

Mother-to-infant transmission of hepatitis C

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Transmission of hepatitis C virus (HCV) infection from the mother to her child is, after blood transfusion, the second most frequent way by which children are currently found to have been infected (1,2).

An infant has been contaminated from his HCV carrier mother, either when HCV RNA is detected in the child's serum after the age of one month, or when anti-HCV are detected in the child's serum after the age of 18 months, and when no other potential source of HCV infection is present (3-8). The virus genotype in the child is the same as his mother's and there are high sequence homologies between viral RNAs in the mother and her child (9-15).

Anti HCV (as detected by RIBA and/or ELISA 2 or 3) were found in 697 pregnant women among the 56943 studied so far (prevalence : 1.2%) ; HCV RNA was detected in the serum of 411 of 674 anti HCV positive pregnant women reported (prevalence : 60%) (3,4,6-9,12,16-30). In exceptional cases HCV RNA may be detected in an otherwise anti HCV negative pregnant woman (32).

Factors associated with transmission

So far all studies indicate that only children whose mother's blood contains HCV RNA as detected by the PCR method are at risk of being contaminated (3,6,9,17,21,25,28).

According to published studies, transmission of HCV from HCV-RNA positive mothers to their child may be considered to occur in 12% of cases when the mother is HIV negative, but the risk is three times higher when the mother is HIV positive (3,4,6-9,12,17-22,24,25,27-30,33-39). Transmission of HCV and HIV infections may occur simultaneously or independently from one another (1,40).

High circulating levels of HCV in the mother are strongly associated with a higher risk of transmission of HCV to her child. the risk is highest when maternal viremia is equal to or above 10^6 viral equivalents/ml (12). This might explain why the risk of transmission has been reported to be high in cases of acute hepatitis C occurring during pregnancy (36).

Results of currently published studies do not favor an elective transmission of a given genotype of

HCV (34). Among the 41 mother-child pairs reported in the literature, in whom the child has been infected and HCV genotype was known, genotype 1a was found in 7 cases, genotype 1b in 15 cases, genotype 2a in 10 cases, genotype 2b in 1 case, genotype 3a in 7 cases and genotype 4a in 1 case (3,7-9,12,13,34,36,42).

It seems however that the child is infected by a limited number or even by only one of the numerous viral quasi species that are present in the mother's blood (11,15,43). The resulting relatively low level of heterogeneity of viral populations in the child, which persists for at least a few years (43), may explain why the disease is, initially, not very severe in the infected children since a high degree of viral heterogeneity may be associated with a more severe degree of chronic hepatitis (44).

HCV RNA can be detected in 15% of milks or colostrum from HCV carrier mothers (8,13,17-19,30,41,45-48). The level of HCV RNA was reported to be much lower in the milk than in the serum (41). The results published so far do not show an increased risk of HCV infection in children who are breastfed from their HCV carrier mothers : HCV infection was reported in 27 of 187 breastfed children versus 25 of 84 children who were not breastfed (3,4,6,8,9,13,15,16-18,26,28-30,38,39,41,48-50). In particular, no sign of HCV infection was found in the 6 children reported by Lin *et al.* (41) who were fed their mother's milk that was known to be HCV RNA positive.

There have only been a few reports mentioning the influence of cesarean section on the risk of contamination of the baby. The report dealing with the highest number of patients suggested that the risk of HCV infection was five times lower in children born by cesarean section than in children born by vaginal delivery (5). Others have indicated that cesarean section would not significantly alter the risk of transmission (4,12,15,19,26,51) : of 47 babies born by cesarean section from HCV carrier mothers and reported in the literature, six were found to be infected by HCV. Cesarean section is thus unlikely to prevent HCV infection in all children.

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Clinical presentation and outcome

Clinical presentation

(1,3,9,10,12,27,28,33,37,39,42,50,52)

In virtually all instances children infected with hepatitis C virus from their mother remain symptom-free and hepatitis C is found because of systematic screening. Seric HCV-RNA is most often found positive between 1 and 3 months of age. Raised transaminases are most often found between one and five months and often fluctuate during the following months. Serum anti HCV usually remain detectable throughout the period of study.

There is so far only one instance in which acute liver cell failure was the occasion of detecting a mother-to-child transmission of HCV in a 5 month-old child (53).

Outcome

Spontaneous and lasting disappearance of HCV RNA from serum has been reported in 9 of 72 (12.5%) HCV-RNA positive children followed during their first year of life (3,6,7,9,12,15,17,19,25-28,32,36,37,39,40,50,52,55,56), in 4 of 33 (12%) HCV-RNA positive children followed during their second year (3,6,25,26,37,40,55,56), and in one of 15 (6%) HCV-RNA positive children followed after 2 years (3,25,26,29,39,40,52,55). In such cases serum transaminases activities return to normal; anti HCV remain detectable in serum for several years but may eventually disappear (54); one may hope that these children are cured.

In the majority of cases, however, serum HCV RNA remains detectable after the age of 2 years and children become chronic carriers of the virus (52,56). Serum transaminases activities may be permanently normal or fluctuate. Studies of liver histology have been reported in 24 children (5,7,9,39,42,52,56): in all instances there were minimal or moderate changes with no case so far of severe chronic active hepatitis or cirrhosis.

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