The application of Hepatitis B vaccine and Hepatitis B immunoglobulin for newborn from Hepatitis B carrier mother (Macau data)

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Abstract:

Objective: First: To evaluate the effectiveness of Hepatitis B vaccine (HBV) and Hepatitis B immunoglobulin (HBIG) on the prevention of vertical transmission of Hepatitis B virus from Hepatitis B carrier mother. Second: To assess the effectiveness of HBV in providing adequate immunity to Hepatitis B virus infection.

Method: Between the periods of 1st JAN 2004 to 31th DEC 2008, newborns from Hepatitis B carrier mother followed up by Fong Son Tong (CSSL) health centre in Macau were selected for study. There were a total of 108 newborns but only 78 newborns meet the criteria for enrollment. Hepatitis B carrier status was defined as patient who has Hepatitis B surface antigen (HBsAg) during blood test. All eligible subjects received both HBIG and 1st dose of HBV during birth, followed by 2nd and 3rd dose of HBV vaccine at first and six month of age. Blood test for HBsAg and Hepatitis B surface antigen antibody (Anti-HBs) were performed after 6 months of age to check for Hepatitis B infection and antibody level for Hepatitis B surface antigen.

Results: All 78 babies studied were negative for HBsAg, 70 out of 78 babies developed adequate immune protection (as defined by antibodies level more than 10 mIU/ml) from Hepatitis B virus after 3 doses of HBV.

Conclusion: Active and passive immunization with HBV and HBIG for newborn of Hepatitis B carrier mother is highly effective in preventing vertical transmission of Hepatitis B virus. No subject was infected during the study period. After a single course of 3 doses HBV, about 89.7% of babies developed adequate protection against Hepatitis B virus. Thus a single course of 3 doses HBV is able to provide adequate protection for most patients.

Keywords: Hepatitis B vaccine, Hepatitis B immunoglobulin, peri-natal transmission

Introduction

Hepatitis B virus infection is a worldwide health problem. It is estimated that there are about 350 million Hepatitis B carriers in the world. Approximately 1 million die annually from Hepatitis B virus related liver disease (1). The prevalence of Hepatitis B infection varies greatly with different geographic locations. High prevalence area includes Macau, China and South East Asia have rates up to 10-20%. As compare to low prevalence area like United states, Canada and Australia which have rates around 0.1-2% (1,2) The principle mode of virus transmission varies from High to low prevalence areas. In high prevalence area like Macau, the principle mode of transmission is perinatal. If babies acquired the virus during perinatal period, almost 90% will develop chronic carrier status. On the other hand, if adult acquired the infection, only 5% will become chronic carrier (Fig. 1) (3, 4, 5). It was shown that Chronic Hepatitis B carrier have higher risk for developing chronic hepatitis, liver cirrhosis and even hepatocellular carcinoma. Thus it is important to prevent the transmission of Hepatitis B virus during the perinatal period. Studies have shown that the administration of HBV and HBIG for newborn from Hepatitis B carrier Mother has dramatically reduced the rates of perinatal infection by almost 90%. (6,7) Since the year 1989, Macau has commenced its own Hepatitis B vaccination program. All newborn babies in Macau will receive HBV and newborn from Hepatitis B carrier Mother will receive an addition of HBIG within 24 hours after delivery (8). My study will evaluate the effectiveness of the HBV and HBIG in preventing Hepatitis B virus perinatal
transmission in Macau and also the level of immune protection after receiving 3 doses of HBV.

Method

Newborn babies from Hepatitis B carrier mother followed up by Fong Son Tong (CSSL) Health centre in Macau were selected for study. There were 108 newborn babies between the periods 1st Jan 2004 to 31th Dec 2008. Hepatitis B carrier status was defined as HBsAg positive during blood test. All eligible subjects received HBV and HBIG during birth and followed by 2nd and 3rd dose of HBV. Blood test for HBsAg and Anti-HBs were performed after 6 months of age. Only 78 out of 108 subjects were eligible for the study. 27 subjects were excluded from the study because no blood test results were recorded on the health information system. Two subjects were deceased during the study period. One subject was excluded because HBIG administration during birth cannot be confirmed.

Results

There were a total of 71 mothers giving birth to the 78 eligible subjects. 18 out of the 71 mother were Hepatitis B e antigen (HBeAg) positive prior to giving birth. (Table 1) That represents a total of 25.3% of mother with HBeAg positive status. Among the 78 subjects, all were tested negative for HBsAg. 70 out of 78 subjects developed adequate immune protection from Hepatitis B virus after 3 doses of HBV. That represents 89.7% of the subjects receiving the vaccines. (Fig. 2)

<table>
<thead>
<tr>
<th>Number</th>
<th>HBeAg (+)</th>
<th>HBeAg (-)</th>
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<tr>
<td></td>
<td>18</td>
<td>53</td>
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Table 1. HBeAg status of 71 Hepatitis B carrier mother

Discussion

According to previous studies, the risk of maternal-infant transmission of Hepatitis B virus is about 85-90% in infant born to HBeAg positive mother and 32% in infant born to HBeAg negative mother. Overall risk of transmission is about 40%. (9,10) With the application of HBV and HBIG, less than 5% of infant become carrier (6,7). In my study, none of the 78 study subjects become carrier. (Fig. 3) This result is consistent with the study done in other parts of the world. According to Australian immunization handbook, after single course three dose of HBV, about 90% subjects will develop adequate Anti-HBs level which is defined as more than 10 mIU/ml (3). In my study, about 89.7% of subjects developed adequate antibodies level. This is roughly consistent with the data from Australia. In my study, about 25.3% of mother from eligible subjects were HBeAg positive. However this data only represent one of the health centre population in Macau, it cannot represent the proportion
of HBeAg positive patient among hepatitis B carrier. Out of the 108 potential subjects, 30 subjects were not eligible for the study. The main reason for the exclusion is because no blood test record was found in the health information system. This means a high proportion of newborn from Hepatitis B carrier mother either didn’t have the blood test or they have blood test performed in other health institutions. In the current health information system program for Health centre in Macau, there is an icon on the computer screen to enter the maternal Hepatitis B status. In my opinion, it would be better if there is an additional icon for the clinicians to input the HBsAg status of the baby. This will serve as a reminder to performed HBsAg and Anti-HBs blood test for high risk babies. Overall, the Hepatitis B immunization program in Macau has successfully reduced the risk of vertical transmission of Hepatitis B virus and also provide adequate immunity to most of the subjects receiving 3 doses of HBV. In the future, we should see a fall in the incidence of Hepatitis B infection in Macau.

![Percentage of Perinatal transmission of Hepatitis B virus](image)

Figure 3. Comparing rates of perinatal transmission of Hepatitis B virus between historical control group and the intervention of HBV and HBIG given to newborn during birth.

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**Reference:**

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