

# TRANSPLANTATION OF THE GENITAL SYSTEM OF A FEMALE DOG

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In the accessible literature we could find no information on transplantation of the female internal and external reproductive organs en bloc. Many attempts have been made to transplant the ovaries, and also the uterus in isolation and without direct restoration of the circulation by suture of the blood vessels, but these led to necrosis of the graft followed by absorption, sequestration, or suppuration. Accordingly we have attempted to obtain such an experimental model and to study the circulation both in the reproductive system and in the whole transplanted part of the animal's body, the viability of the tissues, and also the response of the recipient animal.

In our method the whole reproductive system of the recipient is transplanted under conditions of minimal trauma, optimal blood supply, and preservation of nervous connections with the lumbar division of the spinal cord. This method can be used to study not only problems of experimental transplantation of the reproductive organs, but also the possibility of fertilization and development of the embryo in the uterus when attached to another organism.

The dog chosen as recipient should be a young and well developed healthy female weighing more than 20 kg. The donor dog must be one of very small size or a puppy belonging to a small breed.

When it is proposed to transplant the genital system together with the whole urinary system, the body of the donor animal is divided transversely at the level of the diaphragm. Care must be taken to ligate all divided vessels and the spinal cord carefully so as not to lose the cerebrospinal fluid. The aorta and inferior vena cava must be dissected and ligated, and all their numerous branches then divided. The liver can also be transplanted along with the posterior half of the body. If, however, it is not intended to do this, the liver must be removed, together with the gastro-intestinal tract, after ligation of all efferent and afferent blood vessels. The rectum is ligated below the point of division and the stump closed with a purse-string suture. If the experimental conditions do not provide for transplantation of the kidneys along with the genital system, the donor animal's body should also be divided transversely, but below the level of the renal vessels. The aorta and inferior vena cava are dissected below their point of division, as described above, and after careful hemostasis they are freed from all their branches for a distance of not less than 5 cm. The anterior part of the donor's body can be used for transplantation of the head or heart, etc. Next, the blood vessels of the recipient animal must be prepared. For this purpose the skin and underlying tissues are divided parallel to one iliac crest. In our experiments we made the incision on the right. The external iliac arteries and vein must then be mobilized from the cellular tissue by blunt dissection and with the knife, and their

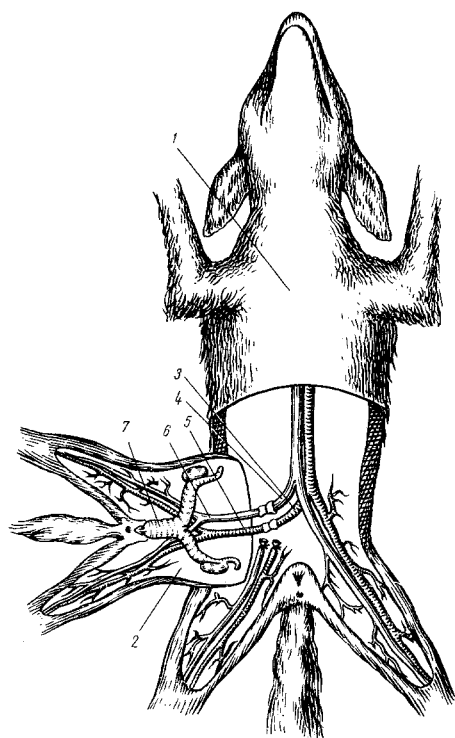


Fig. 1. Scheme of transplantation of dog's genital system. 1) Recipient; 2) posterior part of donor; 3) external iliac artery of recipient; 4) external iliac vein of recipient; 5) aorta of graft; 6) inferior vena cava of graft; 7) uterus of graft.

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branches carefully ligated. The length of each vessel must be about 10 cm. The peripheral ends of both vessels are ligated, and the central ends used to connect the external iliac artery with the donor's aorta and the external iliac vein with the donor's inferior vena cava. We joined the vessels end-to-end by means of an apparatus for vascular suture. They can also be connected by metal sleeves or by synthetic material on the principle of Payr's cannulas. The method of anastomosis is shown schematically in Fig. 1.

After the vessels have been joined, the vertebral column of the graft is fixed to the right iliac crest of the recipient by means of a thick capron ligature passed through the transverse processes of the vertebrae, and the soft tissues are joined by interrupted silk sutures in one or two layers. The edges of the skin wound are also joined by interrupted sutures. When fixing the graft care must be taken to ensure that the blood vessels are not mixed up and thus to ensure that no disturbance of the circulation takes place in the transplanted organs.

We have performed four transplants by the method described. All operations were carried out under morphine-barbiturate anesthesia: initially morphine hydrochloride (1 ml of a 1% solution per kg body weight) was injected, followed by intravenous injection of 1-2% thiopental sodium solution until the surgical stage of anesthesia was reached. One of the basic conditions for successful transplantation is the strictest observance of asepsis of the field of operation (all hair must be carefully shaved from the skin). In one experiment the whole urinary system was transplanted along with the posterior part of the animal's body. The kidneys functioned, but urine was excreted irregularly, just as from the recipient. In the same experiment reflexes from the hind limbs and all other parts of the skin of the graft remained intact. In the other experiments the transplanted posterior part of the body of the female animals was separated at the level of the third or fourth lumbar vertebrae; the ureters were ligated.

In all the experiments the circulation in the grafts was restored immediately after anastomosis of the blood vessels, and the body temperature returned to normal in the course of 1 h.

The recipient animal usually recovers completely from the anesthetic 4-5 h after the end of the operation. For the first experiment (transplantation of the genital system with the complete urinary system) edema of the graft developed on the 3rd day, and subsequently increased. As the edema of the graft increased, toxic manifestations in the recipient animal also increased, and she died on the 5th day. At autopsy multiple extensive myocardial infarcts were found. In the remaining dogs disturbance of the circulation in the grafts developed somewhat later, but despite this, one died on the 5th day, another on the 9th, while the last survived for 15 days.

Consequently, experimental transplantation of the female genital system is possible, but all aspects of this complex subject require further study.