

Operative repair is urgently indicated. The risk of spread of infection intracranially into the basal cisterns is appreciably higher than with fractures involving the other paranasal sinuses.

Operative repair is difficult and requires a bifrontal flap, usually with division of the falx and sacrifice of one or both olfactory tracts. Three patients underwent successful dural repair and have since been followed for nearly four years. There has been no further rhinorrhoea or intracranial infection, and all are well and working.

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## ABSENCE OF THE VASA AS A CAUSE OF AZOOSPERMIA

BY

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The treatment of azoospermia due to a blockage in the system of efferent ducts by which the spermatozoa reach the posterior urethra is admittedly very unsatisfactory. The commonest situation for such a blockage is the epididymal canal, and when we consider the small calibre of this canal, its length, and the prevalence of epididymitis, the frequency with which it becomes occluded can easily be understood. The next commonest site for an obstruction is in the ejaculatory ducts, and this is generally the result of recurrent attacks of prostatitis and vesiculitis. Although the vas deferens may also be involved in the infection which brings about an epididymitis, a post-inflammatory stricture of it is uncommon. Genital tuberculosis is an exception to this generalization. In this disease the lumen of the vas is often obliterated, but as the epididymis is still more seriously affected this is of no practical importance. When the vas is obstructed it is usually from trauma, and the commonest cause is damage inflicted on it during the course of an operation such as herniotomy.

To diagnose the exact site of the blockage is not always an easy task. Should there be a clear history of bilateral epididymitis and additional evidence in the shape of areas of induration at the lower poles of both epididymides, then it may be assumed with confidence that the blockage is in these organs. But if there is no such history, and if no areas of induration are found on palpating the epididymides, then it is quite possible that the ejaculatory canals are at fault.

How is this supposition to be confirmed or refuted? Textbooks suggest that catheterization of the ejaculatory ducts should be carried out for this purpose. But unfortunately this advice is much easier to give than to

follow. The openings of the ducts on the slopes of the verumontanum may be so placed that even when clearly seen it is mechanically impossible to pass a filiform bougie along them. One of us (K. W.) remembers witnessing an expert at catheterization at work and was not impressed with the results of his skill. A probe was forced into the lumen of the ducts through a direct-vision posterior urethroscope employing air distension, but such a manoeuvre as this was far more likely to produce a stricture than dilatation. Trauma of the ducts must be rigorously avoided.

Another method of diagnosing an obstruction in an ejaculatory duct is to expose the vas at the neck of the scrotum and to inject into it a solution of indigo-carmin, noting afterwards whether this has passed into the posterior urethra or not. Some urologists have recommended injection of the vasa also, as a therapeutic measure. They believe that the ejaculatory ducts can be opened up thereby, just as the Fallopian tubes are opened up by insufflation. We have never seen a blockage removed in this way, and dislike puncturing vasa purely for diagnostic reasons, not only because of the damage inflicted on a delicate structure but also because of the risk of provoking a descending epididymitis.

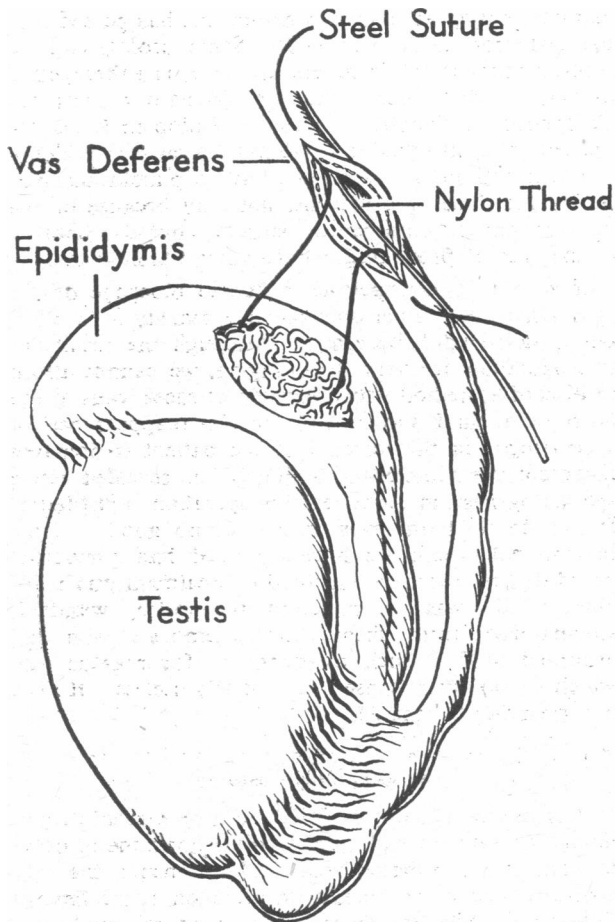
If a case of azoospermia is due to blockage of the epididymal canals, the only possible remedy is to carry out a vaso-epididymostomy. Although the results of this operation are very discouraging, we cannot afford to discard a method which in 10% of cases leads to the birth of a child and in 25% to the reappearance of spermatozoa in the semen. If the patient is prepared to accept the gamble and a biopsy has revealed active spermatogenesis in the testes, this operation is justifiable. It can do no harm even if it does no good. Some patients on whom we have operated had previously heard that an alternative method of treatment was available. This was to puncture the testes, withdraw spermatozoa from them, and inseminate with the aspirated fluid. Such treatment is, for reasons into which we do not propose to go, utterly useless. It need not even be considered.

### Vaso-epididymostomy

It is useful, but not essential, to give a month's preliminary treatment with gonadotropic hormone in order to stimulate spermatogenesis and to ensure that the epididymal tubes are filled with secretion at the time of operating. After the testicles have been delivered from the scrotum and carefully inspected, the vas deferens is separated from surrounding structures at the level of the head of the epididymis, but great care should be exercised not to imperil its blood supply. The vas is next incised and some 5 to 6 in. (12.5 to 15 cm.) of nylon thread passed down it to demonstrate its patency. This thread is left *in situ* to act as a guide, and attention is then directed to the epididymis. An oval area of the tunica covering the underlying distended tubules is removed, and when the tubules are incised a drop of whitish fluid exudes. This is smeared on to a sterilized coverslip and the presence of spermatozoa confirmed. The finest round-bodied straight needle, carrying 40-gauge steel wire, is passed through the wall of the vas at the lower end of the incision into it and then through the exposed epididymal tubules. Having taken a good bite of these, the needle passes through the vas again, but at the upper end of the incision. It finally emerges through the skin of the scrotum near the root

of the penis (see illustration). When pulled upon, this wire invaginates the tubules into the lumen of the vas. During the subsequent healing it also acts as an excellent splint to the juncture between the vas and the epididymal canal. The lips of the vasa incision are finally united to the epididymis on each side by two lateral sutures of 0.005-in. tantalum wire. The operation is completed by returning the testicles into the scrotum and closing the latter, without drainage. The steel splinting wire is pulled out on the ninth day.

The real object of this paper is not so much to describe the details of the operation of vaso-epididymostomy as to call attention to anomalies of the vas which may be accidentally discovered in the course of performing it.



Method of insertion of splinting suture in the operation of vaso-epididymostomy.

In about 10% of the patients operated on by us either no vas at all was found, or else the vas was reduced to a thread-like structure devoid of any lumen. Theoretically, absence of the vasa might be due to one of two causes—congenital absence, or disappearance as the result of some previous disease. Reference to embryological and anatomical literature suggests that the former cause is an uncommon one.

That the second cause—disappearance through disease—is the more likely explanation is supported by what we found in three or four cases. At the level of the neck of the scrotum a vas was discovered, but on tracing it downwards it gradually narrowed, and 2 in. (5 cm.) before it should have joined the epididymis it disappeared altogether. It was noted that where it existed the vas was tortuous, solid, and very friable. On

cutting into it a creamy fluid exuded, as though the vas was in a state of coagulative necrosis. Sometimes an opaque line marked the previous position of the vas in that part of its course from which it was absent. There was nothing in the patients' clinical history to throw light on the nature of the disease which had attacked the vasa and had led to their disappearance.

In two patients a somewhat similar condition was found in the epididymal canal. When seen through the tunica covering them the epididymal tubules had a light yellowish colour, and when cut into they were found to be solid. On pressure a fluid exuded, sometimes containing a few spermatozoa and sometimes without them. Again it looked as though some form of coagulation or fatty necrosis was in progress. In yet another two cases the vas ended abruptly 2 in. above the epididymis in a kind of corkscrew, recalling the terminal portion of the normal vas. Here, congenital malformation may well have been the explanation.

### Conclusion

What is the moral to be drawn from these observations? The first and most obvious is that in all cases of obstructive azoospermia, and particularly if an operation is about to be undertaken to remedy it, the vasa must be very carefully palpated through the scrotum. Every effort must be exerted to make sure that they actually join the epididymides. Through neglect of this precaution one of our patients had been submitted to two years of useless hormone treatment by a specialist before he came to us for operation. It is true that in some cases it is difficult to trace the whole course of the vasa until they meet the epididymides, but if the preliminary examination had been more careful some of these exploratory operations might have been avoided. The second lesson to be learnt is that sterility is occasionally the result of some pathological condition of the vas the nature of which is still obscure. It is to be hoped that further research will throw light on this interesting problem.

The commercial production of adrenocorticotrophic hormone in Britain has been in the stage of planning and organization for some time under the aegis of the National Research Development Corporation, the Government agency set up three years ago to undertake commercial exploitation of Government-owned patents and other technical projects. The three Government departments involved are the Ministry of Health, Medical Research Council, and Ministry of Food, which has organized the collection of some thousands of sheep, cow, and pig pituitary glands weekly from slaughter-houses up and down the country, solved the problem of their preservation, and delivered them to the five pharmaceutical firms who are co-operating in the attempt to produce A.C.T.H. to the required standards of purity and activity. One of these firms, Organon Ltd., has just delivered its first batch of product to the Ministry of Health, which is rigidly controlling distribution since supply is far short of demand, and likely to continue so unless the efficiency of the manufacturing process can be greatly raised or a synthetic substitute discovered. An annual production of 800 g. seems the probable maximum. There is no likelihood of cortisone being made in Britain, since its manufacture in about thirty complicated low-yield stages from ox-bile is covered by American patents, and in any case there is probably not enough British ox-bile available to start with. It will be recalled that the Ministry of Health recently began monthly distribution to 50 hospitals (24 teaching hospitals and 26 other hospitals nominated by regional boards) of 6 g. cortisone and 3 g. A.C.T.H. imported from the U.S.A. at about \$50 a gramme.