

## Unsatisfactory Results of Epididymovasostomy for Post-Inflammatory Obstruction

Hee Yong Lee, Hong Bang Shim, Kyu Hong Park, and Nack Gyeu Choi

*Department of Urology, Seoul National University Hospital, Seoul, Korea*

### INTRODUCTION

During the past 17 years, a total of 159 post-testicular azoospermia due to epididymal obstruction were surgically treated by the authors, but the incidence of both patency and pregnancy after the epididymovasostomy was not up to our expectation. We have, therefore, carefully analysed the operative results of our series in an attempt to isolate the causative factors of the failures.

### MATERIALS AND METHODS

**Subjects:** The pertinent clinical history of the patients was summarized as follows: Mean age of the patients was 33(20-53), and that of their sexual partners, 30(21-42). Mean marital life was 7 years(1-30 years), and duration of obstruction, 8 years(1-22 years). Mean frequency of sexual intercourse per week was 2.5 before obstruction, 2.3 after obstruction and 2.2 after the epididymovasostomy. Educational background of the patients was relatively high in this series. That is, more than 2/3 of the patients finished above the high school with an average of 12 grades. The common occupations of the patients were clerks and commerce. The occupational background was not particular about the causes of the epididymal obstruction.

In the present series, testicular biopsy, epididymovasography, and measurements of plasma FSH, LH, and testosterone were performed in

the majority of the patients pre-operatively in order to make sure of post-testicular azoospermias. And also tissue samples were obtained from the obstructed site of epididymis for the histologic examinations during surgery.

Suspective causes of epididymal obstruction were gonorrheal and nonspecific epididymitis in 86 patients(54%), tuberculous epididymitis in 57 patients(36%), injuries of scrotal contents in 4 patients(2%), and bilateral aplasia of vasa deferentia in 12 patients(8%). The incidence of post-tuberculous obstructions has gradually decreased but that of congenital anomalies increased more frequently in these years. Among these, 147 patients were subjected to this clinical observation. The remaining 12 patients were excluded because of vasa anomalies.

**Surgical techniques:** Under the spinal or general anesthesia, scrotal contents were exposed through a single median scrotal incision. Testis, epididymis and vas deferens were carefully inspected and the point of obstruction should be ascertained on the epididymis. A longitudinal incision of 1 cm in length and 0.5 cm in depth was made with a sharp scalpel in the epididymis just proximal to obstruction site in which a mixture of blood and milky fluid oozed out. In some patients a window was made and epididymal tubule was opened by removing small piece of the tubule. The milky fluid was examined under a microscope for spermatozoa. If none was found, the incision must be made at more proximal level of epididymis until sperms were found. A

longitudinal incision of 1 cm in length was then made over the normal vas or vas was divided opposite the epididymal incision level. The patency of distal vas was examined by injection of 10 ml of normal saline or passing the 3-0 blue nylon thread. In the majority of the patients, a short circuit operation was effected between the epididymal and vasal openings mostly by the side-to-side technique or by side-to-end technique with a total of 10-15 interrupted sutures of 7-0 to 9-0 nylon. The approximation of epididymal and vasal openings was usually started at the upper angle of both wound. Both upper and lower margins of the anastomosis were secured by a few additional sutures. The placement of the internal splint of 1-0 to 3-0 dermalon has been abandoned since 1976.

A surgical microscope has been used instead of 4-6 fold loupe to enhance the technical perfection of minute and delicate operation. Thirty-eight patients out of the 147 were operated by this microsurgical technique. In an attempt to prevent later possible closure of the opening of the original epididymal tubule by spontaneous healing process and also to maintain the spermatic fluid with sperm may pass through the epididymal tubule immediately to the vas lumen, we tried to anastomose the end of mucosal layer of vas deferens directly to the end of original epididymal tubule from which spermatic fluid leaked continuously out in 6 patients of the 38 cases. However, we could not satisfactorily ascertain the original epididymal tubular end

nor could we perfectly anastomose the epididymal tubule to the vasal lumen.

In cases of the tuberculous epididymitis triple anti-tuberculous regimens were given for more than 1 year pre-operatively.

Patients were asked to have repeated semen analyses post-operatively every month for at least 12 months following the corrective surgery, since sperm appeared in the ejaculates of some patients even 6-12 months after the operation. If azoospermias persist for more than 1 year after the anastomosis, reoperation may be then considered.

The success of an operation was judged by the appearance of more than  $10 \times 10^6$ /ml of normal viable sperm (anatomical success), and the occurrence of pregnancy (functional success) after the anastomosis.

## RESULTS

Among the 147 cases of epididymovasostomies, 130 patients were followed-up for more than 1 year after operation. More than 3 semen samples were examined on each patient during the follow-up period. The results were correlated with the following factors.

Due to the causes of epididymal obstruction, both anatomical and functional success rates were higher in patients with non-tuberculous epididymitis than in patients with tuberculous epididymitis (Table 1).

Due to the extent of post-inflammatory fibro-

Table 1. Success rate by causative factors of obstruction

Causes, bilateral	Total operations	Semen examined	Sperm positive		Pregnancy positive	
	Cases	Cases	Cases	%	Cases	%
Non-tuberculous epididymitis	86	79	29	37	12	15
Tuberculous epididymitis	57	49	8	16	3	6
Trauma of scrotal contents	4	2	1	50	0	0
Total-Average	147	130	38	29	15	11

tic scar on the epididymis, vas to epididymis anastomosis was possible bilaterally on 113 patients and unilaterally on 13 patients. The vas end was implanted directly into the top of the testis on both sides on the remaining patients, because the post-inflammatory scarring on both sides of epididymis was so extensive that no form of anastomosis was technically feasible. Both anatomical and functional success rates were relatively high in the bilateral vas to epididymis anastomosis patients. No successful

results were obtained from the vas implantation patients (Table 2).

Due to the level of the epididymal window or incision, vas to epididymal head anastomosis, vas to epididymal upper-body anastomosis and vas to epididymal lower-body anastomosis were carried out. No statistically significant differences were found in both anatomical and functional success rates by the anastomosis levels of the epididymis (Table 3).

Due to the duration of the obstruction and

**Table 2.** Success rate by site of anastomosis

Anastomosis site	Total operations	Semen examined	Sperm positive		Pregnancy positive	
	Cases	Cases	Cases	%	Cases	%
Vas-to-epididymis, bilateral	125	113	35	31	14	12
Vas-to-epididymis, unilateral	16	13	3	23	1	8
Vas-to-testis, bilateral	6	4	0	0	0	0
Total-Average	147	130	38	28	15	11

**Table 3.** Success rate by level of epididymal window

Level of epididymal window	Total operations	Semen examined	Sperm positive		Pregnancy positive	
	Cases	Cases	Cases	%	Cases	%
Head	72	64	20	28	8	13
Upper-body	59	53	15	25	6	11
Lower-body	10	8	3	30	1	13
Testis (implantation)	6	5	0	0	0	0
Total-Average	147	130	38	29	15	11

**Table 4.** Success rate by interval of obstruction

Interval	Total operations	Semen examined	Sperm positive		Pregnancy positive	
	Cases	Cases	Cases	%	Cases	%
Years						
1~2	3	2	1	50	0	0
3~4	28	25	7	28	3	12
5~6	60	55	17	31	7	13
7~8	36	33	10	30	4	12
9~10	14	12	3	25	1	8
11(+)	6	3	0	0	0	0
Total-Average	147	130	38	29	15	11

age group of the patients, no significant differences were noted in both anatomical and functional success rates (Tables 4 and 5).

Summarized results of our series: Viable sperms were appeared in 38 patients and pregnancy occurred in 15 patients out of the 130 cases following the epididymovasostomy (Table 6).

The results of semen analyses on 38 successful cases averaged that volume was 2.5ml; counts,  $26 \times 10^6$ /ml; motility, 40%; and normal morphology, 76%. No particular differences were

**Table 5.** Success rate by age groups

Age groups	Total operations	Semen examined	Sperm positive		Pregnancy positive	
	Cases	Cases	Cases	%	Cases	%
20~25	5	3	1	33	0	0
26~30	35	32	9	28	3	9
31~35	66	62	19	31	9	15
36~40	24	21	7	33	2	10
41~45	11	8	2	25	1	13
46~50	5	4	0	0	0	0
51(+)	1	0	0	0	0	0
Total-Average	147	130	38	29	15	11

**Table 6.** Results of total epididymovasostomy

Factors	Success rates	
	Cases	%
Total operations	147	
Semen examined	130	100
Sperm appeared (Anatomical success)	38	29
Pregnancy occurred (Functional success)	15	11

**Table 7.** Spermigramme of 38 successful cases by age groups

Age	Total	Volume	Count	Motility	Morphology
Decade	Cases	ml	mill./ml	%	%
20~30	10	2.6	29	41	77
31~40	26	2.5	28	39	76
41~50	2	2.5	29	40	77
Total-Average	38	2.5	28	40	76

**Table 8.** Spermigramme of 38 successful cases by interval of obstruction

Interval	Total	Volume	Count	Motility	Morphology
Years	Cases	ml	mill./ml	%	%
1~2	1	3.0	33	44	77
3~4	7	2.6	32	43	75
5~6	17	2.5	28	40	76
7~8	10	2.5	27	38	76
9~10	3	2.4	26	37	75
Total-Average	38	2.5	28	40	76

noted on spermigramme by age group or by intervals of obstruction in the present series (Tables 7 and 8).

## DISCUSSION

For the anastomosis level of the epididymis, it has been recommended that the higher epididymis level, the more patency rate and the lower epididymis level, the more pregnancy rate. Accordingly the anatomical success rate should be highest when the vas is anastomosed near the epididymal head since a dozen of efferent ducts connect the 20-30 tubules of rete testis to the head of the epididymis. This procedure facilitate the flow of spermatic fluid from the rete testis into the vas deferens. The functional success rate should be theoretically the highest when the vas is anastomosed to epididymal lower-body since the spermatozoa tend to undergo maturation as they are transported through from epididymal head to tail. However, both anatomical and functional success rates were much the same in entire anastomosis groups of vas to epididymal head, vas to epididymal upper-body and vas to epididymal lower-body in our series (Lee, 1972, 1977, 1978; Schoysman, 1978).

It has been considered that cases of post-tuberculous obstruction were no longer contraindicated to epididymovasostomy due to the success of modern anti-tuberculous chemotherapy (Ob-rant, 1964). Thus, preoperative chemotherapy, with tripple drug in full therapeutic dosage for suitable time, has made the epididymovasostomy safe and compatible procedure except beaded vas deferens. However, the success rate of corrective surgery after tuberculous epididymal obstruction was proved to be very poor in this series.

Overall success rates of epididymovasostomy were not encouraging, even though the anat-

mical success rate averaged, 35% (7~66%), and the functional success rate, 15% (0~44%) according to the reported results by different authors (Schoysman, 1978; Handry, 1978; Smith, 1963; Kelami, 1980; Hanley, 1955; Lee, 1978). Since Hanley's statement in 1959 that "one could go so far as to say that unless the patient has a gonococcal obstruction in the tail of the epididymis, the chances of becoming fertile after an operation are very slender", results of epididymovasostomy particularly on post-inflammatory obstruction were not much improved yet. And also the prognosis for the obstruction due to malformation or trauma was generally poor one.

The success of epididymovasostomy for post-inflammatory epididymal obstruction depends on technical perfection. That is, skill of surgeon with adequate instruments, proper suture materials, and perfect magnification are, of course, the most important factor. However, this has not been accomplished yet for all one's efforts (Pryor, 1976). Our observation on failed epididymovasostomies at reoperations revealed that there were marked fibrosis and scar formation with sperm and suture granulomas and blockage of the original epididymal tubular opening at the site of the previous anastomosis. It is, therefore, ideal to attempt direct anastomosis between the original epididymal tubule and the mucosal layer of vas deferens (Silber, 1978).

In addition, several factors which have been supposed to be influencing on the success or failure of epididymovasostomy might be listed as follows: inadequate selection of subjects, infection leading to formation of fibrosis, persisting previous residual infection, early ambulation following the anastomosis, regional changes in environments of testis and epididymis, injuries to the sympathetic nervous system which disturbing the peristalsis of seminal tracts, sperm antibody formation, low fertility level of part-

ners, incompatibility between husbands and wives, poor follow-up and so on.

## SUMMARY

A total of 147 patients were treated surgically for the correction of post-testicular azoospermias due to epididymal obstruction during the past 17 years. Thirty-eight patients were operated by the microsurgical technique and the remaining patients were operated by the conventional technique. The anatomical success rate was 29%, and the functional success rate, 11% in the 130 patients who were followed-up for more than 1 year after the epididymovasostomy. The success rates were higher in patients with non-tuberculous epididymitis than in patients with tuberculous epididymitis. No significant differences were found in both anatomical and functional success rates by the anastomosis levels of the epididymis. Our observation on failed epididymovasostomy at reoperation revealed that there were marked scar formation with sperm and suture granulomas and blockage of the opening of the original epididymal tubule at the site of the previous anastomosis. It is, therefore, ideal to attempt direct anastomosis between the original epididymal tubule and the mucosal layer of vas deferens.

### = 國 文 抄 錄 =

#### 副睪丸精管吻合術의 失敗誘因

서울대학교 의과대학 비뇨기과학교실

李熙永 · 沈鴻芳 · 朴圭鉉 · 崔樂圭

지난 17년 동안에 159예의 副睪丸閉塞으로 인한 無精子症환자를 치료한 바 있다. 이들의 病類別을 보면 淋菌性 및 非特異性 副睪丸炎이 86예, 結核性 副睪丸炎이 57예, 陰囊內容物外傷이 4예 및 精管畸形이 12예로 되어 있다.

이들의 平均年齡은 33세에, 이들 배우자의 그것은

30세가 된다. 平均結婚期間은 7년에, 閉塞期間은 8년이 된다. 이들의 2/3는 高等學校이상의 졸업자로 敎育程度는 비교적 높은 편이다. 職業別에서 閉塞原因과 직접 관련성이 있는 것은 없었다.

이들중에서 12예의 精管缺損畸形을 제외한 147예에게 精路再開를 위한 副辜丸精管吻合術을 시술하였다. 즉 38예는 顯微鏡의 方法으로, 그리고 나머지 109예는 在來式 方法으로 吻合하였다.

吻合術後 1년이상 追求觀察이 가능했던 130예의 성적을 분석해 보면 術後 精子가  $10 \times 10^6$ /ml이상 出現한 解剖學的 成功率는 29%가 되나, 妊娠한 機能的 成功率는 겨우 11%가 되는 바 희망적인 성적이 못된다. 특히 結核性 副辜丸炎後의 閉塞에서는 非結核性 副辜丸炎後의 그것에 비해 再開成功率이 낮다. 副辜丸의 吻合部位別로 볼 때 開通率에서나 妊娠率에서 이렇다 할 뜻있는 差를 보이지 않는다.

副辜丸精管吻合術의 失敗原因을 살펴본 바 吻合部位에서 同部位組織이 심하게 纖維化를 일으켰고 또 本來의 副辜丸近位管의 開口部位가 자연적으로 막혀버린 현상등을 발견하게 된다. 따라서 本吻合術의 成功率向上을 위해서는 顯微鏡下에서 副辜丸管腔과 精管内腔을 직접 端端吻合해 주는 術式이 開發되어야 할 것으로 믿어진다.

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