

Case Report

A case of congenital syphilis hepatitis treated effectively with hyperbaric oxygenation

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Abstract: Congenital syphilis (CS) is caused by infection of *Treponema pallidum* and affects multiple organs including the liver. Here, we report a case of CS with florid signs and symptoms at birth. After treatment of penicillin, the infant developed hepatitis presented by increased transaminase and bilirubin. Subsequent treatment with hyperbaric oxygenation (HBO) proved effective. It is important to implement the World Health Organization's (WHO) recommendation that all pregnant women should be screened for syphilis. HBO is a possible potential effective treatment for hepatitis in CS.

Keywords: Congenital syphilis, newborn, hepatitis

Introduction

Congenital syphilis (CS) is a severe infection caused by *Treponema pallidum* and affects multiple organs including the liver. It occurs due to transmission of *Treponema pallidum* from an infected mother to the fetus through the placenta. The continuing prevalence of this disease reveals failure of control measures for its prevention. Here, we report a case of CS presenting with florid signs and symptoms at birth. After treatment with penicillin, the infant developed hepatitis presented by increased transaminase and bilirubin. Subsequent treatment with hyperbaric oxygenation (HBO) proved effective. The report stresses that it is important to implement the World Health Organization's (WHO) recommendation that all pregnant women should be screened for syphilis. Hyperbaric oxygenation is a possible potential effective treatment for hepatitis in congenital syphilis.

Case report

A premature baby boy with the birth body weight of 1870 gm and gestational age of 33 weeks was born spontaneously to a G4P2 mother after 8 days of premature rupture of fetal membranes. The Apgar scores were 7 and 8 at 1 and

5 minute respectively. He was intubated immediately after his birth because of heavy meconium staining. Examination revealed severe desquamating erythematous lesions over the face, extremities, trunk, and buttocks. The infant was lethargic with a temperature of 38.5°C. His mother was proven to have syphilitic infection serologically with treponema pallidum hemagglutination assay (TPHA) of 6.573 and rapid plasma reagin (RPR) of 1:16. The infant's TPHA and RPR were 12.211 and 1:128 respectively. The main hematological findings were marked leukocytosis with neutrophils $16.10 \times 10^9/L$, moderate anemia and thrombocytosis (**Table 1**). Procalcitonin (PCT) was 30.06 mg/dL and blood culture was negative. Because of the refusal of the parents, the lumbar puncture was not performed.

A diagnosis of CS and newborn sepsis was established. A 21 day course of crystalline penicillin (PEN) (100,000 units/kg/day) and at the same time a 15 day course of meropenem (MEM) (120 mg/kg/day) was given.

On the third day of his life, jaundice was noted and biochemical analysis revealed increased serum aspartate transaminase (AST), total bilirubin (TBIL), direct bilirubin (DBIL), indirect bilirubin (IBIL) and alkaline phosphatase (ALP)

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Table 1. Lab investigation results of the CS patient

Date	Treatment	Blood test				Liver function test					ALP (U/L)	RPR
		WBC ($\times 10^9/L$)	RBC ($\times 10^{12}/L$)	HGB (g/L)	PLT ($\times 10^9/L$)	ALT (U/L)	AST (U/L)	TBIL (umol/L)	DBIL (umol/L)	IBIL (umol/L)		
Ref. range		3.5-9.5	4.3-5.8	130-175	125-350	9-50	15-40	2-20.1	0-6.84	1.71-11.97	45-125	Negative
1 st day	-	30.8	2.94	109	37.0	-	-	-	-	-	-	1:128
3 rd day	PEN+MEM	-	-	-	-	36	162	153.60	113.90	39.70	201	-
14 th day	PEN+MEM	9.1	3.18	102	170	265	423	180.1	149.4	30.7	290	-
19 th day	PEN	-	-	-	-	492	746	227.4	175.8	51.6	244	-
25 th day	Before DEX	4.7	3.2	99	111	520	569	241	208.2	32.9	245	-
35 th day	After DEX	-	-	-	-	980	835	249.9	208.2	41.7	177	1:64
48 th day	After HBO	14.3	4.55	143	210	310	381	160.8	135.9	24.9	-	-
70 th day	Vit D	9.0	2.43	77	150	122	243	86	74.2	11.8	306	1:4
122 nd day	Vit D	6.8	3.05	100	137	80	73	18.3	6.15	12.5	516	-

(Table 1). Investigations for TORCH test and hepatitis A, B, C and E were persistently negative.

Subsequent to the therapy, his skin rash regressed, and abnormal hematological presentations recovered gradually except a persistent anemia (Table 1). But jaundice progressed slightly. Biochemistry showed transaminase including alanine transaminase (ALT) and bilirubin increased gradually and consistently (Table 1). On the 25th day, the jaundice was exaggerated suddenly and clay colored stool was noted. Investigation showed that ALT, AST, TBIL, DBIL, and IBIL increased further. Dexamethasone (DEX) (0.5 mg/kg/d) was applied to the patient for one week, but jaundice, clay colored stools and lab investigations did not improve (Table 1).

Afterwards, the patient was treated with hyperbaric oxygen (HBO) therapy once a day for 10 days and the stool color began to return yellow instantly. At the same time, the investigation results recovered as both transaminase and bilirubin decreased (Table 1). Although his body weight gain was slow, he was discharged on his 59 day of life with body weight 1940 gm.

There was a consistent elevation of ALP together with the decrease in the levels of RPR (Table 1) although vitamin D (Vit D) was supplied every day. At the follow-up when the patient was 4 months old, he weighed 4300 gm and was showing a marked clinical reduction of jaundice with regression in AST, ALT, TBIL, IDIL, and DBIL though ALP was increased further to 516 U/L.

Discussion

The incidence of CS parallels the syphilis rates in women of childbearing age. In 2010, the

WHO estimated that 1.49 million cases of syphilis occur globally among pregnant women [1] and maternal syphilis is responsible for 460,000 abortions or stillbirths, 279,000 cases of CS and the birth of 270,000 low-birth-weight or premature babies each year [2]. China has been recognized as a high priority country for CS elimination owing to its large burden of maternal syphilis [3].

The most common clinical manifestations of early CS include mucocutaneous lesions, rhinitis, lymphadenopathy, hepatosplenomegaly, jaundice, skeletal abnormalities, anemia, leucopenia or leukocytosis, thrombocytopenia, and nephrotic syndrome [4]. About 10% of CS patients have abnormal liver enzyme concentrations, but clinical hepatitis is rare [5]. Since the advent of penicillin treatment, hepatitis in CS has seemed to increase. It has been speculated that the pathogenesis may be a toxic reaction to the products of treponemal lysis or an autoimmune reaction [5].

The symptoms of hepatitis of our patient such as poor weight gain, clay colored stools, jaundice, increasing ALP and abnormal liver function tests characterized by the elevation of aminotransferase and bilirubin were fully manifested on the 25th day of the patient. In syphilitic hepatitis, elevation in ALP is likely a characteristic and is probably due to pericholangiolar inflammation [5] and the impaired liver function [6].

Treatment of syphilitic hepatitis is mainly supportive. Steroid therapy has been suggested but it was found to have little effect [7]. In this patient, DEX was applied for one week but it didn't help greatly. Afterwards, the treatment of

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HBO was tried and magnificent improvements were acquired both in the symptoms and the lab investigations.

HBO involves inspiration of a high concentration of oxygen at pressures greater than the sea level. It can result in increased oxygen delivery throughout the body and has proven to be beneficial for liver disease models. HBO could promote the regeneration of biliary ductal cells and postoperative cholestasis after a partial hepatectomy [8]. In rats with obstructive jaundice after bile duct ligation (BDL), HBO prevent bacterial translocation and decreasing endogenous bacterial overgrowth [9]. Simultaneously, it attenuates oxidative injury, hepatocytes damage, bile duct proliferation, and fibrosis [10]. In this study, HBO benefited this patient with CS hepatitis greatly and its effects wait further confirmation and exploration.

WHO recommend that all pregnant women should be screened for syphilis [11]. We emphasize the necessity to strengthen antenatal screening for maternal syphilis in China to eliminate the occurrence of CS. HBO is a possible potential effective treatment for hepatitis in CS.

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Disclosure of conflict of interest

None.

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