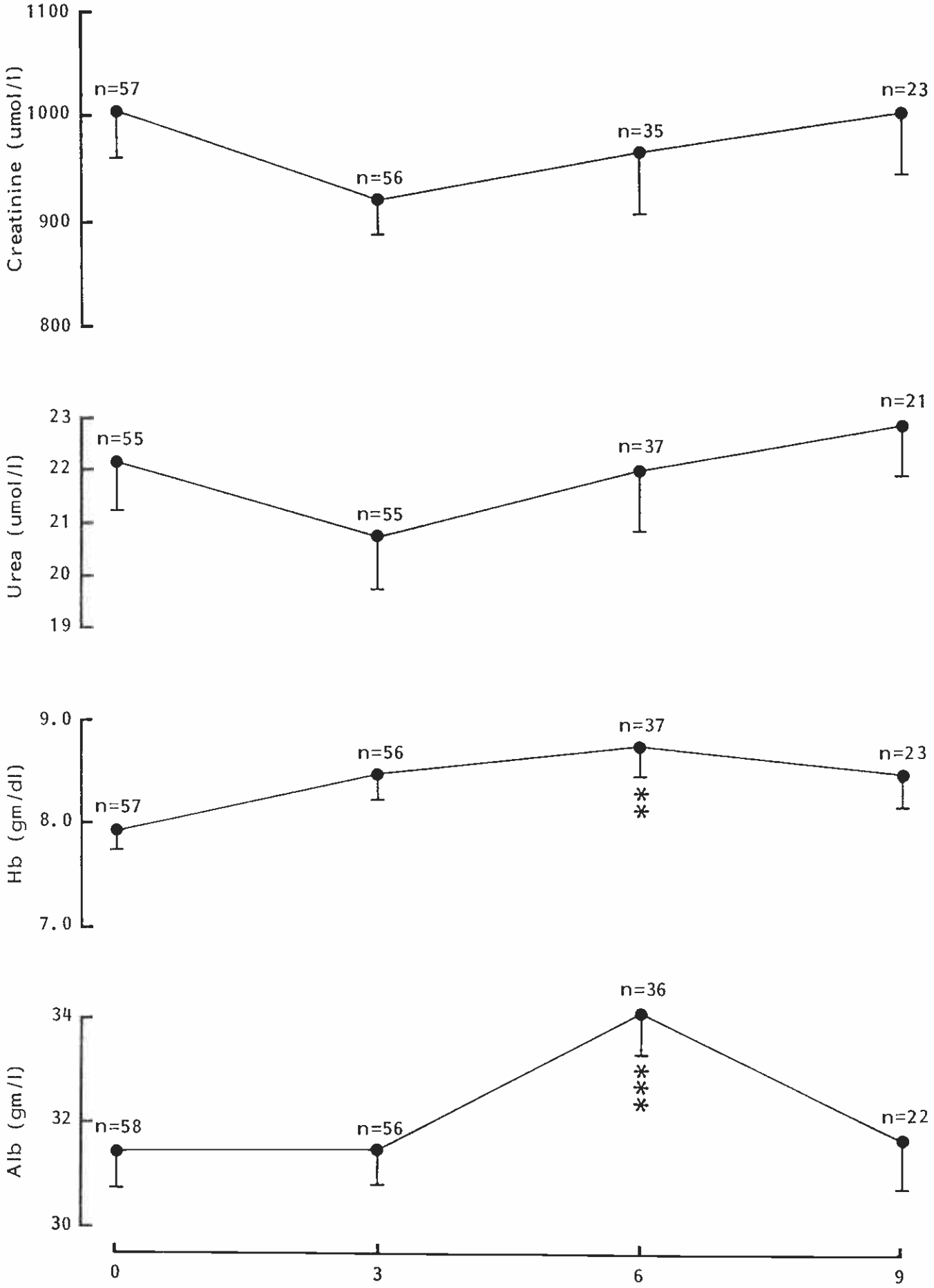

Figure 1b: Serial changes in some anthropometric and biochemical data in CAPD patients

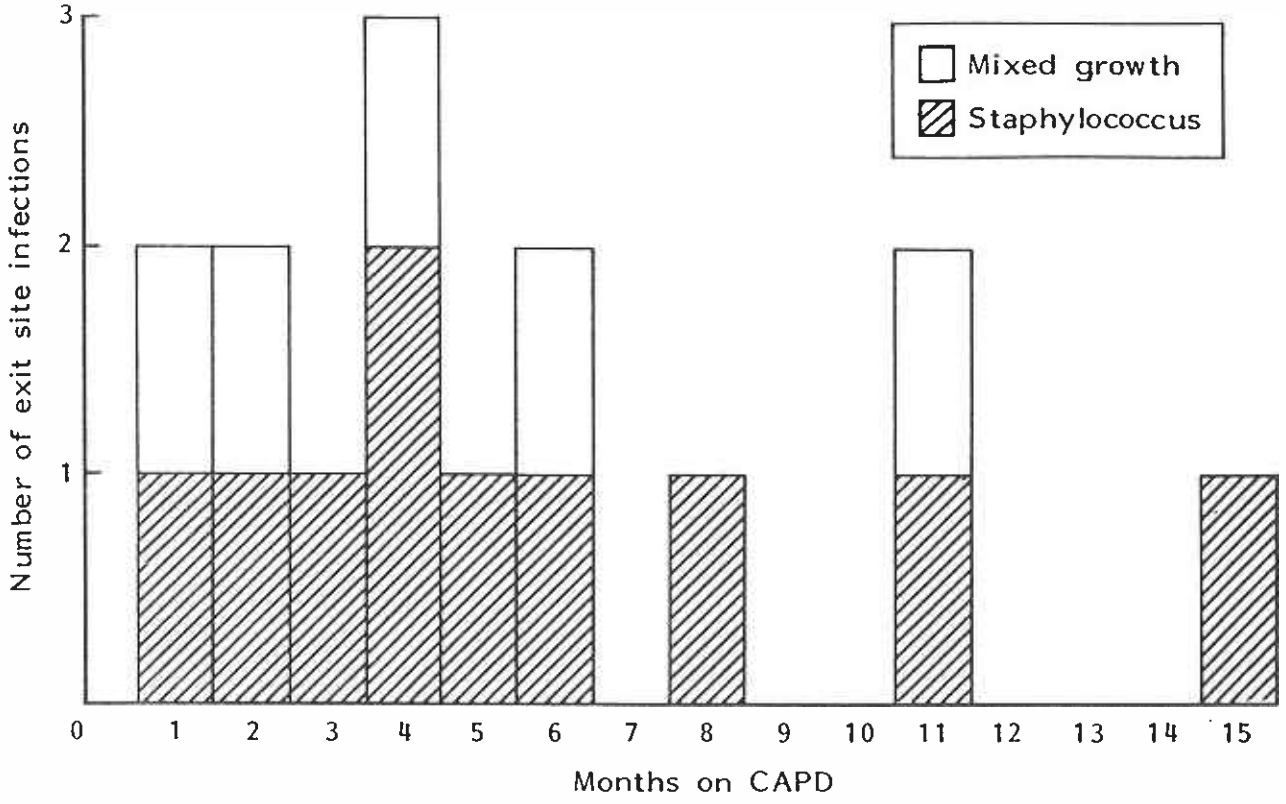

Figure 2: Exit site infections in CAPD patients

TABLE 2: PERITONITIS IN CAPD PATIENTS

Pathogen	No. of episodes	% of culture positive epidoses
Staphylococcus*	19	51.4
Actinetobacter	7	18.9
Pseudomonas	5	13.5
Streptococcus	3	8.4
Candida Albicans	2	5.4

*including 3 Staph. aureus

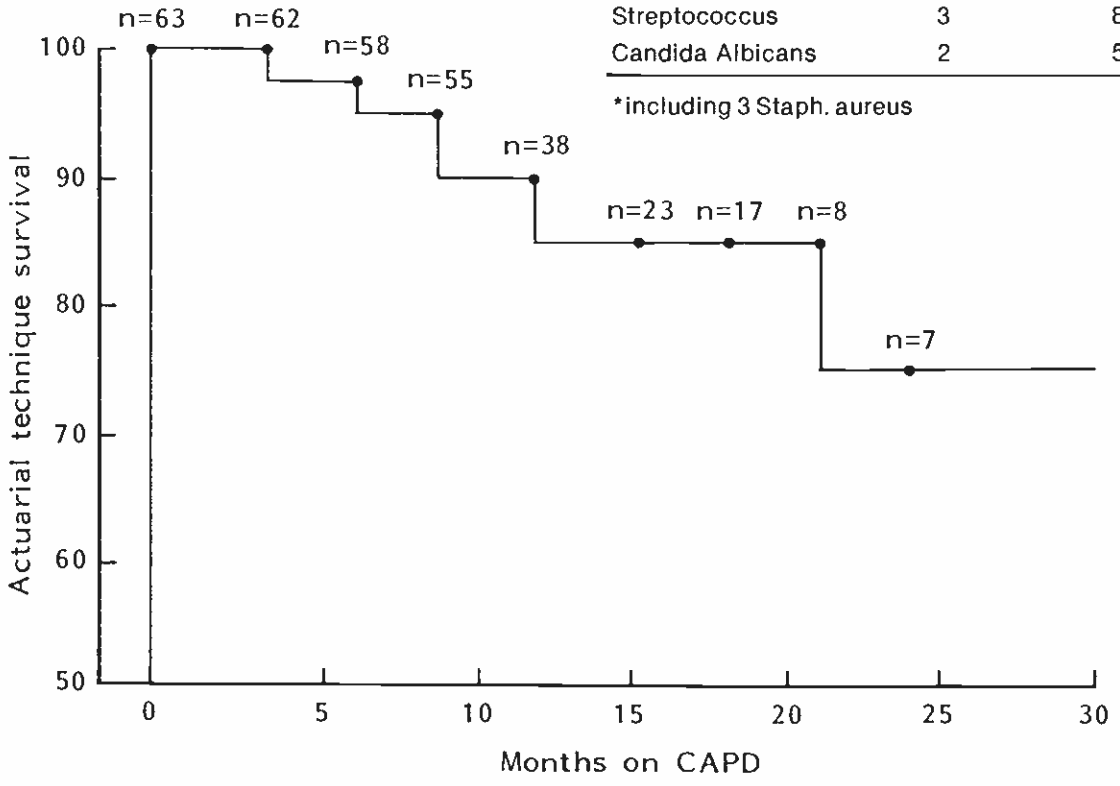

Figure 3: Technique survival in patients on CAPD

Rehabilitation was good in most patients. The quality of life was assessed with a questionaire in 52 CAPD patients and 39 haemodialysis patients by a technique in which the interviewed patient was asked to trade off a portion of life on dialysis for a shorter life in full health (3). The acceptance of the treatment was also assessed with a scoring system. The results are shown in Table 3. CAPD patients rated their treatment superior to IPD and 3 patients who had experience of haemodialysis preferred CAPD while 3 patients who were transferred from CAPD to haemodialysis after the former technique failed preferred haemodialysis. The quality of life was significantly higher than that of haemodialysis patients if financial considerations were excluded. Thirty five out of sixty three (66%) patients worked full time and 3 worked part time. Twelve patients were retired and only 3 were unemployed. Duration of hospitalization is shown in Table 4. The overall hospital stay during our experience was 0.836 day per patient-month or 10 days per patient-year. It must be noted that admission for peritonitis accounted for less than half the total period of hospitalization.

The final outcome of all patients is listed in Table 5. Fifty (79.4%) patients remained on CAPD at the time of review.

TABLE 5: OUTCOME OF PATIENTS ON CAPD

Death	n = 3 (2 candida peritonitis; 1 cardiovascular)	4.7%
Transplanted	n = 10* (9 functioning grafts)	14.3%
Transferred to HD	n = 1* (failed transplant)	1.6%
Remains on CAPD	n = 50	79.4%
Total	63	100%

* One patient was listed twice

TABLE 3: COMPARISON OF THE QUALITY OF LIFE ON CAPD AND ON HAEMODIALYSIS

	CAPD	HD	Difference*
No of patients	52 (25 m: 27f)	30 (18m: 21f)	—
Age	46.5 ± 2.3	38.3 ± 1.8	p = 0.005
$\frac{X}{t}$	0.788 ± 0.033	0.732 ± 0.038	p = ns
$\frac{X}{t}$ (corrected)**	0.919 ± 0.027	(0.732 ± 0.038)**	p = 0.0000
Total score	7.13 ± 0.28	7.64 ± 0.22	p = ns

All values in mean ± S.E.M.

* Mann-Whitney test

** $\frac{X}{t}$ was recalculated after financial considerations were excluded for CAPD patients. Haemodialysis patients were given free treatment and so $\frac{X}{t}$ remained unchanged

DISCUSSION

CAPD is used to treat about 30% of patients with end-stage renal failure in Canada, UK and Australia (4). The traditional method involves four 2—1 exchanges per day. Our experience with Chinese patients shows that satisfactory biochemical and nutritional state can be maintained with three 2-litre exchanges per day. This renders the procedure much more socially acceptable and also cuts down the cost of the treatment.

TBALE 4: HOSPITAL STAY FOR PATIENTS ON CAPD

	Peritonitis (proven or suspected)	Other reasons*
No of days	232	254
Frequency	0.40 day/patient-month	0.44 day/patient-month
Total	0.84 day/patient-month = 10.1 day/patient-year	

*Pulmonary TB
GI bleeding
PR bleeding
Stabilization of sugar, BP and fluid status

Because of limited resources, our patients on maintenance haemodialysis receive 10 hours of treatment a week. The nutritional status of our CAPD patients as judged from serum C3 and skin fold thickness was at least as good as, if not better than, those treated with 10-hour-a-week haemodialysis (unpublished observations). Although hyperlipidaemia is common on CAPD (5), the mean serum cholesterol in our patients was not high. The well-known defects in lipid metabolism in chronic uraemia cannot be corrected with three-2-1-exchange-a-day CAPD (6). Because we discouraged the use of hypertonic exchanges, and ultrafiltration with long-dwell is low, a high proportion (47%) of our patients required antihypertensives for blood pressure control.

Peritonitis remains a problem. It is the authors' belief that with over 1000 breaks in the sterile system a year, the possibility of introducing bacteria into the peritoneal cavity cannot be eradicated. That some patients develop peritonitis and others do not is most likely related to the immunological competence of the individual. Peritonitis only accounted for less than half the total duration of hospitalization in our patients. Technique survival of 94% at 1 year compares favourably with that of other centres (7).

The influence of residual renal function on steady-state plasma creatinine is considerable (8). Although three 2-1 exchange daily is sufficient for most patients, individuals with a big lean body mass and residual creatinine clearance less than 1.5 ml per day requires four exchanges a day. Unlike others, we did not use 3—1 exchanges.

Patients with renal failure due to diabetic nephropathy were often rejected from hospital haemodialysis programme and in the face of the paucity of cadaveric renal donors, their only hope is CAPD. In our experience, diabetic patients did not fare worse and their transperitoneal solute transfer rate was comparable to that of non-diabetics (8). Peritonitis was no more frequent, either. Diabetic nephropathy accounted for 15.8% of patients requiring dialysis. Whether their long-term survival can achieve that of non-diabetics remains to be seen.

Eleven patients received renal transplantation, including 2 who had cadaveric kidneys. They never had to be haemodialyzed and experienced no peritonitis even though the Tenckhoff catheter was allowed to remain in situ for as long as 4 weeks after renal transplantation.

Our experience to date justifies the conclusion that CAPD is an important mode of therapy for patients with end-stage renal failure in developing countries. Three exchanges a day greatly increases the social acceptability of CAPD. Used in conjunction with living-related renal transplantation, CAPD provides an important mode of therapy for end-stage renal failure and its use should be encouraged (9). It must be pointed out that because technique failure occurs, CAPD should not be undertaken if there is no back up facilities for haemodialysis.

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