COURSE OF SEROLOGIC INCOMPATIBILITY IN TWIN FETUSES

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The course of hemolytic disease is generally more severe in twin than in single-born infants, because of prematurity prevailing in twin births and resulting prolonged hospitalization.
The course of hemolytic disease in double conflict (ABO and Rh) does not appear to be milder than in single Rh incompatibility. In one case it was even found to cause more extensive damage to one fetus, as compared to the other with simple Rh conflict.

In 1960-1965 the Clinic registered 8269 births, including 104 twin deliveries (1.1%), 7 of which complicated by serological incompatibility. As shown in the Table, double conflict (Rh and ABO) prevailed as it affected 7 children (cases 1*a* and *b*, 4*a* and *b*, 6*b*, 7*a* and *b*). Rh incompatibility was found in 4 cases (3*a*, 5*a* and *b*, 6*a*) and ABO conflict in 1. Five pairs of twins were premature (32-37 weeks of pregnancy) and 2 pairs full-term (39-40 weeks).

In premature twins the low body weight had a highly adverse effect both on the course of the hemolytic disease and the later physical and mental development of the children. The mildest course of the hemolytic disease (icterus praecox, anemia) was found in a full-term twin with an ABO conflict (2*a*).

The condition due to Rh conflict took the most severe course in a twin born at 32 weeks of pregnancy who died immediately after birth (3*a*). The case concerned a twin birth in a 37-year-old woman with two previous deliveries (both births were physiological: one child is alive while the other died at 9 months for unknown reasons). The course of the present twin pregnancy was uneventful, with birth occurring spontaneously at 32 weeks of pregnancy. The first newborn, a girl weighing 1820 g with symptoms of generalized edema (hydrops foetalis universalis) died immediately after birth. The blood picture revealed severe anemia and erythroblastosis (Hb 25%; E 900,200; I 1.38; L 97,000; erythroblasts 534/200 leuc.).

Post-mortem examinations (Institute of Pathologic Anatomy, Medical School in Wroclaw) convalidated the clinical diagnosis of severe damage due to Rh incompatibility: atelectasis pulmonum congenita totalis et haemorrhagica interbronchialis, anasarca maioris gradus, ascites, petechiae galeae aponeuroticae, lien succenturiatus (protocol no. 660/62). No sign of conflict was found in the second twin (3*b*), a male weighing 1520 g.

The comparison of the clinical conditions of the newborns, body weight, course of serologic conflict and laboratory findings (blood picture, serum bilirubin level) points to the

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Table

Mother				Newborns			
Case no. and characteristics		Blood group	Immune antibodes	Sex and weight	Blood group	Reaction Coombs	Reaction Munk-Andersen
1.	K.K., gr. III P III, age 39, case hist. 2406/60, 40 weeks	ARh —	anti-Rh 1/64 anti-B 1/1024	*a.* M 2500	ABRh +	+	
				b. M 2050	ABRh +	+	
2.	W.K., gr. I P I, age 21, case hist. 597/61, 39 weeks	ORh +	anti-A 1/32 anti-B 1/8	*a.* F 2295	ARh +	—	
				b. F 2680	ORh +	—	
3.	W.J., gr. III P III, age 37, case hist. 2576/62, 32 weeks	BRh —	anti-Rh 1/64	*a.* F 1820	ORh +	+	
				b. M 1520	BRh —	—	
4.	R.E., gr. III P II, age 32, case hist. 2681/63, 33 weeks	ARh —	anti-Rh 1/32 anti-B 1/16	*a.* M 1740	ABRh +	+	+
				b. M 1990	ABRh +	+	+
5.	K.H., gr. II P II, age 23, case hist. 587/64, 36 weeks	ARh —	anti-Rh 1/16	*a.* F 2230	ARh +	+	
				b. M 2280	ARh +	+	
6.	S.W., gr. V P V, age 25, case hist. 1187/64, 34 weeks	BRh —	anti-Rh 1/8 anti-A 1/2048	*a.* M 1750	BRh +	+	
				a. M 1950	ARh +	+	+
7.	R.J., gr. VI P III, age 34, case hist. 479/65, 37 weeks	ORh —	anti-Rh 1/2 anti-A 1/2048 anti-B 1/128	*a.* F 1700	BRh +	+	+
				b. M 2250	ARh +	+	+

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Serum bilirubin level (mg %)	Course of hemolytic disease	Blood transfusion		Hospitalization period and body weight when discharged	Conflict
		Exchange	Accessory		
nondetermined	icterus gravis, anaemia gravis	450 ml ABRh —	2 × 60 ml ABRh — after 3 weeks	4 weeks 3090	double
nondetermined	icterus gravis, anaemia	480 ml ABRh —	2 × 50 ml ABRh — after 3 weeks	4 weeks 2540	double
before transf. 11.2	icterus praecox, anaemia	390 ml ORh +		17 days 2660	ABO
nondetermined				3 weeks 3030	absent
nondetermined	hydrops foetalis			exitus post partum	Rh
nondetermined				6 weeks 2280	absent
before transf. 5.2 after transf. 3.4	icterus gravis	350 ml Eryth. ORh — in plasma AB		4 weeks 2150	double
before transf. 5.8 after transf. 3.0	icterus gravis	385 ml Eryth. ORh — in plasma AB		4 weeks 2380	double
umbil. blood 2.0 before transf. 10.2 after transf. 6.4	icterus gravis	420 ml ARh —		17 days 2270	Rh
before transf. I 18.6, II 29.8 after transf. I 12.2, II 17.2	icterus gravis	I 460 ml ARh — II 400 ml ARh —		17 days 2220	Rh
umbil. blood 4.2 before transf. I 8.4, II 16.6 after transf. I 6.6, II 8.8	icterus gravis, anaemia gravis	I 260 ml BRh — II 400 ml BRh —	50 ml BRh — after 5 weeks	6 weeks 2820	Rh
umbil. blood 5.0	hydrops foetalis			exitus 11 h post partum	double
umbil. blood 2.5 before transf. 8.0 after transf. 2.7	icterus gravis, anaemia gravis	355 ml Eryth. ORh — in plasma B	50 ml ORh — after 1 week	5 weeks 2800	double
umbil. blood 2.5 before transf. I 5.2, II 17.2 after transf. I 2.0, II 9.0	icterus gravis, anaemia gravis	I 440 ml II 330 ml Eryth. ORh — in plasma A		5 weeks 3140	double

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conclusion that the course of the hemolytic disease is not milder in cases of double conflict (Rh and ABO) than in single Rh incompatibility.
This finding disagrees with Levine and Hirszfeld's theory that the pathological symptoms due to double conflict are not as strong as those resulting from single Rh incompatibility (Hirszfeldowa et al. 1956, Rudkowski 1959).
Attention should be focused to case 6 where symptoms were even more marked in the twin with double conflict than in his cotwin with single Rh incompatibility.

The case is that of a 25-year-old multipara with her first pregnancy terminated by a physiologic birth: the child is alive. The baby from the second pregnancy, delivered prematurely by Cesarean section because of placenta praevia, is dead. The third pregnancy resulted in physiologic birth: the child is alive. The fourth pregnancy was characterized by Rh conflict: the child is alive after exchange transfusion. Mother's blood group, B Rh (—); anti-Rh antibodies, 1/8; anti-A antibodies, 1/2048.
The course of the fifth pregnancy is uncomplicated. Twin birth occurred spontaneously at 34 weeks of pregnancy. The first twin, a male, weighs 1750 g. Newborn's blood picture: Hb 68%; E 3,450,000; I 1.0; L 25,700; erythroblasts 67.5/100 leuc. Blood group B Rh (+); direct Coombs test positive; serum bilirubin values increased. The conditions of the newborn and the course of the hemolytic disease were severe in view of the fact that the damage due to Rh incompatibility was complicated by prematurity. The newborn was given two B Rh (—) blood transfusions, as well as 50 ml of blood five weeks later. After six weeks the child was discharged from the Clinic in good conditions. He has been followed up for 8 years. His physical and mental development exhibits only a slight retardation. The second twin, also a boy, weighing 1950 g, showed signs of generalized edema (hydrops foetalis universalis) and neurologic manifestations consistent with icterus of the basal nuclei of the brain. Blood group A Rh (+); direct Coombs test positive; Munk-Andersen reaction positive. Blood picture: Hb 45%; E 2,300,000; L 30,300; I 0.91; erythroblasts 457.5/100 leuc.
In view of the hopeless conditions of the newborn, who died 11 hours after birth, no exchange transfusion was made.
The post-mortem findings (Institute of Pathologic Anatomy, Medical School in Wroclaw) indicated: icterus universalis, praecipue nucleorum basalis cerebri; anaemia universalis; petechiae multiplices dispersae cerebri; foci haemopoietici et degeneratio adiposa hepatis; splenomegalia; atelectasis pulmonum congenita partialis, praecipue lateralis sinistri; oedema scroti (protocol no. 294/64).

As evidenced by the comparison of fetal damage and course of hemolytic disease in both twin brothers, the severity of the latter was much greater in the case of double conflict than in sigle Rh incompatibility. Understandably, however, a small number of cases provides no conclusive evidence and the problem seems to require further clinical consideration.
Exchange blood transfusion in newborns from the twin pregnancy was indicated by the generally accepted criteria based on anamnesis, clinical state of the newborn, and serologic data (blood picture, serum bilirubin level).
All procedures were performed according to Diamond's method with Gasser's modification, including additional transfusions in cases 5*b*, 6*a* and 7*b* because of increasing serum bilirubin content in twins with severe symptoms of hemolytic disease. The amount of blood to be transfused was determined individually for each newborn depending on the body weight and intensity of the disease. Blood selection was made routinely (Nowosad et al. 1961, 1965), and in four cases of double conflict (4*a*, 4*b*, 7*a*, 7*b*) blood preparations provided by the Wroclaw Blood Bank (O group red cells with Rh factor neutral to mother's antibodies suspended in liophilized plasma compatible with the newborns blood group) were used successfully.

All twins treated with exchange transfusions were discharged in good conditions after 17 days to 6 weeks. None of them showed any sign of damage to the central nervous system. They are being examined regularly and show, as a rule, no appreciable retardation in their physical and mental development.
The problem of the development of twins with serologic conflict will be dealt with separately. The fairly prolonged hospitalization of the newborns was indirectly connected with prematurity, requiring a proper management and long-term therapy in most twins.

CONCLUSIONS

1. The course of the hemolytic disease in newborns from twin pregnancy is, as a rule, more severe than in single pregnancy, prolonged hospitalization being required in view of the twins prematurity.
2. In our cases, the double conflict showed a more severe course than single Rh incompatibility and in one case it even caused much more damage to the fetus than Rh incompatibility did in his twin brother. This finding is in disagreement with observations by other authors, and the problem should be studied on a larger clinical material.

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