Risk factors for hepatitis C : past, present and future

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Abstract

Patients at risk for hepatitis C (HCV) are those exposed to a major risk factor (i. e. blood transfusion prior 1990, and intravenous drug abuse), and those exposed to a minor risk factor (sexual, mother-to-infant transmission, household contact, nosocomial contamination). The present paper aims to review the current and past modes of transmission of the virus C. (Acta gastroenterol. belg., **2002**, 65, **87-89**).

Key words : hepatitis C, disease transmission.

Introduction

Infection with hepatitis C virus represents an important cause of morbidity within the population. The majority of individuals infected with the virus remains viraemic and therefore infectious for long period of time. Furthermore, a large proportion of infected people are at the current time unaware of their infection. Currently, no vaccine is available.

A clear understanding of the modes of transmission and methods for preventing the spread of this important hepatitis virus is essential to optimal care and education of patients and their families. Two major risk factors for HCV infection are recognised : the transfusion of blood or blood products untested for anti-HCV (i.e. prior to 1990) and the use of shared syringes by intravenous drug users. Minor risk factors include exposure to contaminated blood during high risk medical intervention (nosocomial transmission) ; via sexual, perinatal (mother-to-infant), or household contact ; and via unidentified sources, probably including covert or non-covert percutaneous contact with contaminated blood.

Transfusions

Until relatively recently, blood transfusion posed a major risk of HCV infection. Before 1985, post-transfusion hepatitis C occurred at rates varying widely between different geographic areas : 0.5% in England, 3-4% in the USA, 6% in France, 10% in Spain. During 1985-1990, cases declined by more than 50% because of screening policies that excluded donors with HIV infection and donors with surrogate markers for non-A, non-B hepatitis (recent transfusion, iv drug abusers, multiple sexual partners,…) (1). By 1990, risk was approximately 1.5% / recipient, or 1 in 5 000 transfused units. The introduction in 1990 of blood-screening measures based on the detection of HCV antibodies in blood donors has dramatically decreased the risk of transfusion-associated HCV infection. Although the residual risk of transfusion is low, it is not fully eliminated. This risk is linked to the so-called silent window of infection (the interval, estimated to be less than 12 weeks, between infection in blood donor and the development of detectable antibodies). Current residual risk for post-transfusion hepatitis C is estimated 1 in 217 000 transfused units (test ELISA 3) in France (2), and 1 in 103 000 (test ELISA 2) in the USA (3). To avoid this residual risk, blood banks are currently exploring the feasibility of evaluating potential donors using polymerase chain reaction-based techniques (PCR) for detecting HCV-RNA in donor.

Injection-drug use

Actually, injection-drug users constitute the largest group of persons who are infected with HCV and account for the majority of new infections. In the USA, of the 15 million persons who currently use illicit drug, an estimated 1 to 1.5 million inject them, and some 80 to 95 percent of injection-drug users have been infected with HCV (4). The same rate of prevalence has been found in Belgium, in Charleroi, 82% (5). Most of the iv drug users become infected after one year of drug use, and nearly all become infected after eight years of use (6). Thus, the highest risk for acquisition is among adolescents and young adults. These people are particularly exposed to excessive risk of cirrhosis and hepatocellular carcinoma later in life. Preventing hepatitis C transmission among young drug abusers is therefore an important task. Needle exchange programs in combination with intensive education programs will remain the mainstays of HCV prevention, until a vaccine is developed.

Sexual activity, household contact, mother-to-infant transmission

Sexual transmission of HCV between non-HIV infected partners or in monogamous partnerships appears to be a very rare event. Whether this is due to the low levels of the virus in the genital fluids and tissues or to a lack of appropriate target cells in the genital tract is unknown (7). However, genital lesions and traumatic

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sexual intercourse favour sexual transmission. Co-infection with HIV may be a factor increasing the risk of sexual transmission. HCV transmission has also been linked to multiple sexual partners and to sexual contact with iv drug users.

HCV infections in a family setting have been documented from areas of intermediate endemicity. Infection when it occurred was seen more often in the older contacts and it appeared associated with the number of years lived with the HCV carrier. Covert percutaneous exposure via shared household articles or sharps or needles contaminated with blood may account for transmission in households. Nevertheless, casual household contact and contact with the saliva of infected persons appear to be very uncommon.

The average rate of HCV infection among infants born to HCV-RNA-positive women is about 5% (8). The average infection rate for infants born to women co-infected with HIV is higher,17% (9). Independent of HIV, the risk of transmission seems to be correlated with the viral load in the infected mother (10). However, a threshold of infectivity, usable in practice, has not yet been determined, and currently no definitive recommendations can be made to prevent the infection. Until recently, it was thought that the rate of HCV transmission was not affected by the type of delivery (vaginal or cesarean delivery). Recent data suggest, however, that the risk of contamination could be considerably lowered when elective cesarean section is performed in mother with highly elevated viremia (≥ 2.5 million RNA copies/ml) (11,12).

The majority of evidence suggests that the transmission through breast milk is unlikely. Therefore, there is no scientific basis for mothers with chronic hepatitis C to avoid breastfeeding unless their nipples are cracked or bleeding.

Nosocomial and occupational exposures

Transmission from infected patient to health-care worker

The average incidence of anti-HCV seroconversion after unintentional needle-stick injury involving blood known to be infected ranges from 3-10% (13). The transmission is likely influenced by the size of the inoculum, the size of the needle, and the depth of inoculation. Transmission of HCV from blood splashes to the conjunctiva has also been described.

Transmission from infected health-care worker to patient

There are some anecdotal reports of transmission of the hepatitis C virus from an anti-HCV positive health-care worker to patients during a medical procedures (14). These are very rare events and practically the problem to discuss is the need to restrict professional activities of health-care workers with HCV infection. The US consensus in this field is that "*there are currently no recommendations regarding the restriction of health care workers with hepatitis C because the risk appears to be low and there are no detection methods for determining infectivity*" (15). As recommended for all health-care workers, those who are HCV-positive should follow strict aseptic technique and standard precautions including care in the use and disposal of needles and other sharp instruments.

Transmission from infected patient to another patient

Nosocomial transmission has been documented in Belgium as well as in other countries (16,17,18). Nosocomial transmission of HCV is possible if infection-control techniques or disinfection procedures are inadequate and contaminated equipment is shared among patients.

No recognized source of infection

In about 10% of patients, no recognized source of infection can be identified. Most persons in this category are associated with low socio-economic level. Although low socio-economic level has been associated with several infectious diseases and might be a surrogate for high-risk exposures, its non specific nature makes targeting prevention measures difficult (9).

Special patient populations

Transplantation

Hepatitis C can be transmitted during bone marrow or solid organ transplantation and occasionally even by transplantation of corneas and bone. Use of anti-HCV-negative organ donors has virtually eliminated risks for HCV transmission from transplantation. In consequence, the safest approach is to exclude all anti-HCV-positive donors. However, given the shortage of donor organs, organ procurement agencies are exploring a variety of options, including using anti-HCV-positive organs only in anti-HCV-positive recipients or only in life-threatening situations. The safety of this approach has yet to be determined (19).

Haemophilia patients

Before 1990, haemophilia patients, who received factor concentrates produced from pooled plasma had a very high risk to be contaminated. Between 75 and 90% of these patients developed chronic hepatitis C. Adoption of viral inactivation of clotting factor concentrates and development of recombinant coagulation factors have virtually eliminated these blood products as a source of HCV infection (20). No cases of hepatitis C from the use of factor concentrates have been reported since 1994.

Dialysis patients

Patients on dialysis are recognised as a group at increased risk of infection with HCV. Approximately, 15-20% of hemodialysis patients have HCV antibodies (21). Most of these patients probably acquired hepatitis C from previous blood transfusions, although there is some evidence to support nosocomial transmission between patients (22). The incidence of new HCV infections in dialysis units has declined appreciably in recent years, largely as the result of the use of erythropoietin for treatment of anaemia and the introduction of HCV screening of blood products.

Prisoners

The prevalence of hepatitis C among prisoners ranges from 30 to 50% (19). The risk factors are injection drug use, either before or during incarceration, and tattooing with non sterile instruments. It has to be noticed that prisons could be an important site for introducing public health interventions that will have an impact on hard-to-reach communities.

Conclusion

In the past, the incidences of transmissions following transfusions or iv drug use had markedly declined even before the discovery of the serologic tests to detect the virus C. This trend offers hope that aggressive educational programs may be effective in reducing transmission of this important pathogen. Primary and secondary prevention must continue by identifying persons infected with HCV, providing appropriate follow-up and counselling, and promoting healthy lifestyles and behaviours. Efforts in continuous professional education (23) have to be made.

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