Prevalence and risk factors for hepatitis C virus infection in continuous ambulatory peritoneal dialysis patients


Nephrology Services of: 1Hospital Dr Peset, Valencia; 2Hospital Clínico Universitario, Valencia; 3Hospital General, Alicante; 4Hospital General, Albacete; 5Hospital Universitario La Fe, Valencia; 6Hospital Virgen de la Arrixaca, Murcia

Abstract

Background. Studies on hepatitis C virus antibodies (Anti-HCV) in CAPD patients are scarce and include a small number of patients. Nevertheless, risk factors related to Anti-HCV in these patients are still subject to controversy.

Purpose of the study. To analyse the incidence and risk factors associated with the presence of Anti-HCV in CAPD patients.

Methods. We studied 255 patients from five different treatment centres of our region. The analysis was repeated after excluding 161 patients who had previously received haemodialysis treatment at least once. Anti-HCV testing was made by the 2nd-generation ELISA. As a supplementary test we used RIBA-4 in three centers and INNOLIA in the other two. Risk factors were analysed using logistic regression model for multivariate analysis.

Results. In the whole group, 29 patients (11.4%) were anti-HCV positive. Logistic regression analysis determined the following variables as independent risk factors: hepatitis previous to CAPD (P < 0.0001, odds ratio (OR): 44.9), Anti HBc positivity (P = 0.019, OR: 9.24), blood transfusions previous to CAPD (P = 0.015, OR: 1.05) and CAPD duration (P = 0.025, OR: 1.02). When patients who had previously undergone haemodialysis were excluded, the prevalence of HCV antibodies was 8.5% (8/94). In this group multivariate analysis showed that Anti-HCV positivity correlated with hepatitis previous to CAPD (P < 0.0003, OR: 126) and Anti HBc positivity (P = 0.002, OR: 41.9).

Conclusions. Our prevalence of hepatitis C virus (HCV) infection in CAPD patients was lower than other renal replacement therapy modalities, and correlated to events occurring mainly before starting CAPD treatment. This technique could be considered as low risk for HCV infection.

Key words: CAPD, HCV antibodies, Hepatitis C, Peritoneal dialysis, Risk factors.

Introduction

Hepatitis C virus (HCV) is an important health care problem in haemodialysis (HD) and kidney graft recipients [1,2], but limited information is available on antibodies against hepatitis C virus (Anti-HCV) in patients undergoing continuous ambulatory peritoneal dialysis (CAPD), and most studies reported include a small number of patients [3-12] and only five of these studies consisted of over a hundred patients [3,8,9,11,12]. On the other hand, most patients start CAPD program after a short period of HD through a catheter, or they are often transiently transferred to HD because of intercurrent complications (catheter removal, hernia, etc.), receiving a few number of HD treatments, and this fact has not been taken account in most of the previous studies.

Several authors reported a prevalence of HCV infection ranging between 1% and 68% in HD patients, which varies from country to country and among treatment centres [1,11,13,14]. The prevalence in renal transplant recipients ranges from 10% to 66% [1,2]. Patients on CAPD require neither extracorporeal circulation nor blood manipulation, and they are not exposed to other patients since it is performed at home. For this reason CAPD may reduce the potential risk for HCV infection. Results from CAPD studies indicate a prevalence of anti-HCV ranging from 1.1% to 15.4% [3,4,9]. Nevertheless, according to results reported, risk factors related to anti-HCV are still controversial.

The purpose of this study was to determine the prevalence of anti-HCV and the risk factors associated with HCV infection in a cohort of 255 CAPD patients, and secondly to perform the same study after excluding all patients who had been given at least one HD treatment.

Correspondence and offprint requests to: Jose Luis Górriz MD, Servicio de Nefrología, Hospital Dr. Peset, Avda. Gaspar Aguilar, 90, 46017 Valencia, Spain.

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Subjects and methods

Two hundred and fifty five CAPD patients were eligible for entry into this cross-over study carried out in five treatment centres of our region. The anti-HCV were determined in this population as well as data on different variables in order to identify the potential risk factors, were collected from the Registry of CAPD patients of the Multicentric Levante Study Group involving the former centers. Prevalence and risk factors were first analysed in the whole group, and later the same analysis was performed again in the group of patients treated only with CAPD (94 patients), i.e. with the exclusion of a total of 61 patients who had previously HD, and 100 patients who had occasionally been transferred to HD because of intercurrent complications, or who had been given HD through a catheter while the peritoneal catheter was inserted.

In the whole group there were 132 (51.7%) males and 123 (48.3%) females, with a mean age of 56.4 years (range 15–86). They had been on CAPD for 29.3 months (1–132). A total of 61 (23.9%) patients had previously been on HD program for periods ranging from 1 to 159 months (mean 43.11) prior to CAPD treatment. Other 100 patients received treatment at least one HD treatment because of intercurrent complications or while peritoneal catheter was inserted. The CAPD group (94 patients), consisted of 54 (57.4%) males and 40 (42.6%) females, with a mean age of 61.4 (range 19–86).

Laboratory tests

Anti-HCV testing was made by the 2nd-generation ELISA System (C-100, C-33c, C-22) in all CAPD centres (Ortho Diagnostic System and Chiron). Positive reactions were verified by re-testing with a recombinant immunoblot assay (RIBA; Ortho Diagnostic System and Chiron) (C-100, C-511, C-33c, C-22) in three centres. The other two centres used the INNOLIA test (Innogenetics®) (C-100, C-33c, NS5 and three core antigens) as a confirmatory test. Alanine-aminotransferase (ALT) levels were considered abnormal when serum values were above the upper normal limits (40 IU/L) in more than two consecutive measurements.

Statistical analysis

Group comparisons were made using the chi-square test applying Yates’ correction, the Fisher’s exact test and the Mann-Whitney’s non-parametric tests when appropriate. A multivariate analysis using the logistic regression model was carried out in order to evaluate the risk factors for HCV infection. A statistical analysis as expressed by odds ratio (OR) and 95% confidence interval was performed, taking a P value of less than 0.05 to indicate statistical significance. SPSS statistical package was used.

Results

Total sample

The anti-HCV prevalence was 11.4% (29/255). Nineteen (65%) of them showed an increase in the ALT levels. All seronegative patients showed normal ALT levels. Of the 29 Anti-HCV patients, 15 (52%) had a documented episode of hepatitis previous to CAPD treatment while only 8 (3%) were found in seronegative patients (P<0.0001). Patients with anti-HCV had a significantly higher HBc antibody positivity rate (28%) than those with negative anti-HCV (9%) (P=0.006), they were older (P<0.0001), and underwent a longer duration of CAPD than seronegative patients (P=0.018). Twelve of Anti-HCV positive patients (41%) had previously been on HD program (P=0.034), but no significant difference was observed regarding Anti-HCV positivity when we compared patients who had received HD at least once, and those who had never undergone HD. Ten of the Anti-HCV positive patients (34%) had never been transfused, but seropositive patients received a higher number of blood units before CAPD (8.3±14.1) than seronegative patients (2.8±7.4) (P<0.001). No significant differences in sex, CAPD centre, etiology of renal disease and number of blood transfusions during CAPD treatment were found.

When the stepwise logistic-regression analysis was performed, hepatitis previous to CAPD treatment, HBc antibody positivity, blood transfusions previous to CAPD and duration of CAPD were associated with a significant risk of anti-HCV positivity (Table 1).

CAPD Patient Sample (excluding previous HD)

When patients who only underwent CAPD were analysed, a lower prevalence of anti-HCV (8.5%) (8/94) was observed as compared with the overall group. In the univariate analysis a significant correlation was found between anti-HCV and history of previous hepatitis (P<0.0001) (4/8/6), presence of anti-HBc (P<0.0001), and elderly age (P<0.032). In contrast, no significant differences were observed regarding the duration of CAPD, the number of blood transfusions and the other variables analysed. Five Anti-HCV positive patients (62%) had never been transfused. Risk factors for the presence of anti-HCV identified by the logistic regression analysis were history of hepatitis previous to CAPD and anti-HBc positivity (Table 2). The number of blood transfusions before CAPD treatment was not identified as a risk factor.

Discussion

Prevalence rates were similar to those reported by other authors [3–11], showing a decrease when HD patients were excluded [4,6,11]. These figures are much lower than those reported for HD [1,3,13,14], or in renal transplantation [1,2]. Rates as low as 1.1 or 1.9% have been reported on CAPD by some authors [3,9] in a series including 278 and 269 patients respectively. This low prevalence could be associated with the absence of blood manipulation or extracorporeal circulation in this kind of therapy, which is performed through a closed system at home. This situation could result from a lower risk of cross-over infection compared to HD treatment [3,6]. In our CAPD patients we found similar rates to those reported by other authors [15,16] in patients with chronic renal failure.
in our country. They showed rates of 7.9% and 8.2% analysing 226 and 318 patients respectively. These data, suggest that CAPD treatment could be considered as a 'protective' technique against risk for HCV infection.

The most important risk factor for Anti-HCV was hepatitis history previous to CAPD, as other authors have reported [4,7], indicating that HCV infection occurs mostly before CAPD treatment begins. The presence of anti-HBc as a risk factor for HCV infection is controversial [5,8,17]. Although some authors have reported no significant correlation regarding Anti-HBc positivity [5,7], our study revealed a significant relationship between the presence of anti-HBc and anti-HCV, which has been recognised by others [7,11]. Before 1989, the presence of anti-HBc and increased ALT levels were considered surrogate markers for detecting non-A, non-B hepatitis in blood donors [17], and their value as a risk factor for C HCV has been confirmed in recent studies [18]. This could be explained by a common transmission via for both hepatitis B virus and HCV infection.

Although transfusions have been identified as a risk factor for C virus transmission [1], their significance as a risk factor is controversial [19,20]. As observed in our study, some authors have reported that the anti-HCV prevalence is consistent with the number of transfusions received [5,7], although, in other studies the number of transfusions did not correlate with the anti-HCV prevalence [8,19,20] which may be due, among other factors, to a bias of data collected on the number of transfusions [19]. In our study, the number of transfusions received previous to CAPD treatment was identified as a risk factor, nevertheless with a minimum independent prognostic value (odds ratio 1.05). In fact, when patients who had previously undergone HD were excluded, the number of transfusions prior to CAPD, was not identified as a risk factor for the presence of anti-HCV, which suggests that the higher number of transfusions received could possibly be linked to HD treatment. A prolonged time on CAPD of seropositive patients, could involve a longer exposure to the virus [1,13], nevertheless this fact was controversial in CAPD patients [4,5], in contrast to HD patients [1,19].

The purpose of excluding HD patients was to obtain a group which could accurately detect the risk factors related to HCV infection in CAPD patients, and it was again observed that these factors were already present when CAPD was started (history of hepatitis and anti-Hbc). When HD patients were excluded, a decrease in the prevalence rate of Anti-HCV was observed, and this suggested that some patients acquired HCV infection while they were on HD.

When almost all the transmission routes through blood transfusions are controlled [21], other via which are only partially known, have to be further investigated as likely cross infection sources which may play an important role in this context, especially in HD patients [12].

In summary, our results indicated that the prevalence of anti-HCV in CAPD patients is lower in comparison with other modalities of renal replacement therapy, particularly HD, and it seems to be related to events which basically occurred prior to CAPD treatment. This form of therapy implies practically the absence of cross infection, so it could be considered as a low-risk technique for hepatitis C virus infection.

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