

METHOD OF RECORDING BLOOD PRESSURE IN THE UMBILICAL ARTERIES OF GUINEA PIG FETUSES WITH THE PLACENTAL CIRCULATION INTACT

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To record the blood pressure in the umbilical arteries of guinea pig fetuses a polyvinyl chloride catheter with an external diameter of 0.7 mm and internal diameter of 0.6 mm was introduced into the exposed umbilical artery.

Attempts to measure the blood pressure directly in the umbilical arteries of small laboratory animals have been unsuccessful because of the small size of the fetuses. Only an indirect method of measuring the blood pressure in the umbilical artery of rat [2] and rabbit [1] fetuses has been described.

The object of this investigation was to develop a method of measuring and recording the blood pressure in the umbilical arteries of guinea pig fetuses connected via the placenta with the mother. The pregnant guinea pig was anesthetized with ether and the spinal cord divided at various levels below C7. One hour after this operation the animal was immersed up to the forelimbs in a bath of Ringer's solution (36-37°C). After laparotomy, both uterine cornua were brought out. The uterus was then opened and the fetuses extracted.

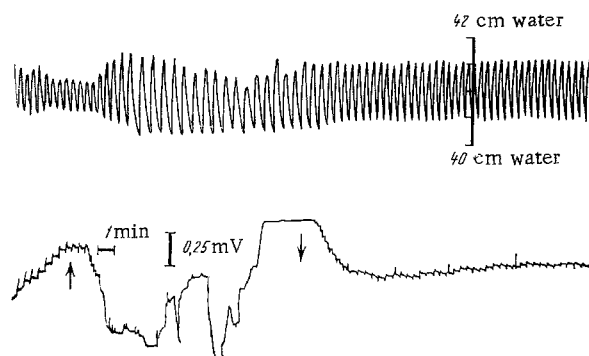


Fig. 1. Record of blood pressure of guinea pig fetus during placental circulation. Top curve, blood pressure (recorded by electromanometer); bottom curve, ECG. Arrows indicate beginning and end of fetal movement, causing sharp displacement of the isoelectric line on the ECG, but no artefacts were visible on the blood pressure curve.

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To catheterize the artery a thin polyvinyl chloride catheter with an internal diameter of 0.6 mm and external diameter of 0.7 mm was made. The catheter was filled with heparin and connected to a thin polyvinyl chloride tube, 1 mm in diameter, filled with Ringer's solution and with its upper part fixed vertically to a millimeter scale.

The umbilical artery was separated from the other vessels and the catheter inserted into it. It must be remembered that on the slightest contact the umbilical vessels easily go into spasm. The umbilical artery must therefore be separated with very great care. With the rounded blade of a small pair of scissors (the other blade was sharply pointed) the Wharton's jelly surrounding the whole umbilicus was slowly cut and removed (all this was done in physiological saline without raising the vessels to the surface). The connective tissue surrounding the umbilical vessels was then divided in the same way. This is one of the most crucial stages of the whole operation.

Two ligatures were placed under the mobilized umbilical artery: one nearer to the placenta, the other 1 cm further away. The middle finger of the left hand was placed under the umbilical artery, and the ligature was tied with the index finger and thumb. The catheter filled with heparin was held by the index finger and thumb of the right hand, and a ligature placed under it by the little finger, pressed against the palm, and the ligature was then drawn tightly so as to temporarily stop the blood flow in the vessel. An incision was then made in the vessel between these two ligatures, and the catheter was introduced into it, while the ligature held by the right hand was gradually released. Once the catheter was filled with blood, its pulsation indicated that the tip of the catheter was in the normal position. The catheter was carefully advanced as far as the junction of the umbilical artery with the aorta (the position of the catheter was verified after the operation by laparotomy on the fetus), after which the catheter was fixed. These manipulations required not more than 3 min altogether.

This method enables the experimenter without other assistance to measure the blood pressure of the fetus while keeping the placental connection intact. It is unnecessary to anesthetize the fetus. Movements of the fetus during the experiment do not in any way interfere with measurement of the pressure (Fig. 1).

It is considered that this method can be used with advantage to measure the blood pressure in fetuses of other small laboratory animals.

LITERATURE CITED

1. V. V. Yakovlev, *Fiziol. Zh. SSSR*, No. 10, 1282 (1959).
2. E. L. Corey, *Am. J. Physiol.*, 101, 304 (1932).