

# DIALYSIS/TRANSPLANTATION ΑΙΜΟΚΑΘΑΡΣΗ/ΜΕΤΑΜΟΣΧΕΥΣΗ

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A. San

Anatolia Kidney Foundation, Ankara,  
Turkey

Η ιστορία της περιτοναϊκής  
κάθαρσης στην Τουρκία

Περίληψη στο τέλος του άρθρου

## The history of peritoneal dialysis in Turkey

Peritoneal Dialysis (PD) in Turkey was first applied in 1950s by Kemal Önen in Istanbul Haseki Treatment Clinics. In Ankara, it was first applied by Nihat Sipahi at the Ankara University Faculty of Medicine in 1958. In modern sense, PD applications started in Istanbul University, Faculty of Medicine Treatment Clinic in 1965. In Ankara, it was first applied at Hacettepe University, Faculty of Medicine by Şeref Zileli in 1969. CAPD was first applied at Istanbul University Faculty of Medicine in 1981. The recording system started in 1994 by the coordination of the Turkish Society of Nephrology and Ministry of Health. 2018 reports show that there are 139 PD centers and 3192 patients in Turkey.

### Key words

Continuous ambulatory peritoneal dialysis (CAPD)  
First applications  
History of peritoneal dialysis  
Peritoneal dialysis (PD) to day  
Turkey

### 1. INTRODUCTION

J. Kolff developed the first functioning artificial kidney for the treatment of patients with uraemia in Holland in 1940. Frank Seligman and Jacob Fine put peritoneal dialysis (PD) into practice in 1946 with peritoneal irrigation. In 1950, Odell conducted a literature review of 101 patients and these procedures were reviewed.<sup>1–4</sup>

In Turkey, Kemal Önen first applied PD with Celal Öker and Tahsis Artunkal on two patients with septic abortion and acute renal failure (ARF) by placing two catheters in the peritoneal cavity on both sides, filling from one side and draining from the other side with Ringer's solution in the early 1950s.<sup>5–7</sup> The first publication on the history of PD in Turkey was by K. Önen et al 1968<sup>8</sup> (figures 1, 2).

In modern sense, Uğur Ülkü first applied PD at the Istanbul University Faculty of Medicine Treatment Clinic in 1965. The first domestic commercial PD solutions were produced in 1965–1966. Ali Gürçay applied PD with peritoneal catheters which he brought to Turkey from the USA in acute renal failure cases in Erzurum, a city in eastern Turkey in 1971.<sup>6–10</sup>

In 1964, the first acute peritoneal dialysis applications started by Necdet Koçak and Ercüment Özdağ. Between 1968 and 1970, chronic renal failure patients received intermittent PD. After 1973, it became routine to apply chronic intermittent PD on patients. In 1979, with the use of Tenckhoff catheter, patients themselves began to apply

chronic intermittent PD. Necdet Koçak and his team applied bottle dialysis on the 18 patients using Tenckhoff catheter by waiting for 6–8 hours in the abdomen, as Popovich

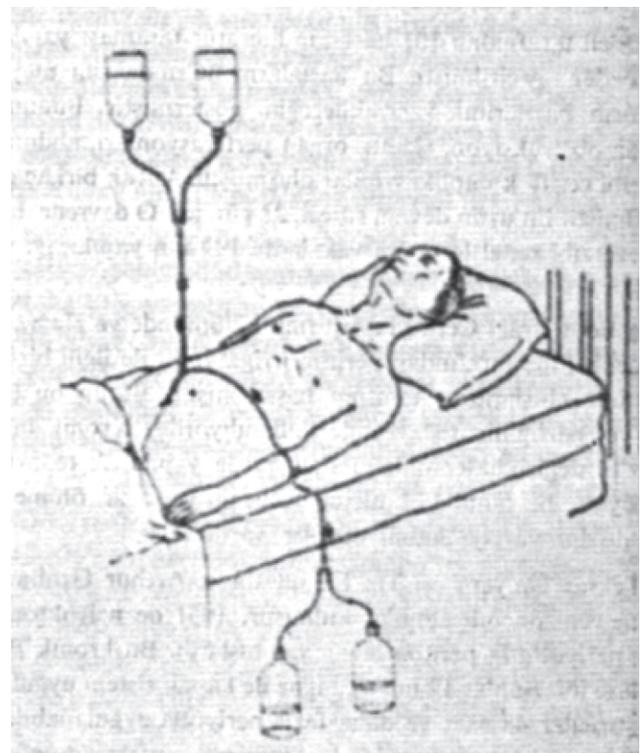
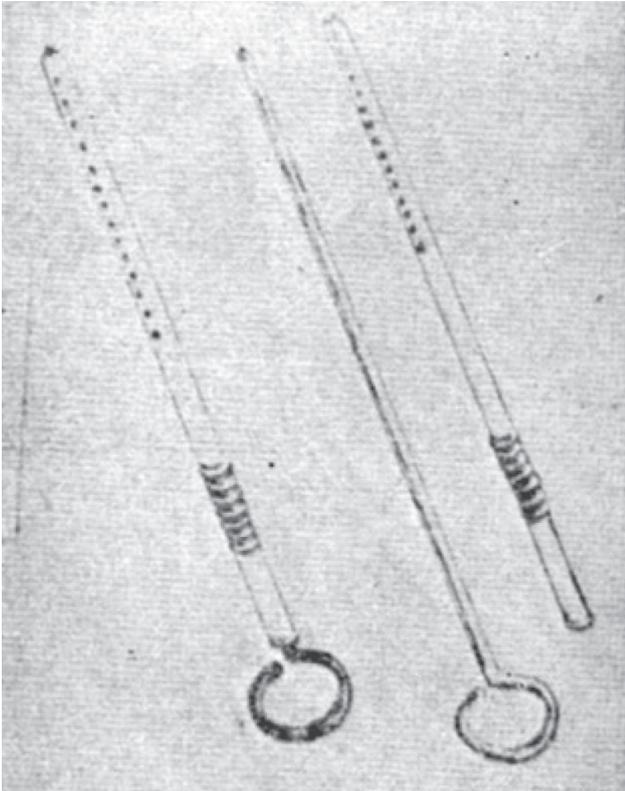


Figure 1. Modification of Maxwell's practice was first applied from Grollman's method in Turkey.<sup>9</sup>



**Figure 2.** Weston and Robert's chuck catheter first used in Turkey.<sup>9</sup>

and Moncrief described. Bottle dialysis was applied on two patients at Akdeniz University, Faculty of Medicine in 1982, but it was not published.<sup>10-12</sup> Ambulatory PD in the modern sense started in 1985 with plastic vacuum bags and Braun connection sets and Tenckhoff-type silastic permanent catheters. The first article on Continuous Ambulatory Peritoneal Dialysis (CAPD) was published in Ankara Medical Bulletin.<sup>9-12</sup>

After Ayla San was appointed to establish the Faculty of Medicine and Department of Nephrology in Atatürk University in 1973, she first applied hemodialysis and later PD to outpatients. She started CAPD application at the Atatürk University Faculty of Medicine, Erzurum in 1992<sup>9</sup> (fig. 3).

At the same time, Semra Bozfakioğlu started CAPD at Istanbul University in 1994.

Automatic PD (APD) applications have also been implemented.<sup>8,10</sup> CAPD bags were produced by Eczacıbaşı Company. The Turkish Multicentre Peritoneal Dialysis Study Group contributed to the regulations for its clinical use (1998).<sup>13</sup> Research has progressed greatly in Turkey since 2008 and about 316 scientific publications on PD have emerged.<sup>14-16</sup>



**Figure 3.** An outpatient on peritoneal dialysis (PD) at Erzurum Atatürk University (1980).

## 2. PERITONEAL DIALYSIS TYPES APPLIED TODAY<sup>9</sup>

### 2.1. Acute Peritoneal Dialysis

In this classical technique, a temporary catheter is used.

### 2.2. Chronic Intermittent Peritoneal Dialysis (IPD)

Dean's prosthesis and Gotlob's device or continuous peritoneal catheter (Tenckhoff) used as catheters.

### 2.3. Continuous Ambulatory Peritoneal Dialysis (CAPD)

Permanent peritoneal catheter used.

### 2.4. Automated Prolonged Dwell Peritoneal Dialysis (PDPD) and Continuous Cyclic PD (CCPD)

This is essentially another form of CAPD. The difference is that the solutions are changed automatically at night.

### 2.5. Continuous Equilibration Peritoneal Dialysis (CEPD)

It is similar to CAPD except that the patients are not

ambulatory. CEPD was applied to five hypercatabolic and seven non-hypercatabolic patients with ARF or exacerbation of CRF.

All of these PD types can be applied in Turkey.

### 3. RESULTS

#### 3.1. Worldwide Firsts in peritoneal dialysis<sup>17</sup>

- 1923: Ganter (University of Wurzburg)
- 1924: USA and Germany Intermittent PD
- 1976: Popovich et al. First CAPD experience
- 1978: Oreopoulos et al. CAPD with plastic bags (Toronto Western Hospital Technical).

#### 3.2. Peritoneal Dialysis in Turkey<sup>18</sup>

- Late 1950s: ARF patients were treated through bottle dialysis
- 1968: Chronic Renal Failure (CRF) patients were treated with bottles
- 1980s: A small number of CRF patients were treated with CAPD with imported bags
- 1989: The first CAPD was applied at the Paediatric Department of the Ankara Medical Faculty (N. Tümer, M. Ekim)
- Since 1994: CRF patients were treated with CAPD, with bags produced in Turkey.

#### 3.3. First practices in acute peritoneal dialysis<sup>19</sup>

- Early 1950s: Treatment Clinic at Istanbul Haseki Hospital (C. Öker, T. Artunkal)
- 1958: Ankara University Medical Faculty (N. Sipahi)
- 1969: Hacettepe University Medical Faculty (Ş. Zileli)
- 1967: Ege University Medical Faculty (S. Yeğinboylu, A. Cura)
- 1971: Atatürk University Medical Faculty (A. Gürçay)
- 1978: Istanbul Social Security Institution Training Hospital (F. Karakullukçu)
- First Domestic Peritoneal Dialysis Solution Production, produced by Eczacıbaşı (1994)

#### 3.4. First applications in continuous ambulatory peritoneal dialysis<sup>19</sup>

- 1981: Istanbul University Medical Faculty (N. Koçak et al)
- 1982: Works initiated on two patients at Akdeniz University Medical Faculty, but they were not published
- 1982–1983: Atatürk University, Medical Faculty practice on two patients (A. San)

- First thesis on CAPD (1983, A. San)
- 1984: Ankara University Medical Faculty (B. Erbay, O. Karatan)
- 1985: CAPD results of Istanbul Samatya Istanbul Social Security Institution Training Hospital as presented at the congress held in Erzurum (F. Karakullukçu).

### 4. DISCUSSION

#### 4.1. According to the Turkish Society's of Nephrology (TSN) 2018 Report<sup>20</sup>

- A decline in the number of patients undergoing PD after the peak in 2008 is noteworthy. There is a clear downtrend, which is continuing for a decade.
- According to USRDS data, although hemodialysis (HD) is the most common dialysis type worldwide, in Turkey PD is widely used.
- The aetiology of decreasing PD rates seems to be multifactorial. There is no significant increase in new recruited patients (2017: 876/2018: 886). Moreover, the drop-out rate is high (total deaths or modality switches: 1,007). Renal transplantation was performed on 157 patients (5.0% of all PD patients).
- Inadequate dialysis and PD-related infections seem to be the most important factors for switching to HD, followed by mechanical complications and ultrafiltration failure.
- The most common non-infectious complications in PD patients are obesity and hernias.
- It is noteworthy that PD patients are younger than HD patients.
- The ratio of patients with hypoalbuminaemia is higher in PD than in HD.
- Cardiovascular diseases are the most common death causes among PD patients, followed by cerebrovascular diseases and infections.
- The number of patients (including paediatric patients) who started PD for the first time in 2018 is 886 (CAPD: 669 and APD: 217) (tables 1–4).

**Table 1.** Distribution of prevalent peritoneal dialysis (PD) patients according to peritoneal membrane permeability at the end of 2018 (according to data obtained from 32 centres).<sup>20</sup>

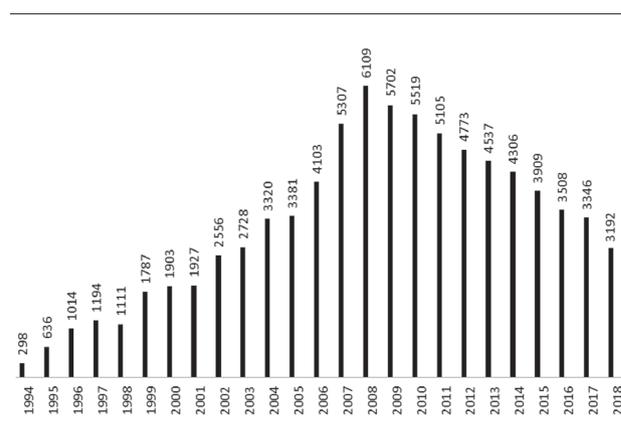
	n	%
Low	85	9,06
Low-average	332	35,40
High-average	365	38,91
High	156	16,63
Total	938	100,00

**Table 2.** Distribution of causes of transfer to hemodialysis (HD) in prevalent peritoneal dialysis (PD) patients in 2018.<sup>20</sup>

	n	%
Inadequate dialysis	148	30,33
PD-related infection	93	19,06
Mechanical complications	88	18,03
Ultrafiltration failure	77	15,78
Patient preference	43	8,81
Psychosocial causes	22	4,51
Other	17	3,48
Total	488	100,00

**Table 3.** Number of peritoneal dialysis (PD) centres at the end of 2018 in Turkey.<sup>20</sup>

	n	%
Ministry of Health	74	53,24
University	48	34,53
Private	17	12,23
Total	139	100,00

**Table 4.** Number of peritoneal dialysis patients in Turkey.<sup>20,21</sup>

## 5. CONCLUSIONS

The 2018 Joint Report of the Ministry of Health and the Turkish Society of Nephrology shows that, in Turkey, there are 139 PD centres and 2,139 patients, 1,053 on CAPD and 3,192 on APD.

With the contribution scientific research and experience, PD, which started 50 years ago in Turkey, has reached world standards.

## ΠΕΡΙΛΗΨΗ

### Η ιστορία της περιτοναϊκής κάθαρσης στην Τουρκία

A. SAN

Anatolia Kidney Foundation, Ankara, Τουρκία

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Η περιτοναϊκή αιμοκάθαρση (PD) στην Τουρκία εφαρμόστηκε για πρώτη φορά τη δεκαετία του 1950 από τον Kemal Önen στην κλινική θεραπείας Haseki της Κωνσταντινούπολης. Στην Άγκυρα, εφαρμόστηκε για πρώτη φορά το 1958 από τον Nihat Sirahi στη Σχολή Ιατρικής του Πανεπιστημίου της Άγκυρας. Στη σύγχρονη εποχή, οι εφαρμογές περιτοναϊκής αιμοκάθαρσης ξεκίνησαν στο Πανεπιστήμιο της Κωνσταντινούπολης, το 1965, στη Σχολή Ιατρικής. Στην Άγκυρα, εφαρμόστηκε για πρώτη φορά το 1969 στο Πανεπιστήμιο Hacettepe στην Ιατρική Σχολή από τον Şeref Zileli. Η συνεχής περιπατητική περιτοναϊκή κάθαρση (CAPD) εφαρμόστηκε για πρώτη φορά το 1981 στο Πανεπιστήμιο της Κωνσταντινούπολης στην Ιατρική Σχολή. Το σύστημα καταγραφής ξεκίνησε το 1994 με συντονισμό της Τουρκικής Νεφρολογικής Εταιρείας και του Υπουργείου Υγείας. Οι εκθέσεις του 2018 δείχνουν ότι υπάρχουν 139 κέντρα περιτοναϊκής αιμοκάθαρσης και 3.192 ασθενείς στην Τουρκία.

**Λέξεις ευρητηρίου:** Ιστορία περιτοναϊκής κάθαρσης, Περιτοναϊκή κάθαρση (PD) σήμερα, Πρώτες εφαρμογές, Συνεχής περιπατητική περιτοναϊκή κάθαρση (CAPD), Τουρκία

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- Corresponding author:*
- A. San, Anatolia Kidney Foundation, Emek Mahallesi 29, Sokak no 9/1, Çankaya/Ankara, Turkey  
e-mail: ayla.san@hotmail.com