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Microsurgical vasoepididymostomy: a comparison between the end-to-side anastomosis and the invagination technique

M. Shekarriz and S. Pomer

Department of Urology, University Clinic, Heidelberg, FRG

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Summary. In this study we compared the invagination technique with the commonly used end-to-side anastomosis. A total of 30 invaginations and 30 end-to-side anastomoses was performed randomly in 30 Wistar rats. We checked the patency of the anastomoses 4 months after operation by macroscopic examination, spermiogram, methylene blue injection, and X-radiography studies as well as histology. The examination of the anastomoses showed patency in 19 (63.2%) compared with 24 patent invaginations (80%). The introduction of the simple time-saving technique of invagination could be useful for clinical purposes, since it is easier to learn and to practise and might also improve the clinical results concerning the patency of anastomoses.

The success rate in the correction of obstructive azoospermia involving the epididymal block of sperm transport is low [16, 19, 20]. The conventional technique of vasoepididymostomy for restoring the continuity of sperm passage consisted of a fistula-shaped anastomosis between the vas and the epididymis [7–9, 19, 22]. A microsurgical vasoepididymostomy (tubulovasostomy) was carried out for the first time in 1978 by Silber [14, 16].

The new idea is to anastomose directly one single epididymal tubule with the inner lumen of the vas deferens. Silber used an end-to-end two-layer anastomosis after transection of the entire cross-sectional area of the epididymis [14]. However, others described it as difficult, sometimes even impossible, to find the proximal tubule among the cut ones. Furthermore, the cutting of the entire cross-section of the secondary scarring as well as obstruction was involved [5, 18]. Therefore, several authors tried to modify the microsurgical epididymovasostomy by mobilizing a single epididymal loop, fenestrating its wall and performing an end-to-side anastomosis [3, 5].

Recently, various other techniques of anastomoses were tried in order to improve the vasoepididymostomy both in animals and in humans, using end-to-end and end-to-side anastomoses [1, 3–5, 10, 11, 18]. However, a simple method with an acceptable patency rate still remained to be found.

Our approach was to develop a new technique of tubulovasostomy through the invagination of the epididymal loop into the vas deferens. In this study we compare this technique with the commonly used end-to-side anastomosis. The purpose of the study was to examine whether the method yields comparable or even better results concerning the patency rate. We also tried to uncover further advantages or disadvantages of both techniques.

Materials and methods

A total of 30 Wistar rats, weighing 270–300 g, were operated upon. The rats were fed by the standard altromin diet and were allowed to drink ad libitum. The animals were anesthetized with ether [21]. The 30 end-to-side anastomoses and 30 invaginations were performed randomly. A Zeiss microscope OPMI 6 was used. All anastomoses were performed at the level of the cauda epididymidis.

After desinfection of the razored skin the abdomen was opened by a median laparatomy and the scrotal contents exposed. After ligation of the vas deferens 1 cm distal from the epididymis the tunica vaginalis of the epididymis was fenestrated by microscissors, and a single loop was dissected free.

The anastomoses were begun with two sutures at the back of the vas deferens between the muscular-adventational layer and the tunica epididymis; 10/0 Ethilon sutures and BV-2 needles were used. The lumen of the ductus deferens was rinsed repeatedly with a special round-tipped cannula [2].

Until now, the steps of the two procedures were the same. The invagination was carried out after a monofile splint was introduced into the vas deferensto facilitate the sutures. Using a BV-6 needle and 11/0 Ethilon suture, the needle was inserted near-proximal to the free end of the vas deferens from outside into the lumen. Then the needle was led out through the lumen of the vas. Now the splint

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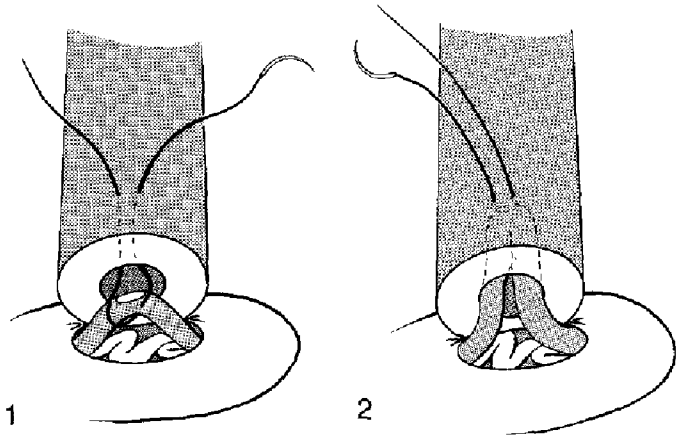

Fig. 1. U-turn suture

Fig. 2. Invagination of a single loap

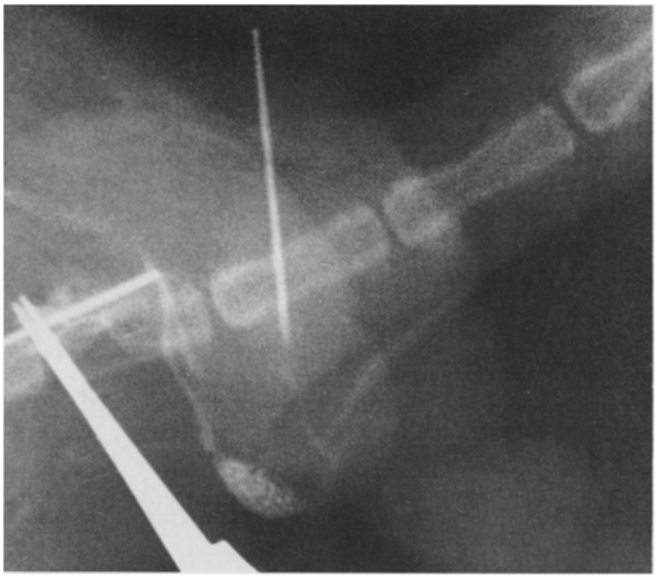

Fig. 3. X-radiography examination of a patent anastomosis

could be removed and the needle put through the wall at the concave side of the loop without tangling the inner lumen of the tubule. The loop was incised with microscissors on the side opposite to the stitch to create an oval window. The needle was then led back through the lumen of the vas deferens and pulled through its wall near the first suture (U-turn suture) (Fig. 1a, b).

The epididymal loop could now be inserted into the lumen of the vas deferens by pulling the ends of the stitch and tying them (Fig. 2). The frontal wall of the vas deferens was fixed to the tunica epididymidis with two 10/0 sutures.

The end-to-side anastomosis was started with the fenestration of an epididymal loop. This window was adapted to the mucosa of the vas deferens with four interrupted sutures. A BV-6 needle and 11/0 Ethikon suture were used.

We checked the patency of the anastomoses 4 months after operation by macroscopic examination, spermiogram, methylene blue injection, and X-radiography studies (Fig. 3) as well as histology (Fig. 4). The methods used were described previously [1, 3, 10, 11].

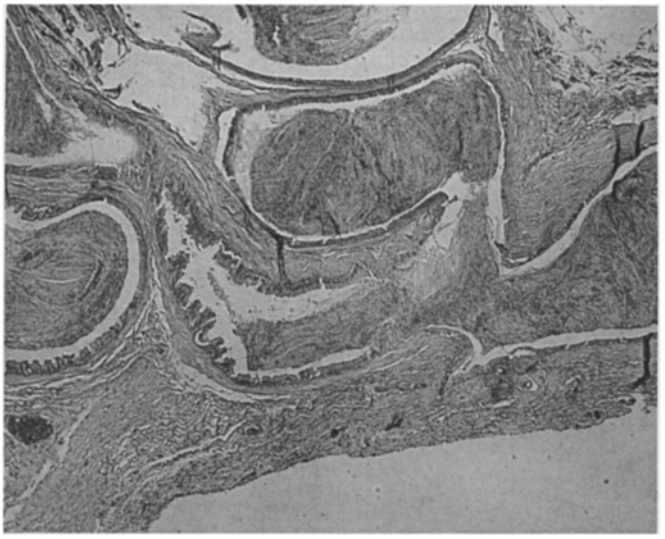

Fig. 4. Histology of a patent anastomosis

Results

The examination of the anastomoses showed patency in 19 out of 30 end-to-side anastomoses (63.2%) compared with 24 patent invaginations (80%).

The statistical evaluation was done according to [12]. No statistical significance could be found.

The analysis of practicability demonstrated that the end-to-side-anastomosis took 45–60 min, whereas only 20–30 min were needed to carry out the invagination. Moreover, the invagination was much easier to learn than the conventional technique.

Discussion

In our experience the rat proved to be a suitable experimental model to examine the efficiency of microsurgical vasoepididymostomies although the microsurgical techniques in the rat are basically not easy because of smaller organ dimensions compared with those in such animals as dogs. Drawz et al. [3] described 8 patent end-to-side anastomoses out of 15 in the rat (58%) comparable with the results of this study (63.2%).

Certainly, part of the failure of end-to-side anastomoses in the rat is due to technical difficulties resulting from the small size of the tubules. Invaginations yield better patency rates in this study (80%), promising even better results in clinical use.

The technique of invagination is especially valuable if used in the smaller proximal tubules of the epididymis in the rat since end-to-side anastomoses can only be performed in the lower caudal part of this organ [1, 3]. As a result, invagination could become particularly useful as a new experimental model, enabling studies of the influence of the epididymis in sperm maturation on its fertilizing ability [13, 15, 17].

The use of nonabsorbable sutures for end-to-side anastomoses, which inevitably narrow the tubular lumen,

might further contribute to the risk of partial obstruction and formation of sperm granulomas [10].

A permanent stenting of the anastomosis did not prove to be useful. Generally, the use of absorbable splints for the simplified splinted tubulovasostomy [10, 11] did not show convincing advantages: The high pressure inside the epididymis as well as the upward migration of the splint and incomplete reabsorbtion can cause spermatic leakage, finally leading to sperm granulomas and an insufficiency of the anastomosis [1]. However, a precise adaption is especially important for the prevention of sperm granulomas [16]. In conclusion, the stenting techniques have not yet achieved any clinical significance.

With the technique of invagination, the lumen of the prepared loop is not distorted by any stitches; the only suture required is the one needed for outer fixation of the tubular wall. Thus any obstruction of the lumina is avoided. Moreover, less material for sutures is needed.

The introduction of the simple time-saving technique of invagination could be useful for clinical purposes, since it is easier to learn and to practise and might also improve the clinical results concerning the patency of anastomoses.

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Priv.-Doz. Dr. S. Pomer
Urologische Universitätsklinik
Im Neuenheimer Feld 110
W-6900 Heidelberg
Federal Republic of Germany