

BRINGING THE URETERS TO THE OUTSIDE SEPARATELY TO STUDY RENAL FUNCTION¹

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For many years attention has been paid to the problem of establishing a method for the collection of urine as an index of renal function; the method should leave the ureters anatomically intact, be easily applicable, and minimally traumatic.

I. P. Pavlov [4] was the first to propose in 1883 an operation for bringing the ureters to the outside. With a Pavlov fistula of the bladder, the whole mass of urine may be collected, or the function of one kidney may be studied by catheterizing the ureters separately.

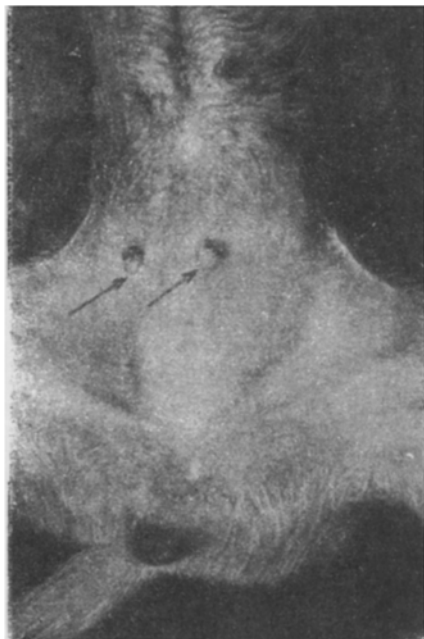


Fig. 1. Ureteric fistulae brought out to the nipples of the mammary gland of a dog; condition 6 months after the operation.

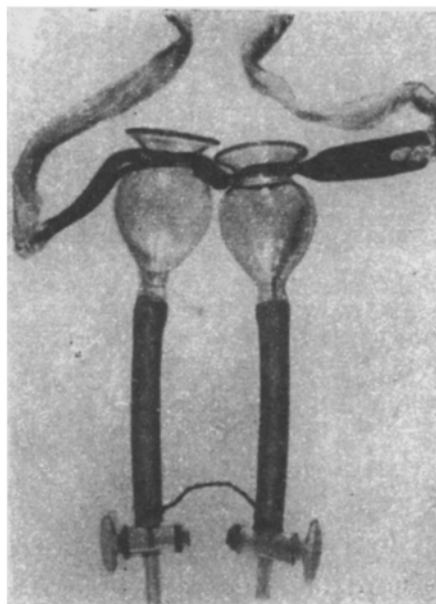


Fig. 2. Urinary receptacle.

In 1921, L. A. Orbeli [2] proposed a modification of Pavlov's method which consisted of bringing the ureters separately out on to the skin. This allowed the function of each kidney to be studied separately. However, the

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external apertures of the ureters, sewn flush with the surface of the skin may be pulled into the tissue through traction, or as a result of inflammatory processes. Fistulae level with the surface cause the surrounding tissues to become soaked in urine, and lead to cutaneous inflammation.

In order to facilitate the collection of urine from the ureteric fistulae, N. N. Elanskii [1] extended L. A. Orbeli's method by a skin graft in which a tube was established around the lower end of the ureter. The canal formed in this way served as a urinary duct from the ureters. This method protects the skin from maceration caused by the irritation by urine.

A disadvantage of the method was that sometimes the tube necrosed, and the wound opened. To prevent these complications, we have worked out the following method of bringing the ureters to the surface.

Like L. A. Orbeli, we cut off the urinary bladder at the origin of the urethra. We invaginated the urethra, then dissected out the urinary bladder, and around each ureter we left a portion of bladder 2 - 3 cm in diameter. Then, instead of bringing the ureters to the surface of the skin, we attached them to nipples of the mammary gland. To do so, we cut off the apices of the penultimate pair of nipples. With small dressing forceps we penetrated into the abdominal cavity, and by opening the forceps we extended the canal to a diameter of 1 - 2 cm. With the end of the forceps we then seized the ureters which had previously been freed, and brought them to the openings of the nipples, and fixed them in place with knotted sutures. An antibiotic was injected into the abdominal cavity through the wound.

After 8 - 10 days, well formed ureteric fistulae were established, and were raised 2 - 3 cm above the skin (Fig. 1).

It is important to note that to collect the urine voided from the fistula, instead of the apparatus proposed previously we used a breast pump to which was attached a rubber tube with a glass tap. In the last experiments we replaced the breast pump with a funnel-shaped glass vessel which we made ourselves, to which rubber tubes were connected. Instead of the latter, transparent graduated tubes of polythene, glass, or perspex may be used (Fig. 2).

The operation is quite easily carried out, and is well tolerated. The ureters introduced into the nipples constitute a fistula which may easily be used in a chronic experiment. The height of the fistula above the surface of the skin enables urine to be collected without waste, so that accuracy is attained. This kind of fistula does not lead to the development of dermatosis, even when no special care is taken over the animal. The use of urinary receivers prepared by our method convinced us that the method is practical and more convenient than a corked funnel.

SUMMARY

A modification of the method of Pavlov, Orbeli, and Elanskii for collecting urine separately from each of the two kidneys of a dog is described. The ureters are brought out to the openings of the nipples of the mammary glands. A new method of construction is described for a receptacle for collection of the urine from the fistulae. The method is recommended for chronic preparations, because it enables urine to be collected without loss, ensures accurate results, and does not induce dermatosis.

LITERATURE CITED

1. N. N. Elanskii, Quoted by A. P. Tsulukidze, *Outlines of Operative Urology*. Monograph. [in Russian] Tbilisi (1955), p. 122.
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3. L. A. Orbeli, *Physiological Surgery of the Kidneys*. *Vestn. khir.*, No. 9 (1927), p. 43.
4. I. P. Pavlov, *Ezhened. klin. gazeta*, No. 30 (1883), p. 479.

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.
