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Success of the peritoneal dialysis programme in Hong Kong

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Is CAPD successful in Hong Kong?

The success of a dialysis programme can be exemplified by a high utilization rate, excellent patient and technique survival, reduced complication rates and good quality of life.

Utilization rate

The incidence of dialysis-dependent end-stage renal disease (ESRD) in Hong Kong in 2005 was 173 per million population in Hong Kong while the prevalence of ESRD was 965 per million population. This figure is comparable to most western countries, with the exception of Taiwan and the USA [1]. As of 31 March 2007, there were 3410 patients treated with peritoneal dialysis (PD) in Hong Kong, with a median age of 62.3 years. Nearly 40% of all new dialysis patients had diabetic nephropathy as the underlying disease while around 21% had glomerulonephritis. Only ~5% of our chronic PD patients used automated PD. The discussion will therefore focus on continuous ambulatory peritoneal dialysis (CAPD).

Patient and technique survival

In general, Chinese CAPD patients enjoyed an excellent survival. Our previous cohort study showed that the 2-year actuarial survival was 83.0% [2], which compared favourably to that of the Canadian (79.7%) and USA subgroup (63.2%) of the CANUSA study [3]. Our recent cohort of 328 incident CAPD patients recruited in the Prince of Wales Hospital between 1 January 2000 and 31 December 2004 also showed a very acceptable patient and technique survival. There were 170 male patients and 158 female patients with a mean age of 57.6 ± 13.9 years (mean ± SD). 38% (127/328) had the renal failure caused by diabetes mellitus (DM). Another 25 patients (8%) had DM as a comorbid condition and not the cause of the renal failure. The 2-year patient survival was 91% and technique survival 82% (Figure 1). Even for elderly patients (>65 years old), our recent analysis showed excellent 2- and 5-year technique survival of 84.0% and 45.7%, respectively [4].

Peritonitis rate

With the extensive use of disconnect and double-bag systems, our patients enjoyed very low peritonitis rates. In the mid-1990s, our peritonitis rate was around one episode every 17 patient-months of treatment with a simple disconnect system [5]. It gradually improved to one episode every 29 to 34 patient-months in the late 1990s [6] and then to every 36 to 45 patient-months with the application of double-bag systems [7]. Our recent analysis also showed that the probability of a 12-month peritonitis-free period for our CAPD patients was 76% [4]. With the improvement in connectology, however, the proportion of peritonitis episodes
Table 1. Patient factors affecting survival in peritoneal dialysis

<table>
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<th>General populations</th>
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<td>Genetics</td>
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caused by Gram-negative bacteria, especially Pseudomonas species, has been increasing [7], which may have a potential impact on the choice of first-line antibiotics for the treatment of CAPD-related peritonitis.

Quality of life

Although many of our patients are elderly and have multiple comorbidities, their functional status compares favourably to patients on long-term haemodialysis. In our previous survey, nearly 90% of our CAPD patients were able to carry on normal activity with no need of any special care, and over 70% were able to join social functions with minimal restriction most of the time [8].

Why is CAPD successful in Hong Kong?

Table 1 summarizes the various inherent patient factors that would affect survival in PD. Among dialysis patients, Asian Americans had a markedly lower adjusted relative mortality risk than whites [9]. The difference in death rates does not appear to be primarily treatment related, but is likely related to background death rates [9], which may be explained by the differences in genetics, dietary habits, lifestyle and cultural practices [10,11]. In dialysis patients, the difference in mortality between Chinese and white subjects may be attributed to the differences in body size, dialysis prescription, compliance to treatment, prevalence of comorbid conditions and possibly peritoneal transport characteristics [10,11]. For example, our previous study showed that the socioeconomic status is closely associated with the rate of peritonitis among CAPD patients [12].

Not only is the absolute mortality different but there is also a major difference in the cause of death between Chinese and white CAPD patients. In the CANUSA study [3], 76% of the deaths were due to cardiovascular or cerebrovascular disease. In contrast, vascular disease was the cause of death in only 53% of our patients [2]. The discrepancy in the prevalence of vascular disease is, at least in part, caused by the difference in genetic make-up. For example, in one of our previous studies we found that the deletion–deletion (DD) genotype of the angiotensin-converting enzyme (ACE) gene was present in 32–42% of a normal white population, but only in 14% of Hong Kong Chinese [13]. A subsequent study showed that the ACE D allele was associated with macroangiopathy in Chinese patients with type 2 diabetes with nephropathy, and the association is dependent on its effect on the serum ACE activity [14]. In addition, a high peritoneal transport status—which is associated with increased cardiovascular morbidity in CAPD patients [15]—appears to be less common in our patient population [16].

Another important characteristic of Chinese CAPD patients is that a lower dialysis volume is usually required. In contrast to the usual 8 l/day treatment in white patients, nearly 80% of our previous cohort study received only 6 l/day dialysis [2]. A lower number of daily CAPD exchange does not only save time and cost, it may also reduce the risk of peritonitis, hyperglycaemia as well as overweight due to lesser glucose absorption [17]. In addition, compliance to treatment may be enhanced. Blake et al. [18] reported significant differences in compliance to CAPD regimens, with regimens above four exchanges per day being an independent predictor for non-compliance.

Reimbursement policy

In addition to patient-related factors, local reimbursement policy of dialysis therapy has a major impact on the utilization of CAPD. In many developing countries, the annual cost of CAPD is greater than the per-capita gross national income (GNI) while the absolute cost of PD fluid varies very little [19]. Thus, in some developing countries, renal failure patients can be expected to have access problems to CAPD. In countries with unequal reimbursement policies between CAPD and haemodialysis, a lack of incentive to prescribe CAPD also exists [19]. In contrast, the ‘PD first’ concept has been practiced in Hong Kong for over one decade: under the current policy of the Hospital Authority of Hong Kong, CAPD is provided as the first-line dialysis modality unless a medical contraindication dictates otherwise [11,19]. All the patients in the predialysis education in Hong Kong will be introduced to both PD and HD. However, the Hospital Authority of Hong Kong will only reimburse patients for PD if there is no medical contraindication for PD. The patients can choose, paying out of their own pockets, to go to non-profit making charitable HD centre or private HD centre if they choose HD as their treatment despite being medically fit for doing PD. Thus, the success of a ‘PD first’ strategy requires fundamental
changes in health care reimbursement systems in many countries by increasing the incentives for clinicians and hospitals to initiate patients on CAPD. In a recent ‘Asian Roundtable on Dialysis Economics’, academic nephrologists and government officials in Asia agreed to look into ways to increase the utilization of PD in order to improve the clinical and financial management of patients with ESRD [20].

Centre effects and technique-related factors

Huisman et al. [21] found that having <20 CAPD patients in a centre or having a small fraction of patients on CAPD carries an increased risk of technique failure. In Hong Kong, most of the dialysis centres take care of around 300 CAPD patients. This high patient volume certainly depends on the availability of special medical expertise in the practice of CAPD, dedicated staff, well-designed patient training programmes and integrated back-up facilities [11]. In our centre, Tenckhoff catheter insertion and removal are mostly performed by committed nephrologists, which helps in reducing unnecessary surgical consultations and facilitates timely treatment. As a result of a well-designed patient training programme and advances in CAPD connectivity, our median duration of CAPD training is 4–5 days [7,22]. A recent study further showed that the presence of dedicated training nurses could reduce the risk of peritonitis [22].

Perspectives

In summary, a successful CAPD programme requires dedicated staff, prudent application of current technology and appropriate health-economic settings. Patient-related factors, however, do contribute to the excellent survival of Chinese CAPD patients. There are several problems in the clinical practice of CAPD that require further research and improvement, including prevention of peritonitis [23], preservation of residual renal function [24], avoidance of malnutrition and cardiovascular disease [25], peritoneal fibrosis and technique failure [11]. Further research in these areas is needed to further improve the longevity of CAPD patients.

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Conflict of interest statement. None declared.

(See related article by Wim van Biesen et al. Why less success of the peritoneal dialysis programmes in Europe?. Nephrol Dial Transplant 2008; 23: 1478–1481.)

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Why less success of the peritoneal dialysis programmes in Europe?

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Keywords: epidemiology; Europe; haemodialysis; peritoneal dialysis; survival

In this issue of NDT, an interesting editorial by Li and Szeto describes the success of the peritoneal dialysis (PD) programme in Hong Kong. The swift expansion of PD in Asia, and particularly in Hong Kong, is in sharp contrast with the tantalizing efforts of the PD community in Europe to prevent PD utilization rates from declining. Whereas in Hong Kong, the prevalence rates of PD are as high as 80%, in Europe, they are around a disappointing 15% [1]. The prevalence rates vary also substantially from country to country inside Europe, being <5% in Germany [2] and >30% in the United Kingdom [3]. Even within different regions in each country, there are striking differences: in Spain, PD prevalence ranges between 31% in Cantabria and 11% in Catalonia, and in Italy it ranges between 16% in Liguria and 2% in Campania [4]. All these facts make it clear that the penetration rate of PD in Europe is most likely not only attributable to differences in patient mix [5,6]. In this short comment, we will use the successful PD programme in Hong Kong as the benchmark to explore which factors do have an influence, and, more importantly, how they can be changed to improve PD utilization in Europe.

Would an increase in peritoneal dialysis utilisation in Europe offer advantages?

A first and important point is of course related to patient survival. As shown in the Hong Kong experience, survival rates on PD can be excellent, with 2-year survival rates, unadjusted for age, of 83%. In Europe, the gender- and age-adjusted 2- and 3-year survival rates are 79% and 68% respectively [1]. More importantly, these results are equal in patients started on PD or on HD. Hence, starting a patient on PD in Europe does not jeopardize his/her outcome. There is even evidence, to a large extent based on European data, that a ‘PD first’ [7] approach can further improve outcomes [8–11].

A second matter of consideration is related to cost. In Hong Kong, with its staggering real estate prices, a home-based treatment is definitely financially more interesting than the construction of haemodialysis centres. In Western Europe, the highest cost of renal replacement therapies is generated by labour cost [12,13], and the cost of the disposables is lower for patients on HD versus PD. As a final result, PD tends to be overall more economical than HD [12–15]. The cost difference even increases if not only the cost of the treatment by itself, but also the so-called spin-off is taken into account. This spin-off includes medical costs, like biochemistry, radiology, other technical investigations, etc., which are generated more in a patient who is under medical supervision three times a week, than in a patient at home. Also medication, like the use of erythropoiesis stimulating agents, and costs for transport are lower for PD [13]. It is thus not surprising that in countries where RRT is provided by the public sector, like in the United Kingdom and some Northern European countries, PD utilization is much higher than in those where most of the RRT provision is in private practice with fee-for-service reimbursement, like in Belgium [16] or Germany [2].

The economical advantage of PD, however, also has a tradeoff, which is reflected in the distribution of PD in different centres. The labour cost for PD is almost identical irrespective of whether 5 or 30 patients are enrolled, as the programme can be managed by two or three nurses. The cost per PD patient treated is thus much higher in starting centres with low patient numbers. In contrast, the ‘real estate’ cost of an HD unit is fixed, and the cost per capita goes up as more seats remain empty. This tends to create a vicious circle, whereby HD units try to fill their HD seats as much as