INFLUENCE OF INTRAVENOUS INJECTION OF AMNIOTIC FLUID ON THE BLOOD-CLOTTING INDICES OF DOGS

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The hemorrhages which develop on premature detachment of the normally positioned placenta, severe gestoses, delivery of a macerated fetus, Caesarean section, or amniotic embolism are caused by a disruption of blood coagulability resulting from the development of hypofibrinogenemia [9].

It is customary to assume that hypofibrinogenemia develops as a result of precipitation of fibrin (fibrination) caused by the entry of thromboplastins into the mother's blood stream during pathological births. The precipitated fibrin is removed from the blood stream (defibrination) by fibrinolysis [7, 9]. However, data have recently appeared which indicate that the disruption of blood coagulation which occurs in these situations results not only from hypofibrinogenemia, but also from the formation of specific inhibitors, which suppress blood clotting despite a sufficiently high fibrinogen concentration [6, 10].

Our work was intended to elucidate certain aspects of the mechanism by which blood coagulation is disrupted when amniotic fluid enters the blood stream.

EXPERIMENTAL METHOD

The experiments were conducted on 15 healthy dogs of both sexes and different colors, weighing 9 to 24 kg. Both femoral veins were dissected out under morphine anesthesia and amniotic fluid was quickly injected into the right vein in a dose of 3 ml per kg of body weight. Blood was taken for examination from the left femoral vein before the injection and 1, 3, 15, 30, and 60 min afterward. Amniotic fluid from healthy parturients containing no impurities of blood or meconium was used for the investigations.

We determined the clotting time by Lee and White's method, the plasma heparin tolerance by Poller's method, the plasm reclacification time by Bergerhoff and Roca's method, the prothrombin time by Tugolukov's method, and the fibrinogen concentration by Ruthberg's method [1]. The presence of fibrinogen B in the blood was determined by a previously described method [4, 8] and the fibrinogen thermostability by Godal's method [5].

EXPERIMENTAL RESULTS

In all cases rapid intravenous injection of amniotic fluid was accompanied by a marked motor reaction, an increase in the rapidity and depth of breathing, and tachycardia. In certain cases dense obstructive thrombi were formed above the injection site. Copious unchecked hermorhaging from punctures previously made in the femoral veins and over the entire wound surface of the dissected-out section was observed from the 2nd-3rd min after injection of the amniotic fluid. One dog died exhibiting symptoms of respiratory arrest 5 min after administration of the amniotic fluid.

It may be seen from the data cited in the table that 1 min after injection of amniotic fluid blood clotting was accelerated by a factor of almost two in comparison with the initial levels, while after 3-60 min it was retarded by a factor of 3-4. The plasma heparin tolerance increased by a factor of 1.5 1 min after the injection and decreased

Influence of Intravenous Injection of Amniotic Fluid on the Clotting Indices and Fibrinolytic Activity of Dogs' Blood

Index		Statistical index	Before injection	After injection				
				after 1 min	after 3 min	after 15 min	after 30 min	after 60 min
Clotting time (in min)		*M*	5,8	3,2	19,4	23,3	23,3	23,7
		m±	0,3	0,8	2,7	2,2	2,0	2,0
		P		<0,01	<0,001	<0,001	<0,001	<0,001
Plasma heparin tolerance (in min)		*M*	4,0	2,3	18,8	20,4	17,0	18,2
		m±	0,5	0,4	3,2	2,5	3,2	3,6
		P		<0,01	<0,001	<0,001	<0,001	<0,001
Plasma recalcification time (in sec)		*M*	87	125	274	336	398	418
		m±	4	25	45	46	52	30
		P		<0,1	<0,001	<0,001	<0,001	<0,001
Prothrombin time (in sec)		*M*	15	14	16	17	18	18
		m±	0,3	0,3	0,6	0,7	0,8	0,8
		P		<0,02	>0,1	<0,01	<0,01	<0,01
Fibrinogen concentration (in mg-%)		*M*	310	268	197	183	196	180
		m±	20,2	7,3	8,4	8,3	24,0	21,2
		P		<0,05	<0,001	<0,001	<0,001	<0,001
Fibrinogen thermostability	Clotting initiation temperature (in degrees)	*M*	50,9	50,8	50,8	50,8	50,8	50,7
		m±	0,02	0,04	0,03	0,03	0,04	0,04
		P		<0,5	<0,02	<0,02	<0,02	<0,05
	Clotting initiation time (in sec)	*M*	90	80	80	80	80	70
		m±	2,4	3,9	3,2	3,4	3,5	4,5
		P		<0,5	<0,02	<0,02	<0,02	<0,05
Fibrinolytic activity (in h)		*M*	4,7	2,8	4,5	4,1	5,3	5,0
		m±	0,6	0,4	0,8	0,7	0,8	0,5
		P		<0,05	>0,5	<0,5	<0,5	<0,5

by a factor of 4-5 from the 3rd min onward. The recalcification factor increased by a factor of 3.5-4.5 from the 3rd min. The prothrombin time was slightly reduced during the 1st min after injection of amniotic fluid, but was prolonged from the 15th min onward. The plasma fibrinogen concentration progressively decreased from the 1st min after injection of amniotic fluid, dropping to $^2/_3$ of its initial value by the end of the experiment. Fibrinogen B usually appeared in the blood after injection of amniotic fluid (it was not formed in four dogs). The fibrinogen thermostability was slightly reduced from the 1st min. The fibrinolytic activity of the blood almost doubled during the 1st min after injection of amniotic fluid, but was normalized after 3 min.

The initial acceleration of coagulation and the increase in fibrinolytic activity observed in our experiments apparently resulted from injection of a relatively large quantity of thromboplastins and fibrinolytic substances with the amniotic fluid. The rapid normalization of fibrinolytic activity may be attributed to the influence of the antiplasmin activity of the blood. Coagulability is severely disrupted within 3 min after administration of amniotic fluid (the clotting time and plasma recalcification time are prolonged and the plasma heparin tolerance is reduced). The retardation of coagulation cannot be attributed to hypofibrinogenemia, since the fibrinogen concentration remained at approximately 200 mg-% (the clotting time of whole blood is disrupted at fibrinogen concentration of less than 100 mg-% [3]). In our experiments, just as in the investigations of Lewis and Szeto [6], the disruption of coagulability is apparently explained by the participation of a fibrin-polymerization inhibitor,, as is indicated by the appearance of fibrinogen B in the blood and the decrease in fibrinogen thermostability.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
