

The Effect of Catheter Placement Technique on Technical Survival in Patients Receiving Continuous Ambulatory Peritoneal Dialysis

Sürekli Ayaktan Periton Diyalizi Hastalarında Kateter Takma Yönteminin Teknik Sağ Kalım Üzerine Etkileri

ABSTRACT

OBJECTIVE: The effect of the catheter placement method on technical survival was evaluated in patients receiving peritoneal dialysis and followed in our Nephrology Department.

MATERIAL and METHODS: Catheter placement method and functions were assessed retrospectively from medical records of 313 patients. Peritoneal catheter placement was achieved by the percutaneous technique in 220 (70.3%) patients and by the surgical technique in 93 (29.7%) patients.

RESULTS: Technical survival rates were 89.1%, 84% and 74.1% in the first, third and fifth year, respectively. The technique complication incidence was higher in patients where the catheter were placed percutaneously (31.3%) than those who had undergone surgical catheter placement (19.5%) ($p=0.27$). Incidence of exit site infection was lower in patients who were catheterized by the percutaneous technique (20.1%) than those catheterized by the surgical technique (47.3%) ($p<0.001$). Herniation incidence was lower in patients where the catheter was placed percutaneously (3.6%) than surgically (17.2%) ($p=0.001$). There was no relationship between catheter placement method and peritonitis, leakage or revision requirement.

Conclusion: Our results indicate that the catheter placement method could improve patient comfort and reduce cost by altering the frequency of technical complications and exit site infection. Catheter placement by the percutaneous route can be achieved safely and effectively by experienced nephrologists.

KEY WORDS: Peritoneal dialysis, Catheter placement method, Technique survival

ÖZ

AMAÇ: Bu çalışmada Hastanemiz Nefroloji kliniğinde izlenen periton diyaliz hastalarında teknik sağkalıma kateter takma yönteminin etkisi araştırıldı.

GEREÇ ve YÖNTEMLER: 313 hastanın kayıtları incelenerek kateter takma yöntemleri ve kateter işlevleri geriye dönük olarak değerlendirildi. Hastalardan 220'sine (%70,3) perkutan, 93'üne (%29,7) cerrahi yöntemle periton diyaliz kateteri uygulandı.

BULGULAR: Birinci, üçüncü ve beşinci yılda kateterlerin teknik sağkalım oranı sırasıyla %89,1, %84 ve %74,1 olarak saptandı. Teknik komplikasyon görülme sıklığı perkutan yöntemle kateter takılanlarda (%31,3), cerrahi yöntemle kateter takılanlardan (%19,5) daha fazla saptandı ($p=0,027$). Çıkış yeri enfeksiyon görülme sıklığı perkutan teknikle kateter takılan hastalarda (%20,1), cerrahi teknikle kateter takılanlardan (%47,3) daha az saptandı ($p<0,001$). Herni oluşma sıklığı perkutan teknikle kateter takılanlarda (%3,6), cerrahi teknikle kateter takılanlardan (%17,2) daha az bulundu ($p=0,001$). Kateter takma yöntemi ile peritonit, kaçak, sızıntı, revizyon ihtiyacı arasında ilişki saptanmadı.

SONUÇ: Bizim sonuçlarımız kateter takma yönteminin teknik komplikasyon ve çıkış yeri enfeksiyon sıklığını değiştirerek hasta maliyet ve konforunu iyileştirebileceğini göstermektedir. Perkutan teknikle periton diyaliz kateteri yerleştirilmesi deneyimli nefrologların ellerinde güvenli ve etkin bir yöntem olarak uygulanabilir.

ANAHTAR SÖZCÜKLER: Periton diyalizi, Kateter takma yöntemi, Teknik sağkalım

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INTRODUCTION

Peritoneal dialysis (PD) is a process based on the permeability of the peritoneum to reestablish the fluid and electrolyte balance and to remove toxic substances from the blood by diffusion and ultra-filtration via draining ready-made solutions into the peritoneal cavity, allowing them to stay there for some time and draining them out, in patients with acute and chronic renal failure. This method is used increasingly in the management of patients with end-stage renal disease due to some advantages over haemodialysis and advances in application technique.

PD is performed through catheters placed into the patient's peritoneal cavity. The peritoneal catheter can be placed by percutaneous, laparoscopic or open surgical methods (1-3). Although open surgical placement of the catheter is easy and widely used technique, it can lead some complications such as bleeding, leakage, intestinal perforation (4). However, the percutaneous technique is easier and requires less preparation in CAPD catheter placement (3).

Technique failure can occur due to inadequate dialysis, ultra-filtration insufficiency, exit site and/or tunnel infection, peritonitis and mechanical issues. In the present study, the effect of catheter placement method on technical survival was evaluated in CAPD patients who have been followed in our Nephrology Department.

MATERIAL and METHODS

Data from 313 of 386 patients with available medical records who had been followed for up to 12 years at the Antalya Teaching Hospital between 1997 and 2009 were evaluated retrospectively. There were 194 male (62%) and 119 female (38%) patients. Patients who started to receive PD before the age of 15 and who had a PD duration shorter than 3 months were excluded from the study. Peritoneal catheter placement was achieved through the percutaneous technique in 220 (70.3%) patients by nephrologists and the surgical method in 93 (29.7%) patients by general surgeons. Bowel preparation (with enema) was performed before the percutaneous method. 2000 cc fluid was administered between the peritoneal layers from an entrance located 2 cm below the umbilicus. A subcutaneous tunnel was formed after placement of a Tenckoff catheter between the peritoneal layers.

Inadequate dialysis, ultra-filtration insufficiency, exit site and/or tunnel infection and conversion to haemodialysis due to peritonitis and presence of any mechanical problem was defined as a technical failure.

Statistical analyses were performed by using SPSS software version 10.0. Statistic assessments were done by using logistic regression analysis, and the Chi-square and Mann-Whitney U tests. $P < 0.05$ was set as significant.

RESULTS

Mean age for dialysis onset was 51.9 ± 17.6 years and mean dialysis duration was 27.5 ± 27.1 months (median 20 months; range: 3-166 months). Hypertension was the most common cause of end-stage renal disease (36.1%), followed by diabetes mellitus (31.3%). During the follow-up period, 212 patients ceased peritoneal dialysis. The technical survival rate was found as 89.1% in first year, 84.0% in third year and 74.1% in fifth year. There was no relationship between technique survey and age, gender, dialysis duration, and diabetes mellitus ($p > 0.05$).

The complication rates for patients in whom a percutaneous or surgical method was used to place the catheter is presented in Table I.

Evaluation of the study patients showed that there were 161 peritonitis episodes (peritonitis rate 0.31 episode/patient years). Peritoneal dialysis was discontinued in 36 patients (17%). No relationship was found between the catheter placement method and peritonitis, leakage or revision requirement ($p > 0.05$).

DISCUSSION

The use of PD is increasing in Turkey parallel to world practice. There were 6370 patients undergoing peritoneal dialysis in Turkey according to the 2007 registries of Turkish Society of Nephrology (TNS). (Registry of The Nephrology, Dialysis and Transplantation in Turkey, Registry 2007. Istanbul.: Turkish Society of Nephrology, 2007. Available at: <http://tsn.org.tr/documents/registry/TND%20Registry%20kure%20son.pdf>.) Turkish studies have reported the technical survival rate as 96.9%, 84.5% and 68.8% in the first, third and fifth year, respectively (5,6). In the present study, it was found that technical survival rates in the first, third and fifth year were 93.3%, 85.0% and 72.4%, respectively, in agreement with current literature. As in our study, peritonitis is mentioned as the most common

Table I: Comparison of catheter placement technique.

	percutaneous technique	surgical technique	P value
Percentage of technique complication	31.3	19.5	0.027
Percentage of exit site infection	20.1	47.3	<0.001
Percentage of herniation	3.6	17.2	0.001

cause of technical failure in literature (7). Other factors that affect technical survival in PD patients include catheter-related technical issues such as leakage, hernia etc. (8, 9).

PD is performed through catheters placed into the patient's peritoneal cavity. A peritoneal catheter can be placed either by percutaneous, laparoscopic or open surgical methods (1,3). There is controversy about the ideal catheter placement method. Although open surgical placement of the catheter is an easy and widely-used technique, it is associated with a 1.2% mortality and %0.1 morbidity rate (10). The most common complications encountered with this technique were infections, intestinal perforation, exit site leakage and herniation (4). PD catheter placement under direct visualization with laparoscopic surgical method can be performed easily and more safely; it is also more cost-effective and less invasive. There are data suggesting that the laparoscopic method is associated with better outcomes (1, 3, 11). However, percutaneous PD catheter placement is the easiest and most cost-effective technique that can be performed safely by nephrologists with minimum preparation. Better outcomes could be obtained with increasing experience.

A choice between the above-mentioned methods depends on the facility and experienced operators in the facility. Our comparison in terms of technical complication and survival of patients with catheters placed by the percutaneous or surgical methods revealed that the technical complication incidence was higher with the percutaneous method than the surgical catheter placement method. However, exit site infection and herniation frequency was lower with the percutaneous method than surgical one. This could be explained by increasing experience with the percutaneous method as the percutaneous method was performed in most of our patients (70.3%).

Peritonitis is the most common cause of technical failure in patients undergoing peritoneal dialysis (7). Other studies also suggest that the catheter placement method and catheter type do not alter the peritonitis incidence, similar to our study.

Our results indicate that the catheter placement method could improve patient comfort and reduce cost by altering the frequency of technical complications and exit site infection. Catheter placement by the percutaneous route can be achieved safely and effectively by experienced nephrologists.

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