

# **Hemodialysis Access Surgery – Is there an Increased Risk of Acquiring Hepatitis C Virus Compared to Other Elective Vascular Interventions?**

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**Introduction:**

Hepatitis C infection is caused by the Hepatitis C virus (HCV), a RNA virus of the *Flavivirus* family. The infection turns chronic in 75% of patients,<sup>1</sup> and can lead to liver cirrhosis,<sup>2,3</sup> liver failure,<sup>4,5</sup> and hepatocellular carcinoma.<sup>6-9</sup>

In the past decade, substantial improvements have been attained in the treatment of HCV infections with cure rates varying between 80% and 99%.<sup>10,11</sup> However, optimal therapeutic results are only achieved if treatment commences early in the course of disease. Therefore, it has been proposed that health care workers undertaking high risk exposure prone procedures should have routine evaluation of HCV status to ensure early therapy initiation.<sup>12</sup>

The reported prevalence of hepatitis C among hemodialysis patients varies considerably from 8.5% to 43.9%<sup>13-16</sup> and is notably higher than the reported 0.4% to 0.7%<sup>17</sup> among the general population in developed countries. Therefore, healthcare professionals – and specifically access surgeons – intervening on patients on chronic hemodialysis have to be considered at high risk of exposure and infection with HCV.

In order to determine, whether dedicated access surgeons have a significantly higher risk of acquiring hepatitis C infection compared to other vascular surgeons, the aim of this study was to assess the prevalence of hepatitis C in patients undergoing chronic hemodialysis and to compare that to the prevalence of patients undergoing elective vascular interventions.

**Patients and Methods:**

The study was approved by the hospital's local ethic committee (EK 05-068-NZ). A retrospective data analysis of all patients on chronic hemodialysis from January 1998 to December 2002 was conducted, evaluating the prevalence of anti-HCV antibodies and positive HCV RNA PCR of these patients. During this period 285 patients were hemodialysed at the department of nephrology.

As a comparative group, hepatitis C status among patients admitted for elective vascular surgery was assessed from January 2000 to December 2002.

All blood samples were taken during routine visits, patient data were regarded complete and hence evaluable when both, anti-HCV antibody ELISA test and HCV PCR were present.

**Statistical analysis:**

For proportions, we calculated 95% Confidence Intervals (CI95) using Fleiss Quadratic approximation of confidence intervals binomial distribution.<sup>18</sup>

Analysis of the data was performed using Epi Info version 3.3.2 (CDC, Atlanta, GA.). Two-tailed p-values were calculated by applying the Chi-square test or Fisher's exact Test, where appropriate. Odds ratios (OR) were calculated together with 95% Confidence intervals (CI95), and Cornfield correction was used, if appropriate.

**Results:**

Of 285 patients on chronic hemodialysis, 202 (71%) had both, antibody test for HCV and specific HCV RNA PCR testing. Of these patients, 5% (n=11; CI95 = 3–10%) were antibody positive, and 4% (n=8; CI95 = 2–8%) were also PCR positive and therefore infectious. One patient was antibody negative and PCR positive and, therefore, was regarded as acutely infected.

Of the 4,963 vascular surgical patients, 1,141 (23%) underwent anti-HCV antibody ELISA test and specific HCV RNA PCR testing. Of these, 0.4% (n=4; CI95 = 0.1–1%) were antibody positive and 0.2% (n=2; CI95 = 0.03 – 0.7%) were also PCR positive and hence infectious. No acutely infected patient was detected in this population.

Hemodialysis patients were tested more frequently for their HCV status ( $P < 0.0001$ ; OR = 8.15; CI95 = 6.21 – 10.71). Although the proportion of HCV positive patients was significantly higher in the hemodialysis population ( $P < 0.0001$ ; OR = 16.37; CI95 = 4.77 – 61.58), there was no significant difference between the proportion of HCV infective patients among HCV positive patients of both populations ( $P = 0.516$ ; OR = 4.5; CI95 = 0.79 – 94.74). However, the chance of having an HCV infective patient among hemodialysis patients was almost 27 times higher than among elective vascular surgical patients ( $P < 0.0001$ ; OR = 26.56; CI95 = 5.42 – 253.40).

**Discussion:**

Surgeons performing exposure-prone interventions are at increased risk of acquiring intra-operative viral infections, HCV and HIV being the most feared. As the risk of HIV transmission is low during surgical interventions, the reported risk of HCV transmission during these procedures is ranging from 2 % to 3%.<sup>19-21</sup> Yet, sharps injuries as well as micro-lesions of surgical gloves and skin are not always recognized and at times surgeons are even reluctant to report these incidences.<sup>22,23</sup> Therefore, infection rates may be underestimated.

Cross-sectional studies among surgeons have shown that the hepatitis C prevalence is equivalent or only slightly higher than in the general population.<sup>24,25</sup> However, surgeons predominantly intervening on high-risk groups such as hemodialysis patients have not been specifically evaluated.

Postulating the same frequency of needle-stick injuries during interventions, dedicated hemodialysis access surgeons have a 27 time higher relative risk to acquire hepatitis C while performing surgery in this specific patient population, compared to surgeons performing all other elective vascular interventions. Therefore, it is apparent that access surgeons are a higher risk group, even in our population with very low rates of PCR positive patients.

As a consequence, specific screening algorithms should be adopted for these surgeons in order to provide for early antiviral therapy. As acute hepatitis C is frequently asymptomatic, protocols for testing should be adhered to in order to allow early detection and regular and periodical testing of surgeons operating high-risk patient populations would be prudent. One recommended protocol is RNA testing at 4 weeks, followed by anti-hepatitis C antibody testing at week 8 and 12<sup>26</sup> if surgeons sustain suspected sharp injuries from an RNA positive patient.

The major advantage of early testing is early initiation of therapy either with high dose interferon mono-therapy,<sup>10</sup> or with a combination therapy of pegylated interferon combined with ribavirin<sup>11</sup> with reported cure rates of 99% and 80%, respectively.

In conclusion, dedicated hemodialysis access surgeons have a 27 times higher risk to acquire hepatitis C infection compared to vascular surgeons performing all other elective vascular surgical interventions. It would be prudent if all hemodialysis patients were tested for specific hepatitis C RNA in order to expedite investigation and possibly necessary medical therapy after sharp injuries from healthcare practitioners. If intervening on high prevalence populations, PCR testing every three months would be advisable for surgeons, as early treated hepatitis C is almost universally curable.

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