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Epididymal Anomalies Associated with Patent Processus Vaginalis in Hydrocele and Cryptorchidism

The epididymal anomalies and patent processus vaginalis are frequently seen in patients with cryptorchidism or hydrocele. We performed a prospective study on the relationship between the epididymal anomalies and the patency of the processus vaginalis in boys with hydrocele (190 cases) or cryptorchidism (89 cases) who were treated from August 1997 to February 2000 (mean age, 51 months; range, 12 to 152 months). The epididymal anomalies were observed with an overall frequency of 48%. Closed, partially closed, and open processus vaginalis were associated with an epididymal anomaly in 14, 38, and 65% of cases, respectively. The epididymal anomalies were more common in association with undescended (61%) than with descended (43%) testes without statistical significance (p=0.415). Incomplete attachment of the caput epididymis was the most common anomaly (35%), followed by detachment of caput and cauda epididymis (31%), cauda epididymis (24%), and long looping epididymis (10%). These data showed that the epididymal anomalies were strongly associated with the patency of the processus vaginalis irrespective of testicular descent (p<0.001), and they provide further evidence for the hypothesis that a common stimulus, possibly androgens, may be required for the epididymal development and obliteration of the processus vaginalis.

Key Words : *Epididymis; Hernia; Hydrocele; Cryptorchidism*

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INTRODUCTION

The epididymal anomalies occur in association with undescended testes in 32 to 79% of cases (1-7). In the majority of boys with a cryptorchidism, there is a patent processus vaginalis (2). The incidence of the epididymal anomalies is higher in association with ipsilateral patency of the processus vaginalis (71 to 78%) than with ipsilateral closure (16 to 38%) (2, 3, 6). Mininberg and Schlossberg found that if there was a patent processus Vaginalis, 78% of boys with undescended testis had epididymal anomalies, whereas only 38% had an abnormal epididymis if there was no associated hernia (2). Elder also showed that 64% of epididymides were abnormal when the processus vaginalis was completely patent, while only 11% were abnormal when the processus vaginalis was incompletely patent in boys with hydrocele/hernia or undescended testis (6). In contrast, Turek et al. examined the epididymis at inguinal or scrotal exploration for hernia or hydrocele repair, testicular torsion, or varicocele, and noted the normal epididymal anatomy in 97% of cases (8). Our prospective study was designed to determine the incidence of epididymal anomalies in boys with descended or cryptorchid testes and clarify the relationship between the patency of the processus vaginalis and epididymal anomalies in patients with descended testes compared to those with cryptorchid testes.

MATERIALS AND METHODS

All patients undergoing inguinal exploration for hydrocele and cryptorchidism at our hospital between August 1997 and February 2000 were included in this study. At surgery the spermatic cord was isolated and the hernial sac was isolated when present. The patency of the processus vaginalis was assessed and high ligation was performed. The processus vaginalis was considered closed when obliterated at the internal ring, partially closed when open at the internal ring but completely closed at some point distally, and open when patent from the internal ring to the testis. Orchiopexy was performed by the conventional technique of placing the testis in the subdartos space. Epididymis and testis were carefully examined and any anomalies present were recorded. Anomalous epididymis was defined as anomalies of epididymal fusion that consisted of loss of continuity between the testis and the epididymis and long looping epididymis. When a normal firm attachment between the testis and the caput and cauda epididymis was present, the epididymis was regarded as nor-

mal. A widened mesentery between the body of the epididymis and testis was considered normal, since some reports have shown that it is a normal finding, particulary in infancy (8, 9). Anomalies were classified as a separation of the caput and/or cauda epididymis from the testis or a long looping epididymis (Fig. 1).

Statistical analysis

Using a statistics software program SAS, chi-square test were performed to compare the results.

RESULTS

A total of 279 inguinal explorations were performed in 261 boys, including 190 hydrocele repairs, 87 orchiopexies, and 2 orchiectomies. Surgery was done bilaterally for hydrocele in 9 cases, cryptorchidism in 5, and hydrocele and cryptorchidism in 4. The mean patient age at surgery was 42 months (range, 13 to 82 months) in the hydrocele repair group and 67 months (range, 12 to 152 months) in the orchiopexy/orchiectomy group. The patency of the processus vaginalis was complete in 69 cases (36%) of hydrocele and in 64 cases (72%) of cryptorchidism.

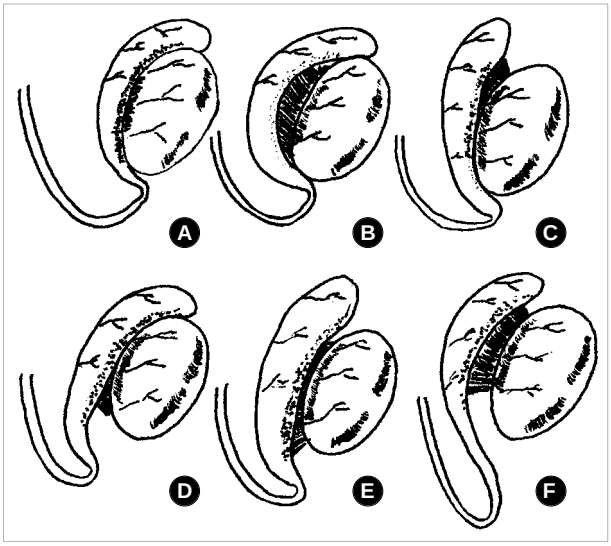

Fig. 1. Anomalies of the epididymal fusion. A: Normal firm attachment between the testis and epididymis. B: Widening of the mesentery between the body of the epididymis and testis. C-E: Complete separation of the caput (C), cauda (D), or both (E) from the testis. F: Long looping epididymis.

Table 1. Number of epididymal anomalies in hydrocele and cryptorchidism according to the patency of the processus vaginalis

Processus vaginalis	No. of patients/Total No. (%)		
	Hydrocele	Cryptorchidism*	Total
Closed	1/12 (8)	3/16 (17)	4/28 (14)
Partially closed	41/109 (39)	4/9 (44)	45/118 (38)
Open	39/69 (57)†	47/64 (73)†	86/133 (65)
Total	81/190 (43)	54/89 (61)	135/279 (48)

*p=0.415 compared to hydrocele group.
†p<0.001 compared to closed or partially closed processus vaginalis.

The proportion of the cases of an epididymal anomaly associated with a hydrocele or cryptorchidism is shown in Table 1. The incidence of the epididymal anomalies was directly proportional to the degree of closure of the processus vaginalis. The anomalies occurred more often in association with cryptorchidism (61%) than with hydrocele (43%) without statistical significance (p=0.415). In both groups, however, the incidence of epididymal anomalies ipsilateral to an open processus vaginalis (57% of hydrocele and 73% of cryptorchidism) was significantly higher than the incidence associated with its partial closure (39% of hydrocele and 44% of cryptorchidism) or complete closure (8% of hydrocele and 17% of cryptorchidism) (p<0.001).

The most common epididymal anomalies were the incomplete fusion of the caput epididymis in hydrocele and the incomplete fusion of both caput and cauda epididymis in cryptorchidism (Table 2).

DISCUSSION

In this study the epididymal anomalies were assessed prospectively in boys with either a hydrocele or a cryptorchidism. These data show a high incidence of epididymal anomalies in association with a patent processus vaginalis irrespective of testicular descent. The incidence of anomalies was highest (73%) in boys with a cryptorchidism and open processus vaginalis, and lowest in those with a hydrocele (descended testis) and closed processus vaginalis (8%).

Embryologically, the testis and the caput epididymis arise from the genital ridge, whereas the body of the epididymis and vas deferens are derived from the mesonephric tubules and the Wolffian duct. Union by canalization of the rete testis and mesonephric tubules begins at 12 weeks and probably is completed at puberty (10). It has been speculated that an epididymal abnormality may interfere with the normal de-

Table 2. Type of epididymal anomalies in hydrocele and cryptorchidism

Type of anomaly	No. of patients (%)		
	Hydrocele	Cryptorchidism	Total
Incomplete fusion			
Caput epididymis	35 (43)	12 (22)	47 (35)
Cauda epididymis	21 (26)	12 (22)	33 (24)
Caput and cauda	23 (28)	19 (35)	42 (31)
Long looping epididymis	2 (3)	11 (20)	13 (7)
Total	81	54	135

scent of the tesis (2, 11, 12), since the epididymis is normally attached to the gubernaculum, which guides the testis into the scrotum (13).

During the process of normal testicular descent, the role of numerous mechanical components has been hypothesized, including a normal gubernaculum, epididymis, intra-abdominal pressure (13), and the innervation of the gubernaculum by the genitofemoral nerve (14). The processus vaginalis develops within the gubernacular mesenchyma that invades and migrates into the scrotum, and provides a potential space into which the testis descends (15). The regression of gubernaculums testis and the obliteration of the processus vaginalis normally occur soon after the testicular descent has been completed. Therefore, both events may occur in response to the same stimuli. It is hypothesized that a subtle abnormality in the hypothalamic-pituitary-gonadal axis results in an abnormal epididymal development, impaired germ cell maturation, and blunting of the normal postnatal testosterone and gonadotropin surge in boys with cryptorchidism (16). And it is possible that a subtle androgen deficiency may lead to an impaired regression of the gubernaculum testis with or without cryptorchidism and persistent patency of the processus vaginalis. It is recognized that the majority of undescended testes at birth spontaneous descent during the first 3 to 6 months of life and spontaneous closure of the processus vaginalis may occur in the first year of life. This phenomenon is thought to be due to the testosterone surge that occurs at 1 to 2 months of age (15, 17).

Our data may indirectly support the hypothesis that testicular descent, processus vaginalis closure, and epididymal development are interrelated and may require a common stimulus, possibly of androgens.

In conclusion, the epididymal anomalies are likely to develop in boys with a patent processus vaginalis, irrespective of testicular descent. The present data strongly suggest that there is no significant relationship between the normal development of epididymis and testicular descent.

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