ADVERSE EFFECTS OF VASECTOMY : SPERM GRANULOMA OF EPIDIDYMIDES

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Summary: Rats and mice were vasectomized to study the pathological changes in the development and resolution of vasectomy induced sperm granuloma. Epididymal weights were increased in all groups of vasectomized animals, whereas testicular weights did not change. Granuloma in the form of yellow nodular masses or cysts were present at the lower pole of the epididymis. It consisted of a pool of sperm and other material surrounded by a wall of histocytes or macrophages. The biologic significance of the phenomena has been discussed.

Key words: vasectomy sperm granuloma epididymis

INTRODUCTION

The side effects of vasectomy are still under investigation. Sperm granuloma is now known to be the most common post-operative complication of vasectomy [4.9-7% in man : Schmidt(7)]. Banerji (1) found "nodules in the cord" in 37 of 202 patients (18.6%).

Escape of spermatozoa from the epididymal duct may follow direct or surgical trauma, lower urinary tract infection or obstruction of the epididymal lumen (4), when stroma cell reaction occurs, creating a sperm granuloma (2). In Wister rats, Russell and Friedman (5) produced experimental granuloma by severing the vas deferenes and implanting the cut end into the scrotal wall or the abdominal cavity or to the retroperitoneum.

Present investigation is concerned with the study of pathological changes involved in the development and resolution of vasectomy induced sperm granuloma in the rats and mice and to discuss the biologic significance of the phenomena observed.

MATERIALS AND METHODS

Adult mature male rats and colony bred Swiss albino mice were allotted to groups of ten and vasectomized under ether anaesthesia (Table I). The scrotal sac was incised at the base. About 2 cm of the begining of the vas deferens was resected. Such an operation facilitates recanalization of vas and does not result in an inflammation of the epididymis (8).

Animals were killed by decapitation 154 to 168 days post-operative. Final body weight was recorded. Testes and epididymides were dissected and weighed immediately on a Mettler balance. The contra-lateral testes of unilaterally vasectomized animals served as the controls.

For histological studies the testes and epididymides were fixed in Bouin's fluid, sectioned at 6 μm and stained with Ehrlich's haematoxylin and eosin.

RESULTS

Body weight and the weights of epididymides were increased in all groups of animals during the experiment (Table I), whereas no significant difference was observed in the weights of testes when compared with those of the controls (Table I).

TABLE I: Changes in body weight, the weights of testes and epididymides of adult male rats and mice after vasectomy*.

Group	Treatment		Initial body wt g	Final body wt g	Weight in mg/100 g body weight			
					Testes		Epididymides	
					Control	Experimental	Control	Experimental
	Rat							
1.	No vasectomy	(10)	156±13	251±27	492±23	—	233±24	—
2.	*Bilateral vasectomy* (154 days)	(10)	169±16	248±21	—	506±34†	—	301±28*
3.	*Unilateral vasectomy* (Right : 154 days)	(10)	161±12	222±16	446±18	399±36†	161±22	227±30*
4.	*Unilateral vasectomy* (Left : 154 days)	(10)	166±16	235±18	510±31	523±28†	191±20	370±25**
	Mouse							
5.	No vasectomy	(10)	30±1.9	35±1	299±32	—	105±13	—
6.	*Bilateral vasectomy* (168 days)	(10)	26±1.2	33±1.4	—	287±16†	—	174±18*
7.	*Unilateral vasectomy* (Right : 168 days)	(10)	27±1.2	35±1.8	238±28	288±26†	99±10	229±37**
8.	*Unilateral vesectomy* (Left : 168 days)	(10)	30±1.5	29±2.0	328±41	346±30†	111±12	202±19**

* $P>0.01$ compared with controls.
** $P<0.001$ compared with controls.
† Not significant, compared with controls.
Figures in parentheses represent the number of animals examined.
All figures ± S.E.M.

Pathologic observations:

Gross — Granulomas were evident as yellow nodular masses or cysts varied from 1.25 mm to 5 mm in dimension. The most frequent site was the lower pole of the epididymis. The body and caput epididymis were less often involved.

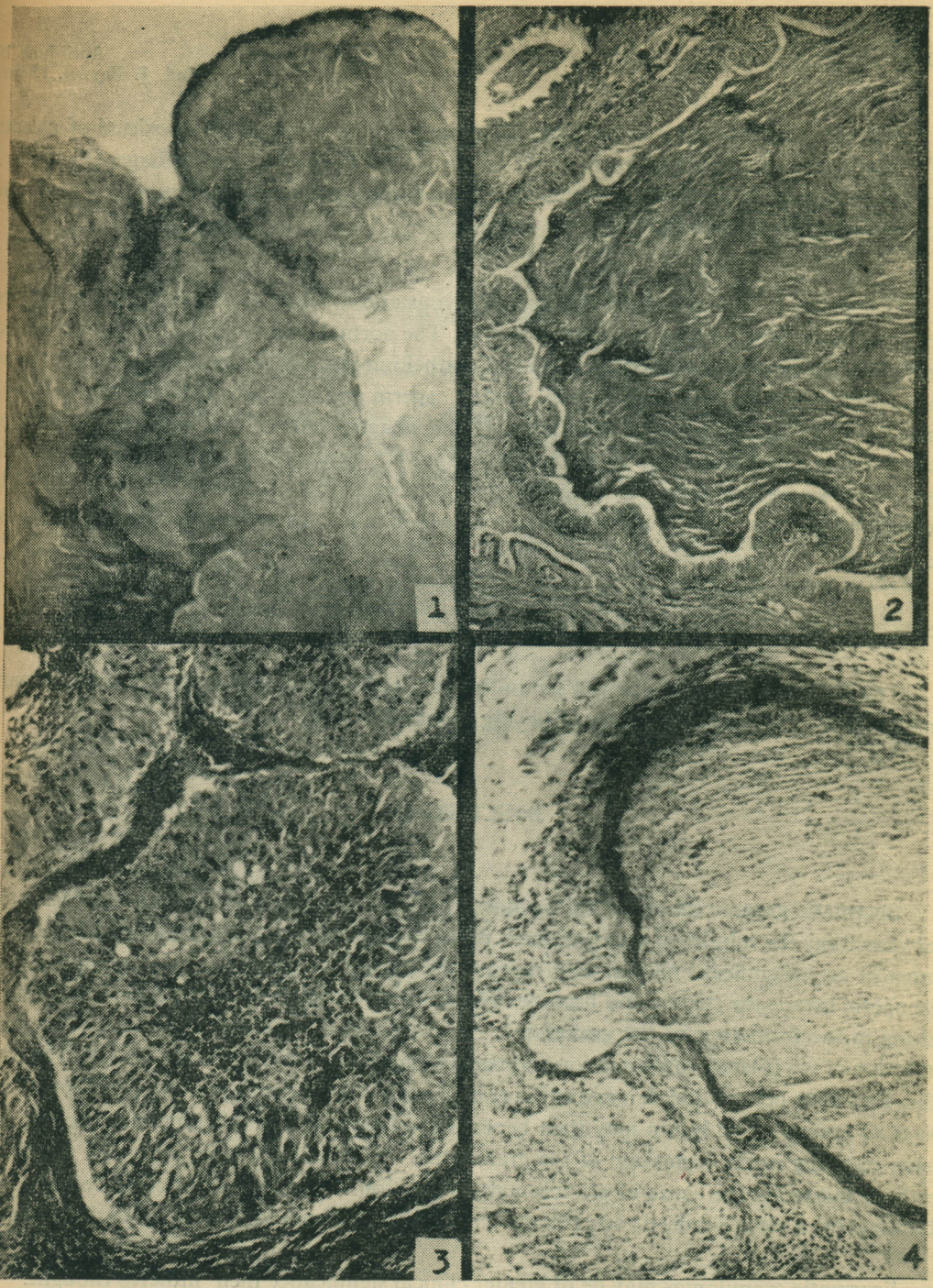

Fig. 1: Extravasation of a large amount of sperm has produced a cystic mass in epididymis of rat. X 24 HE.

Fig. 2: Spermatic granuloma in a 154 days vasectomized rat. Note the dilatations of the tubule and centrally filled mass of sperm. X 24 HE.

Fig. 3: Macrophages and giant cells containing finely granular basophilic concretions are visible in an old spermatic granuloma of the rat. X 80 HE.

Fig. 4: Mice sperm granuloma of the epididymis. Note the calcification of the tubule. X 80 HE.

Microscopic structure: In histologic preparations, the granulomas consisted of a central pool of sperm and other material surrounded by a wall of histocytes or macrophages (Figs. 1 to 3). In lesions polymorphonuclear neutrophils were associated with invasion of sperm. The granulomas involved the epididymal wall and its lumen.

Distension of the coils of the ductus epididymis and atrophy of the lining epithelium were noted in the remaining portion of the epididymis. The normal columnar epithelium was replaced by low cuboidal or in some places by flattened epithelium without stereocilia. The lumen were usually filled with large masses of tightly packed sperm and also with many sperm containing phagocytes (Fig. 3). In general agglutination, and phagocytosis of the spermatozoa were prominent features. Cellular reaction at this stage was very striking and included numerous giant cells. Fibrosis and hyalination of the epididymal tubules were moderate to extensive in 154 days old vasectomized rats (Fig. 3). Calcification was seen in a few granulomas of the epididymis in mice (Fig. 4).

Testis:

Testis of rats and mice showed seminiferous tubules producing mature spermatozoa in a normal fashion. The interstitial cells of Leydig appeared normal.

DISCUSSION

Spermatic granuloma of the epididymis is now a well known complication of vasectomy. After vasectomy the tubules of the epididymis dilate, with a corresponding thinning of their walls. Trauma of an insignificant nature, may rupture the dilated tubules, causing a leakage of sperm. These sperm invade the stroma and become involved with the inflammatory process in the stroma, resulting in the formation of the granuloma. The increased intraluminal pressure that follows obstruction of vas (6) may cause a lesion and resulted in a granuloma in the stroma (3). The present studies lead us to believe that damage to the epithelium is the probable primary mechanism for the leakage of sperm. The sperm may then become involved with the inflammatory process in the stroma, resulting in the formation of the granuloma. The evidence is in favour of sperm being directly or indirectly the cause of granulomatous reaction. The lesions after vasectomy in rats and mice show a close similarity to primary spermatic granuloma in man at its various stages.

Spermatic granulomas may be of greater clinical significance then hitherto thought. They may stimulate other lesions particularly tuberculous epididymitis. The final fate of the spermatozoa in these lessions after vasectomy and the mechanisms of healing are still being studied and a more detailed account will be published at a later date.

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