

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In 1968, Tenckhoff and Schechter, H, were the first investigators who used the catheter device successfully in treatment patients of chronic renal failure (47). Since then, the number of CAPD patients increased. In 1989, Lindblad et al, reported that, the major problem in limitation of CAPD and leading to discontinuation was the peritonitis (48). Fried et al, in 1996, studied 516 CAPD patients, and found that the mortality rate was 17.4 % per year, and peritonitis contributed to 15.8% of the death. They also observed that, the rate of peritonitis increased every year , and was accompanied by the increased risk of the death. However, in the same study, cardiovascular disease was more common in those patients whose death was unrelated to peritonitis (3).

Dumrongkitchaiporn et al, in 1994, studied 327 cases of CAPD and found that peritonitis was still the most common complication of CAPD (1). In 1996, Su-Hernandez et al, performed the cross-sectional analysis in national survey of CAPD patients in Mexico. There were 3774 CAPD patients from 101 hospitals. Infection was the most important complication detected. Rate of peritonitis was 0.8 episodes per year per patient . Mortality rate was 17%, and had been influenced by malnutrition and cardiovascular complication of diabetes (4).

2.2 Rate of Peritonitis

The rate and risk factors of peritonitis varied in many studies.

Dumrongkitchaiporn et al, in 1994, found that the connection technique of Luer lock connector with iodine installation at the dialysis bag connection site had a lower risk of peritonitis than the standard spike technique. In this study, age, sex, and diabetic status had no effect on the rate of peritonitis (1). In 1985, Nolph, et al, from NIH-supported National Continuous Ambulatory Peritoneal Dialysis (CAPD), summarized data on 7,404 patients treated with CAPD during the three-year period . There were 1.7 episodes of peritonitis, 0.7 exit site-tunnel infections, and 0.3 catheter replacements, reported per patient per year of observation. Age and DM impacted on mortality, but appeared to have a limited influence on infection rate (49).

Hagelskjaer et al, in 1996, reported the rate of peritonitis of 0.89 episodes per year per patient in 106 CAPD patients. There was a tendency to increase the frequency of peritonitis in older patients. Patients with polycystic renal disease also had risk of peritonitis. In contrast, diabetic patients had a tendency to have a lower rate of peritonitis (6). Bisturp et al, in 1995, also reported the low rate of peritonitis in 51 CAPD patients during a total of 736 months. The incidence of peritonitis was only 0.67 episodes per patient per year, and was not influenced by sex, diabetes and previous abdominal surgery (7).

2.3 Factors Reported to be Risk of Peritonitis

There were different factors associated with the risk of peritonitis. In 1990, Golper et al, reported that age and living conditions were not the risk factors in

peritonitis in CAPD, but URI, skin infection, and dental treatment were the contributors (27). Korbet et al, in 1993, retrospectively assessed the risk factors of peritonitis among an urban 146 CAPD patients. The results indicated that black race, low education level, and PD system were significantly associated with the rate of peritonitis (11).

Zent R, in 1994, demonstrated that increased rate of peritonitis associated with age, black race, diabetes, and some psychosocial factors in 132 CAPD patients (9). Farias MG, in 1994, studied the risk of peritonitis in African American patients. Factors that were found to be correlated with the risk were student status, rental housing, and substance abuse (10).

Exit site infection from *S.aureus* and *S.aureus* nasal carriage were indicated to be the risk of peritonitis in many studies. Davies SJ, et al, in 1989, studied 217 episodes of peritonitis in 183 patients. Thirty-seven episodes of peritonitis were due to *S.aureus*, and 51.3% of them were associated with exit site infection. In 70% of cases of exit site infection, nasal carriage of *S.aureus* were found in the same strain. They concluded that nasal carriage increased the risk of both catheter infection, and peritonitis (43). Wanten et al, in 1996, also reported that *S.aureus* nasal carriers increased risk for the development of *S.aureus* peritonitis. They studied 54 CAPD patients and found that 31 cases (57%) were nasal *S.aureus* carriers. *S.aureus* peritonitis developed in 6 cases of these group, compared to none in non-carriers (13). Lye et al, in 1994, studied 41 carriers and 105 non carriers of *S.aureus*. The rates of *S.aureus* exit-site infection, peritonitis, and catheter loss, were significantly higher among the carriers (14).

Theoretically, malnutrition and immunodeficiency should be the risk of peritonitis. Andrews et al, in 1996, studied 39 immunosuppressed and 146 non-immunosuppressed CAPD patients. In this study, immunosuppressed patients were younger and had an increased incidence of previous transplantation,

glomerulonephritis, systemic lupus erythromatosus, and vasculitis. The study showed that, immunosuppressed patients had more episodes of peritonitis, required more frequent hospital admission, and required more laparotomies to remove infected CAPD catheters (20).

Lee et al, in 1990, investigated the effect of nutritional status of 79 CAPD patients on the development of peritonitis. The incidences of peritonitis were compared according to the nutritional status of these patients on CAPD. Protein-caloric malnutrition, assessed by a score system based on triceps skinfold thickness, mid-arm circumference, serum albumin level and relative body weight, was demonstrated in 27 patients (34%) among 79 total CAPD patients. The data showed that the incidence of peritonitis was significantly higher in poor nutritional status patients. This study emphasized the role of nutritional status as a risk factors of peritonitis (50).

2.4 Factors which were controversy to be the risk of peritonitis

Factors which were controversy to be the risk of peritonitis were age, causes of chronic renal failure, the presence of DM, and education level. In the aging, the rate of peritonitis and survival time varied in many studies. Nichollis, et al, in 1984 studied 31 CAPD over 60 years old, and found that rate of peritonitis was 0.96 episodes per year per patient. The survival time was 72% at one year and 61% at two year (51). Suh H, 1993 found the lowest rate of peritonitis. The rate was only 0.54 / patient / year in 30 CAPD patients , older than 65 years, with a mean age of 72 years (52).

However, some investigators found worse outcome in old patients. Valente , et al, in 1990, studied peritonitis in older CAPD patients over 55 years. They found that severe catheter - related peritonitis occurred at a rate of 1.41

episodes per patient per year. There were 61 episodes of peritonitis in 31 patients with overall mortality rate of 7% (28). Sreide R, in 1991, studied 13 patients, aging between 70 - 83 years, and found that the average rate of peritonitis of 1.18 per patient per year (26).

Causes of chronic renal failure also were reported to be the risk of peritonitis by the study of Hagelskjaer LH, in 1996. The study showed that patients with polycystic renal disease had a significantly increased risk of peritonitis (6). In contrast Jovanovic D, in 1996, found no correlation between causes of chronic renal failure and frequency of peritonitis (22).

It is still controversial whether DM is the risk of peritonitis or not. Some researcher demonstrated that DM was one of the risk factors .Lye WC, in 1993, carried out a prospective study comparing PD-related infection rates between diabetic and nondiabetic patients treated with CAPD. One hundred and seven diabetic patients and 72 nondiabetic patients were studied. The rate of peritonitis was significantly higher in the diabetic group (23). The same results which showed that DM was the risk factor of peritonitis were reported by Zent R, in 1994 (9), Tielens E , in 1993 (16).

In contrast, some authors found that the rate of peritonitis was not increase in diabetes. Viglino G, et al, in1994, reported ten years experience of CAPD in a group of 301 diabetic patients and a group of 1689 non-diabetic treated in 30 centers in Italy . They found that the first peritonitis episode, the technique survival, and the relative risk of drop-out were not significantly different between the two groups (24) . The data which showed that DM was not the risk factor of peritonitis also supported by the studies of Domrongkitchaiporn S, in 1994 (1), and of Bistrup C, in 1995 (7).

As mentioned , although the presence of DM is controversy to be the risk factor of peritonitis, it may effect the long term out come in CAPD. In the study of

Viglino G , although the risk of peritonitis and technique survival were not significantly different in diabetic cases, cardiovascular diseases, cachexia, and survival time were higher. (24).

2.5 Factors which were proved to Reduce the Rate of Peritonitis

Some factors were proved to reduce the rate of peritonitis. Twin bag system was one of the factors accepted to lower the risk of peritonitis by many investigators. Tielens E, in 1993, analyzed the factors associated to the peritonitis in 100 patients. Patients on the twin-bag system showed a significant increase in the peritonitis-free interval in comparison with patients using other systems (16). The following study of Tofte-Jensen in 1994 (18), and Kiernan L, in 1995 (17), Wanten GJ, in 1996 (2), and Harris DC, in 1996 (15), also gave the same results.

The other factors that can lower rate of peritonitis are Y-set technique and Luer lock with iodine instillation at the connecting site. Y-set is a disconnect systems using a flush-before-fill technique. Holley JL, in 1994, reported that peritonitis, exit site and tunnel infection rates were all significantly lower in the Y-set patients in 119 cases (19). In 1994, Domrongkitchaiporn S, et al, showed the lower rate of peritonitis in Luer lock with iodine instillation at the dialysis bag connector site than the standard spike technique (1).

2.6 Study in Thailand

In Thailand , there have been no studies in older CAPD patients. Chan-O, et al, in 1993, studied in the middle aged patients (mean age = 45.3 years) and found that rate of peritonitis was 0.74 ± 0.94 episodes per year. They found that, the right

to get government medicare system, the failure to practice aseptic techniques, and the poor personal and accommodation hygiene were associated with increased risk of peritonitis. The most common organism caused peritonitis was coagulase negative staphylococci (29).