Analysis for Long term Survival of 30 Maintenance Hemodialysis Patients with HIV/AIDS in a Single Center in China

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Abstract

Background: To investigate the long-term survival rate and influencing factors for long term survival of patients who are under the treatment of Maintenance Hemodialysis (MHD) patients while carrying Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) in Beijing Ditan hospital.

Objectives: 30 MHD patients with HIV/AIDS were retrospectively investigated. Patients who were under MHD treatment for ≥ 3 months at a single center, which was the blood purification department of Beijing Ditan hospital, were selected.

Methods: The cases were divided into two groups. The risk factors affecting the survival of patients were compared, and Cox regression was used to predict the independent risk factors affecting the long term survival.

Results: Among 30 MHD patients with HIV/AIDS, The 1 year survival rate was 86.7% (26/30), the 5 years survival rate was 60% (18/30). Cox regression found that HIV clinical stage at effective Antiretroviral Therapy (ART) initiation and urea clearance index (KT/V) were independent risk factors for long term survival of MHD patients with HIV/AIDS.

Conclusion: Effective ART therapy, control of complications of chronic kidney disease and qualified dialysis adequacy may become important survival factors affecting MHD patients with HIV/AIDS.

Keywords: HIV/AIDS • Aintenance hemodialysis • ART • Survival • Urea clearance index

Introduction

Effective ART improves the survival of HIV/AIDS patients [1,2]. In 2000, domestic medical institutions began to provide free ART therapeutic drugs for HIV/AIDS patients, turning HIV infection into a treatable chronic infectious disease. Antiviral drugs and the use of antiviral drugs prolong the survival time of HIV/AIDS patients, which increase the rates of HIV patients complicated with diabetes, hypertension and other chronic diseases, and further increase the incidence of HIV complicated with acute and chronic renal failure [3]. Influenced by both HIV infection and chronic kidney disease, the death risk of patients with HIV complicated with chronic renal failure is increased. At present, the survival and quality of life for this group have been significantly improved through regular hemodialysis, but they still have a high mortality. There are few reports abroad on the survival of MHD patients complicated with HIV/AIDS [4-8]. There are also few studies in China, and there is no study on survival of more than 2 years in China [9]. Therefore, we retrospectively selected 30 patients who were under MHD treatment for ≥ 3 months at a single center, which was the blood purification department of Beijing Ditan hospital. This retrospective study aimed to investigate the factors associated with long term survival of >1 year in 30 patients with HIV/AIDS on MHD.

Materials and Methods

Object of study

It was a single center retrospective study. The subjects were 30 HIV/AIDS patients who had received MHD over 3 months, from January 1, 2008 to December 31, 2016 in the department of blood purification, Beijing Ditan hospital, and capital medical university.

Inclusion criteria:

- All patients were diagnosed as HIV/AIDS and received ART.
- All patients received ≥ 3 month's regular hemodialysis.

The HIV/AIDS diagnosis should meet the guidelines for AIDS diagnosis and treatment [10]. The diagnosis and staging of maintenance kidney disease were based on Kidney Disease Improving Global Outcomes (KDIGO) standard formulated by the national kidney foundation of the United States [11].

Exclusion criteria:

- Dialysis time was less than 3 months.
- Patients switched to peritoneal dialysis or kidney transplantation.
- The outcome was not clear.

Research contents

Demographic data: First dialysis age (grouped according to the age of the United Nations world health organization in 2013: The youth group was <45 years old, the middle aged group was ≥ 45 years old and <60 years old, the older group was ≥ 60 years or older), gender, access at dialysis initiation, course of nephropathy, renal pathology, mean time on dialysis per week, hemodialysis mode, HIV staging, time from HIV diagnosed to dialysis, HIV co-infected with Hepatitis B Virus (HBV) or/and Hepatitis C Virus (HCV), opportunistic infection, Body Mass Index (BMI) after 3 months of regular dialysis, hypertension and diabetes after 3 months of regular dialysis.

Laboratory data: According to the "Blood Purification Standard Operating Procedure (BPSOP)", laboratory indicators were regularly monitored. The numbers of hemoglobin, albumin, intact Parathyroid Hormone (iPTH), KT/V, Urea Reduction Ratio (URR), and predialysis phosphorus were recorded after received 3 months regular dialysis. The first Cluster of Differentiation 4 (CD4) cell count when receiving dialysis was recorded.

End point of study

Following up to the end event or December 31, 2021. The endpoint of survival was all cause mortality.

Statistical analysis

Analysis was performed with Statistical Package for Social Science （SPSS）version 19. Continuous variables were reported as mean ± Standard Deviation (SD), and the normality test was carried out, the data that obeyed the normal distribution were tested by independent sample t test, and the data that did not obey the normal distribution were tested by Wilcoxon rank sum test. Categorical variables were reported as percentages (%) or numbers, and compared with c^2. Multivariate survival analysis was carried out by cox regression analysis with $P<0.05$ as the difference, which was statistically significant (Figure 1).

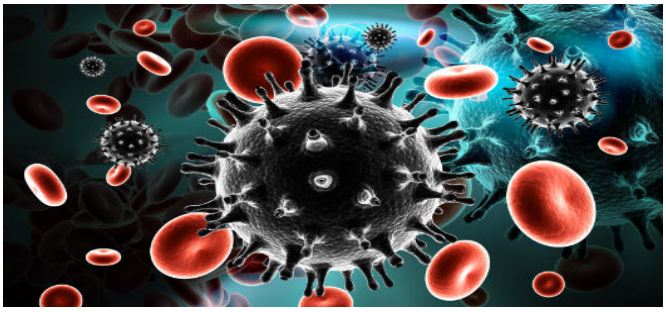

Figure 1: Opportunistic infections.

Results

Clinical epidemiological data

Of 30 MHD HIV/AIDS patients, there were 26 males and 4 females; the ratio of male and female was 6.5: 1. The age ranged from 25 to 60 years old, with an average of 43.80 ± 8.94 years old. There were 16 cases in youth group, there were 13 cases in middle aged group, and there was 1 case in old group. The course from HIV diagnosed to dialysis was 0 years~26 years, with an average of 4.27 years ± 4.95 years; the course of nephropathy ranged from 0 to 7 years, with an average of 3.25 years ± 1.75 years; the dialysis time ranged from 3 months to 60 months, with an average of 46.53 ± 20. 01 months. Dialysis frequency: 28 cases were dialyzed three times a week, and 2 cases were dialyzed four times a week. The access at dialysis initiation: 18 cases had non-cuffed catheter, 3 cases had tunnel cuffed catheter, and 9 cases had arteriovenous fistula. HIV clinical phase: 6 cases were in AIDS phase and 24 cases were in acute and asymptomatic phase. Complication: 27 cases were complicated with hypertension, 9 cases with diabetes, 3 cases with hepatitis B and 2 cases with hepatitis C. Renal pathology: 7 cases were diagnosed as diabetic nephropathy, 3 cases were hypertensive renal damage, 3 cases were others (1 cases were polycystic kidney disease, 2 cases were drug associated chronic interstitial nephrology). Only 4 of 17 patients with primary glomerular diseases underwent renal biopsy: 1 case was focal segmental glomerulosclerosis, 2 cases were membranous nephropathy and 1 case was Immunoglobulin A (IgA) nephropathy. The patient's renal pathology and opportunistic infection.

Co-opportunistic infection

5 cases were infected by bacterial pneumonia, 3 cases were infected by fungal pneumonia, 3 cases were infected by viral pneumonia, 2 cases were infected by pulmonary tuberculosis or extra pulmonary tuberculosis, 4 cases were infected by oral fungal infection, and 4 cases were infected by urinary tract infection. There was no significant difference in opportunistic infection between the two groups.

Prognosis and long-term survival

The average survival time of 30 patients was 46.53 ± 20. 01 months. The 1 year's survival rate was 86.7% (26/30), the 2 years survival rate was 80% (24/30), the 3 years survival rate was 66.7% (20/30), and the 5 years survival rate was 60% (18/30). The patient's long term survival curve. The estimated median survival time is 60 months.

The factors affecting long term survival

The cases were divided into two groups based on dialysis time: ≤ 1 year (short term survival group n=4 cases) and >1 year (long term survival group n=26 cases). There was no significant difference between the two groups in gender, age, course of nephropathy, cause of End Stage Renal Disease (ESRD), proportion of access with non-cuffed catheter, mean time on Hemo Dialysis (HD) per week, number of cases undergoing hemodiafiltration, opportunistic infection, co-infected with HBV or/and HCV, comorbidities, BMI, iPTH and URR ($P>0.05$). There were significant differences between the two groups in HIV course, HIV clinical phase at ART initiation, CD4 count, hemoglobin, albumin, predialysis phosphorus, KT/V ($P<0.05$).

Independent influencing factors

The cox regression analysis was used to carry out multivariate analysis of multiple survival factors of the two groups. Duration of HIV/AIDS-infection at HD beginning, clinical phase at ART initiation, CD4 count, Hb, Alb, predialysis phosphorus and KT/V were compared. Clinical stage at ART initiation and KT/V are independent influencing factors on survival time.

Discussion

Effective antiviral therapy improves the survival rate of people as being HIV positive. Studies have shown that receiving ART treatment can make the expectancy life of HIV/AIDS patients close to that of the general population, and the cumulative survival rates of 1,3,5, and 10 years are 98.4%,97.8%,97.4%,and 95.8% [12]. Regular hemodialysis improves the survival rate of patients with end stage renal disease [13]. However, the mortality of MHD patients with HIV/AIDS is still much higher than that of general people, the mortality and survival related factors of patients with both are still unclear. Some studies believe that the 5 years-10 years survival rate of MHD patients with HIV/AIDS is equivalent to that of patients without HIV/AIDS, and most studies believe that the survival time is shortened [14]. Therefore, we study the survival rate of patients in Beijing Ditan hospital, and analyse the risk factors affecting the survival rate in order to guide clinical medicine.

Our study found that patients mean age at HD beginning was 43.80 years ± 8.94 years old in our dialysis center, and patients at HD beginning was mostly young and middle aged, which was different from patients without HIV/AIDS. Previous studies had confirmed that most MHD patients without HIV/AIDS in China were mostly middle-aged and older group [15]. In 2007-2010, 32.2%-37.3% of ESRD dialysis patients in large cities in China were over 65 years old [16]. In the United States, according to the United States Renal Data System (USRDS), dialysis patients over 65 years old increased from 5.1% in 1973 and 38.1% in 1990 to 60.13% in 2004. The age at HD beginning of our research was also slightly younger compared with MHD patients with HIV/AIDS published by Li Siyan. The 1 year survival rate of patients in our dialysis center was 86.7%. Foreign studies have confirmed that the 1 year survival rate of MHD patients with HIV/AIDS is 67.1-95.2%, which is similar to our research and similar to the 85% survival rate of MHD patients within 1 year in 2014 in the national blood purification case information registration system. However, the 1 year survival rate of MHD patients with HIV/AIDS was significantly higher than 69.14% in Guangxi studied by Li Siyan. The reasons were as follows.

- The age at HD beginning was younger.
- All patients in our study were treated with ART.
- Patients age at HD beginning was young, so there were less comorbidities such as hypertension, diabetes.

The 5 years survival rate of patients in our dialysis center was 60%.

Foreign studies have confirmed that the 5 years survival rate of MHD patients with HIV/AIDS is 62.7%-70.3%, which was similar to our research and similar to the 60% survival rate of MHD

patients within 5 years enrolled in the Beijing Hemodialysis Quality Control and Improvement Center (BJHDQCIC) from 2007 to 2013.

Our study found that HIV clinical phase was an independent risk factor affecting the survival rate of MHD patients with HIV/AIDS. The 2018 China AIDS diagnosis and treatment guidelines divided patients with HIV/AIDS into three phases: Acute phase, asymptomatic phase and AIDS phase. Previous studies confirmed that the death risk of patients with AIDS phase at the beginning of ART was 3.947 times higher than that of patients with acute phase and asymptomatic phase at the beginning of ART. This fully demonstrated the importance of early detection of HIV acute infection and asymptomatic phase before hemodialysis, early detection and antiviral treatment as soon as possible to prevent HIV infection from progressing to AIDS phase, which could better improve the prognosis of patients.

KT/V is an important index to evaluate the adequacy of dialysis. KT/V was used to evaluate the clearance level of small molecule toxins. The 2015 Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines stated that KT/V should be at least 1.2. Previous studies confirmed that the more adequate dialysis was, the longer the survival period of patients was. Dialysis adequacy was closely related to survival rate. In this study, the compliance rate of KT/V in short term survival patients was low. Cox regression pointed out that KT/V was an independent risk factor for HIV patients in our dialysis center. Our study found that the serum albumin, hemoglobin and predialysis phosphorus in patients with dialysis time ≤ 1 year were significantly lower who with dialysis time >1 year. The difference between the two groups was statistically significant. It can be seen that the general condition of patients with dialysis time ≤ 1 year was poor, and the difference in mean dialysis time per week between the two groups is statistically significant. In addition, the influence of compliance and economic status of some patients increased the risk of death.

Conclusion

To sum up, the survival of MHD patients with HIV/AIDS receiving ART does not seem to be significantly different from that of MHD patients without HIV/AIDS. Therefore, effective ART, control of complications of chronic kidney disease and qualified dialysis adequacy may become important survival factors affecting MHD patients with HIV/AIDS.

Limitations

- The sample was small, so there might be some deviations.
- The time span of sample was long, and the time in our study were from 2008 to 2015.3. This is a retrospective study.

Ethics Approval and Consent to Participate

Not applicable.

Human and Animal Rights

No animals/humans were used for studies that are the basis of this research.

Consent for Publication

Survey participants provided implied consent by responding to the survey and could opt out at any time.

Conflict of Interest

None to declare.

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