End-stage kidney disease and kidney transplantation in HIV positive patients

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BACKGROUND

End-stage kidney disease (ESKD) is a major complication of HIV infection which particularly affects patients of black ethnicity [1]. Antiretroviral drug therapy (ART) has dramatically improved the outcome of HIV positive patients with ESKD [2, 3]. Kidney transplantation has become a viable treatment modality for HIV/ESKD. Although the overall survival has been favourable, it remains unclear whether kidney transplantation (KT) affords a survival benefit over dialysis in those who are suitable for KT.

AIMS

The aims of this study were:

- To describe the trends in prevalence and incidence of ESKD in HIV positive patients
- To examine the factors associated with ESKD
- To describe the use of and barriers to KT and to compare survival of ESKD patients managed with KT and dialysis.

METHODS

The UK CHIC Study is an on-going observational cohort study collecting data from many of the largest HIV treatment centres in the UK. The current collation includes data from 8 centres that provided routinely available data on renal function.

Identification of ESKD patients

- Review of all HIV positive patients with an estimated glomerular filtration rate (eGFR) <15 mL/min/1.73m² at any point in time for having received permanent renal replacement therapy (pRRT) during the study period (01/2000-12/2011)
- Review of renal databases for HIV positive patients with ESKD
- Suitability for kidney transplantation was assessed for patients who received pRRT from 2005 onwards and required patients to have

  - HIV RNA <50 copies/mL for at least 6 months
  - No medical comorbidities that precluded KT

- Statistical analyses

  - Univariable and multivariable Poisson regression analyses were used to identify factors associated with ESKD
- Survival was calculated from the time of initiation of pRRT using Kaplan-Meier methods and compared by log-rank test
- Follow up was divided into time spent on dialysis “pre-KT”, and for those who underwent KT, follow up from the date of first KT to the last clinic visit (“post-KT,” censored at 31/12/2012).

RESULTS

Between January 2000 and December 2011, 28,630 patients received HIV care at the participating clinics, with a median follow up of 6.4 (2.5, 11.1) years.

- The median age was 38 years (0.4%), 69% were male, and 64% of black ethnicity
- 117 received pRRT during the study period, of whom 115 could be included in the analyses
- HAWI was the commonest ESKD diagnosis (n=54, 46%)
- Patient characteristics at cohort entry according to ESKD status over follow-up are shown in Table 1

Table 1 Characteristics of patients at cohort entry according to ESKD status over follow-up

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ESKD (n=115)</th>
<th>No ESKD (n=27,255)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (IQR)</td>
<td>38 (32-44)</td>
<td>35 (30.4-41)</td>
<td>0.061</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>Male</td>
<td>89 (80.9)</td>
<td>22,346 (78.7)</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td>Black</td>
<td>73 (64.5)</td>
<td>7,324 (25.4)</td>
</tr>
<tr>
<td>Mode of acquisition, n (%)</td>
<td>MSM</td>
<td>29 (25.2)</td>
<td>17,051 (59.7)</td>
</tr>
<tr>
<td>CD4 count, median (IQR)</td>
<td>cells/mm³</td>
<td>207 (19, 339)</td>
<td>360 (10.1, 505)</td>
</tr>
<tr>
<td>Viral load, median (IQR)</td>
<td>log, copies/ml</td>
<td>3.6 (1.7, 4.7)</td>
<td>3.6 (1.7, 4.7)</td>
</tr>
<tr>
<td>eGFR, median (IQR)</td>
<td>ml/min/1.73m²</td>
<td>22 (11.5)</td>
<td>103 (89, 115)</td>
</tr>
<tr>
<td>Treatment (Years)</td>
<td>0</td>
<td>69 (59.5)</td>
<td>20,131 (70.6)</td>
</tr>
<tr>
<td>Hepatitis B co-infection, n (%)</td>
<td>Yes</td>
<td>2 (1.7)</td>
<td>528 (1.8)</td>
</tr>
<tr>
<td>Hepatitis C co-infection, n (%)</td>
<td>Yes</td>
<td>4 (3.5)</td>
<td>471 (2.2)</td>
</tr>
</tbody>
</table>

Prevalence and Incidence of ESKD

There was a steady increase in ESKD prevalence among patients of black ethnicity (from 0.44% (0.25%, 0.78%) in 2000-1 to 1.09% (0.85%, 1.41%) in 2010-11 (p=0.008) (Figure 1A).

There was a 4.5 fold higher ESKD incidence rate (11.4 [95 CI 0.81, 1.47] vs. 0.24 [0.16, 0.32] per 1000 person years for black vs. white other patients) (Figure 1B).

Factors associated with ESKD

In the multivariable model, older age, ethnicity, lower CD4 cell count and HIV RNA level, and hepatitis B and hepatitis C infection were independently associated with ESKD.

Table 2 Results from univariable & multivariable Poisson regression analyses identifying factors associated with ESKD

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>IR (95% CI)</th>
<th>IR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (per 10 year older)</td>
<td>1.28 (1.02, 1.58)</td>
<td>0.939</td>
</tr>
<tr>
<td>Gender (Female)</td>
<td>1.76 (1.36, 2.28)</td>
<td>0.021</td>
</tr>
<tr>
<td>Ethnicity (Black)</td>
<td>0.483 (0.13, 1.67)</td>
<td>0.661</td>
</tr>
<tr>
<td>Mode of acquisition</td>
<td>Heterosexual</td>
<td>5.44 (3.25, 9.10)</td>
</tr>
<tr>
<td>Other</td>
<td>4.07 (1.69, 9.75)</td>
<td>0.0065</td>
</tr>
<tr>
<td>CD4 count (per 10 cells/mm³ higher)</td>
<td>0.99 (0.98, 1.00)</td>
<td>0.016</td>
</tr>
<tr>
<td>HIV RNA (log10 copies/mL lower)</td>
<td>0.99 (0.98, 1.00)</td>
<td>0.016</td>
</tr>
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</table>

REFERENCES


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DISCUSSION

Summary:

- The incidence of ESKD has remained unchanged despite widespread use of ART.
- Excellent survival was observed among patients with ESKD who were eligible for transplantation irrespective of whether they had been maintained on dialysis or successfully transplanted.
- As the majority of patients have advanced kidney disease at the time of HIV diagnosis, ESKD prevention strategies should continue to diagnose HIV infection earlier, especially in those of black ethnicity.