An Overview of Dialysis Treatment in
Juntendo Tokyo Koto Geriatric Medical Center During the First Ten Years of Operation:
a Comparison with a Nationwide Statistical Survey in Japan at the End of 2012

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Objective: Juntendo Tokyo Koto Geriatric Medical Center (KGMC) has been operated for more than ten years from June 1st, 2002. We analyzed and reviewed dialysis patients admitted to our hospital for ten years, and compared the results with a nationwide statistical survey performed at the end of 2012 in Japan.

Patients and Methods: The subjects were 2,011 patients (1,281 men and 730 women) undergoing maintenance dialysis from June 2002 to December 2012. There were 4 patients who underwent peritoneal dialysis (PD). We evaluated the each patient statistically every year, and analyzed the underlying disease and cause of death during hospitalization.

Results: The number of all and new dialysis patients over the ten-year period increased. The total number of new patients each year was 337 (226 men and 111 women) with the mean age of new patients at 70.8 ± 11.4 years (69.0 ± 11.3 for men vs. 74.4 ± 10.5 for women) and that of all patients at 71.9 ± 10.8 years (70.4 ± 10.6 for men vs. 74.9 ± 10.8 for women). The percentage distribution of all patients over the ten-year period who underwent dialysis according to the underlying disease showed that 58.3% had diabetic nephropathy (DN), 19.5% had nephrosclerosis (NS) and 10.5% had chronic glomerulonephritis (GN). The most frequent cause of death during hospitalization in all years was infection (22.6%), followed by malignancy (17.6%), and cardiac failure (16.0%).

Conclusions: The mean age of patients entering maintenance dialysis treatment decreased to 68.8 ± 11.7 years in 2012 at KGMC, which was nearly in accordance with the mean age of dialysis patients in Japan. The recent increase in aged patients undergoing hemodialysis was attributed to the high incidence of DN. It has been the most common cause of end stage kidney disease (ESKD) in patients receiving chronic dialysis treatment, and this accounts for up to 50% of ESRD patients over the period.

Key words: end stage kidney disease, dialysis therapy, geriatric medicine

Introduction

Tokyo Metropolitan KGMC (Koto Geriatric Medical Center) was established in 2002 with duties being entrusted to Juntendo University in 2004. In 2002, there were 102 beds for patients with general diseases and 86 beds for patients with dementia. In 2004, Juntendo University started to manage the hospital itself as Juntendo Tokyo KGMC and the number of beds increased to 348 (219 for general diseases and 129 for dementia, respectively).

Since the founding of KGMC, we have maintained four to five beds in the dialysis unit and three emergency beds equipped for HD treatment. Initially we accepted only hospitalized patients, but now accept partial outpatients with many complica-
tions. In addition, we started offering peritoneal dialysis (PD) treatment from 2010. In the first five years of operation, there was a tendency towards an increasing number of new dialysis patients, especially amongst the aged population\(^1\).

The number of dialysis patients has been growing every year in Japan; it was 310,007 at the end of 2012 with the number of new dialysis patients at 38,055 and a mean age of 68.5 years\(^1\). Furthermore, the most common primary cause of renal failure among new dialysis patients was DN (44.2%) in 2012\(^2\).

We have always strived to achieve progressive geriatric medicine for patients suffering from kidney disease and hypertension. In order to better understand the current condition of dialysis patients in Japan, we analyzed and reviewed dialysis patients admitted to KGMC for the past ten years, and compared the results with a nationwide statistical survey performed at the end of 2012.

**Patients and Methods**

There were 2,011 patients (1,281 men and 730 women) undergoing maintenance dialysis therapy at KGMC from June 2002 to December 2012. Patients with a history of acute renal failure escaped from dialysis treatment within two weeks were excluded from the study.

We evaluated each patient statistically every year and analyzed the underlying disease and cause of death during hospitalization. These results were weighed against a nationwide statistical survey.

![Figure 1A](image1.png) The number of all dialysis patients each year from 2002 to 2012 in KGMC

![Figure 1B](image2.png) The number of new dialysis patients each year from 2002 to 2012 in KGMC
performed at the end of 2012. Data are expressed as means ± standard deviation (SD).

Results

The number of all and new dialysis patients each year over the ten-year period grew five-fold when compared with the first five years of operation (Figure-1A, B). The total number of new patients each year was 337 (226 men and 111 women) in KGMC. The proportion of males remained consistent over the time course of this study. The mean age of new patients was 70.8 ± 11.4 years (69.0 ± 11.3 for men vs. 74.4 ± 10.5 for women) and that of all patients was 71.9 ± 10.8 years (70.4 ± 10.6 for men vs. 74.9 ± 10.8 for women). The mean age of patients entering maintenance dialysis treatment decreased to 68.8 ± 11.7 years in 2012 at KGMC, which was nearly in

Figure-2  The mean age of new patients each year in KGMC compared to Japan

Table-1  The percentage distribution of patients each year according to the underlying disease in KGMC and Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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<th>All</th>
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<td>45.5</td>
<td>60.0</td>
<td>75.0</td>
<td>72.2</td>
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<td>27.3</td>
<td>16.0</td>
<td>3.6</td>
<td>13.9</td>
<td>19.5</td>
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<td>35.0</td>
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<td>7.1</td>
<td>8.3</td>
<td>14.6</td>
<td>11.6</td>
<td>7.5</td>
<td>15.4</td>
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<td>41.3</td>
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<td>8.5</td>
<td>8.8</td>
<td>9.4</td>
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<td>22.8</td>
<td>21.9</td>
<td>21.0</td>
<td>20.2</td>
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Table-2  Cause of death during hospitalization each year in KGMC compared to Japan

<table>
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<tr>
<td>Infection (%)</td>
<td>66.7</td>
<td>20.0</td>
<td>0.0</td>
<td>16.7</td>
<td>10.0</td>
<td>25.0</td>
<td>0.0</td>
<td>23.1</td>
<td>26.7</td>
<td>30.8</td>
<td>42.9</td>
<td>22.6</td>
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<tr>
<td>Malignancy (%)</td>
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<td>20.0</td>
<td>16.7</td>
<td>8.3</td>
<td>10.0</td>
<td>0.0</td>
<td>18.2</td>
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<td>13.3</td>
<td>30.8</td>
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<td>20.0</td>
<td>33.3</td>
<td>0.0</td>
<td>30.0</td>
<td>50.0</td>
<td>0.0</td>
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<td>20.0</td>
<td>15.4</td>
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<td>16.0</td>
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<tr>
<td>Cachexia/Uremia (%)</td>
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<td>20.0</td>
<td>0.0</td>
<td>16.7</td>
<td>30.0</td>
<td>0.0</td>
<td>18.2</td>
<td>7.7</td>
<td>0.0</td>
<td>7.7</td>
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<tr>
<td>Infection (%)</td>
<td>15.9</td>
<td>18.5</td>
<td>18.8</td>
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<td>18.9</td>
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<tr>
<td>Malignancy (%)</td>
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<td>8.5</td>
<td>9.0</td>
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<td>9.2</td>
<td>9.2</td>
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<td>9.4</td>
<td>9.8</td>
<td>9.1</td>
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<tr>
<td>Heart Failure (%)</td>
<td>25.1</td>
<td>25.0</td>
<td>25.1</td>
<td>25.8</td>
<td>24.9</td>
<td>24.0</td>
<td>23.7</td>
<td>23.6</td>
<td>27.0</td>
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<tr>
<td>Cachexia/Uremia (%)</td>
<td>4.7</td>
<td>2.7</td>
<td>2.3</td>
<td>3.0</td>
<td>3.1</td>
<td>3.1</td>
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<td>2.7</td>
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<td>3.9</td>
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</table>
accordance with the mean age of all dialysis patients in Japan over this period (Figure-2).

The percentage distribution of patients over the entire period who underwent dialysis according to the underlying disease showed that 58.3% had DN, 19.5% had nephrosclerosis (NS), and 10.5% had chronic glomerulonephritis (GN) (Table-1). DN has been the most common cause of ESKD in patients receiving chronic dialysis treatment in KGMC. In addition, there was also a significant rise in the percent of patients with NS, as compared to the nationwide statistical survey in Japan. Conversely, there was significant decrease in the proportion of patients with GN over the study period.

There were four cases of patients who underwent peritoneal dialysis with different causes of renal disease, i.e. GN, NS, and polycystic kidney disease.

106 patients (69 men and 37 women) died after admission to KGMC during the study period. The mean age of the deceased was 76.0 ± 9.8 years (74.6 ± 8.4 for men vs. 78.7 ± 11.6 for women). The most frequent cause of death during hospitalization in all years was infection (22.6%), followed by malignancy (17.6%), and heart failure (16.0%) (Table-2). In the nationwide survey in 2012, the leading cause of death in Japan was heart failure (27.2%) 1).

Discussion

There has been a remarkable rise in the number of patients receiving dialysis therapy in Japan. In particular, male participants except those with type 1 diabetes were likely to develop ESKD, which might be explained in part by differences in HbA1c levels, hypertension and lipid levels between the sexes 3).

In addition, the demographics of the population have changed from relatively young patients with primary GN to older patients with systemic co-morbidities such as diabetes and cardiovascular diseases 4). This is comparable to epidemiological studies conducted in Europe 5) 6).

In KGMC, most patients were relatively old without GN and there was an increase in older patients with DN and NS. Currently, DN has reached epidemic proportions worldwide 7). In Japan, it was the most common primary disease among the entire dialysis patient population from 1998, followed by chronic GN. In our institution, this accounts for up to 50% of ESKD patients over the period, presumably the result of a higher prevalence of type 2 diabetes, secondarily due to ageing, physical inactivity, obesity, etc. In more recent years, diabetes-related ESKD incidences have declined in Europe 6) and US 8). The actual number of new dialysis patients with DN has been approximately 16,000 for the last few years. Reasons to explain the flat trendline may include the early detection and management of DN and improved treatment with the specific blockade of the renin–angiotensin–aldosterone axis.

In Japan, 3% of patients underwent PD treatment in 2012 1). In this study, a total of 4 patients (1.2%) began PD therapy at the Juntendo University Hospital and were cared for at our outpatient clinic, KGMC. They were observed to be younger and without diabetes mellitus. Most of ESKD patients and their families had the tendency to accept HD treatment rather than PD treatment. One factors associated with the lower percentage of patients on PD includes a higher diabetes prevalence 9), since many studies have reported poorer outcomes for PD when compared with HD for patients with DN.

There has been a significant difference in the cause of death as compared with the nationwide survey. Infection and malignancy were major causes of death in KGMC, thereby matching the rising trend in diabetes and an aging population.

Microinflammation is a common finding in HD patients with a history of type-II diabetes mellitus 10). Because the most frequent cause of death during hospitalization during all years was infection in our unit, we should employ an early detection system for the risk factors and proper management of the nutritional status of these patients.

References

3) Costacou T, Fried L, Ellis D, et al: Sex differences in the development of kidney disease in individuals with type 1


