

Research Article

Testicular Volume of Bilateral Cryptorchidism in Short-Term

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Abstract

Objective: To observe the changes of testis volume before and after operation in children with bilateral cryptorchidism.

Patients and methods: Bilateral cryptorchidism in outpatient follow-up and clinical operation were selected. Doppler ultrasound was used to measure testis volume at 0-3 months of age (B1), 3-6 months of age (B2), preoperative (B3), postoperative 3 months (B4), and postoperative 6 months (B5), 12 cases in each group. At the same time, control groups were health check-up in outpatient, with non-testicular and endocrinology diseases, which were divided into group of 0-3 months old (C1), group of 3-6 months old (C2) and C3, C4 and C5 groups with similar ages as B3, B4 and B5 groups, 10 cases in each group.

Results: Bilateral cryptorchidism even in the timely surgery, testis volume has been decreased, and the continuous declination in the 3 months of post-operation. Testis volume grown in 6 months after surgery, testis volume was obvious improvement compared with preoperative, but there were still significant smaller than the healthier children's.

Conclusion: Children with bilateral cryptorchidism should be diagnosed as early as possible and followed up closely with ultrasonography after diagnosis. If testis volume decreased gradually during follow-up, surgical treatment should be performed as early as possible to reduce testis volume loss.

Keywords: Cryptorchidism; Testis volume; Treatment

Introduction

Cryptorchidism is a relatively common congenital malformation in pediatric urology. The incidence of full-term male infants is 1.0-4.6%, and the incidence in premature infants is as high as 45% [1]. The study shows descending testis is regulated by testicular secretion hormone, cryptorchidism indicates testicular dysgenesis [2]. Statistics show that the incidence of cryptorchidism has increased significantly, and nearly one in five patients are bilateral cryptorchidism [3,4]. In bilateral cryptorchidism, azoospermia was found to be up to 46%, normal sperm concentrations were found only in 12% [5]. So, timely and effective treatment for patients with bilateral cryptorchidism, not only reduce the risk of testicular tumor, but also improve the semen quality and fertility level.

Subjects and Methods

Subjects data

Preoperative data of bilateral cryptorchidism groups and control groups data were obtained from outpatient clinic, control groups were health boys that take a routine examination, 10 boys in each group. The surgical cases in bilateral cryptorchidism group were 12, 6-24 months, who received surgical treatment and outpatient follow-up in our hospital from 2014 to 2016. Control groups inclusion criteria: Cases of cryptorchidism, indirect inguinal hernia, hydrocele,

varicocele, epididymitis and hermaphroditism were excluded. Cryptorchidism groups inclusion criteria: All patients in the case group were confirmed by ultrasound and physical examination. The diagnostic criteria and operating time of the patients all met the pediatric surgical disease diagnosis and treatment guideline. All of the enrolled children had good compliance and complete data. Their families agreed to cooperate with the clinical study and signed the agreement. This study is in line with the Helsinki Declaration of the World Medical Association. All enrolled children have obtained the informed consent of their first guardian for examination and treatment and signed an agreement.

Data collection

The age was sign in month. Testicular volume was measured by ultrasound with three values of length (L), width (W) and thickness (H). Unilateral testicular volume was calculated by formula: $V=L * W * H * 0.71$. L=left testicular volume, R=right testicular volume, and the testicular volume of children was $(L+R/2)$ [6].

Statistical analysis

The statistical analyses of the results were done with GraphPad Prism 6.0, using t test, $p < 0.05$ for statistical significance.

Result

Ages

There was no statistical difference in age between the two groups ($P > 0.05$). Data difference analysis of the two groups was performed by Unpaired t test, listed in Table 1.

Testicular volume

The difference of testicular volume between bilateral cryptorchidism groups and control group ($P > 0.05$); With the increase of monthly age, testicular volume of normal children did not increase significantly in a short time, showing no statistical significance; However, testicular volume did not increase but decreased in children

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with cryptorchidism; Surgical intervention was initiated at the age of 6 months, and there was no significant increase in testicular volume within 3 months after surgery in children receiving surgical intervention; 6 months after surgery, testicular volume increased significantly in the children with bilateral cryptorchidism. However, compared with the healthy children, there was still a significant difference in testicular volume, and the difference was statistically significant ($P>0.05$), listed in the Table 2 and 3.

Discussion

Cryptorchidism is the main cause of male infertility, and testicular volume is mainly determined by the number and volume of testicular tubules, which accounts about 80% of the testis volume. The spermatogenic capacity and spermatogenic cell function of adult testis can be estimated by testicular volume [7]. Therefore, it is possible to estimate the development of the testicular inner curvature tubules according to the measured testicular volume [8]. The study showed that every 1°C increase in the testicular environment inhibited nearly 14% of spermatogenesis and led to atrophy of the testis. The inguinal and abdominal temperatures of the testis that did not descend into the scrotum were 2°C - 8°C higher than those in the scrotum. Therefore, the ambient temperature of the testis may be the main cause of testicular volume loss [9,10]. Our study showed that the testicular volume of patients with bilateral cryptorchidism was similar to that of normal children shortly after birth. However, testicular volume increased slightly in normal boys with monthly age, while testis volume decreased slowly in patients with bilateral cryptorchidism. There was a significant difference between the two groups after 6 months of age, which is the initial age of treatment recommended by the guidelines for the diagnosis and treatment of cryptorchidism. The main purpose of cryptorchidism treatment is to prevent or slow down the occurrence of testicular degeneration, so as to improve the fertility of children in adulthood and prevent cancer [11]. Studies have shown that the sperm count of adult patients with cryptorchidism decreases with the delay of surgical treatment. 76% of children aged between 10 months and 4 years of age had near-normal sperm count, while only 26% of children aged between 4 and 14 years of age had normal sperm count [12], and the number of germ cells in the testis can also be greatly reduced [13]. Orchiopexy is one of the most commonly used surgical methods for the treatment of cryptorchidism, which has been proved to have beneficial effects on the reproduction of adult

patients. From the perspective of testicular volume, children with cryptorchidism should be operated as soon as possible [13]. The latest treatment guidelines recommend that treatment of cryptorchidism begin at 6 months of age, with the best timing before 12 months of age and completion of treatment before at least 1 1/2 years of age [14]. Previous studies have shown that fertility in patients with bilateral cryptorchidism is positively correlated with the number of germ cells treated with surgery and negatively correlated with age, with higher sperm concentrations as adults in patients treated early [15,16]. At the same time, testis is also an endocrine organ, which produces hormones on its own and is also regulated by other hormones in the body, such as Testosterone (T), serum statin B, Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), etc. However, changes in hormone levels are influenced by many factors, and there are significant differences in relevant reports. Therefore, testicular volume is the most intuitive response to the number of germ cells in childhood. Our data showed that the testicular volume of bilateral cryptorchidism patients began to decrease while waiting for the operation opportunity, and did not fully recover in the short term after the operation, which was still significantly different from that of healthy children. Therefore, early surgical treatment for patients with bilateral cryptorchidism may be helpful to avoid the decrease of testicular volume and protect testicular function.

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Table 1: Age statistics between the groups.

team	1—3M		3-6M		Pre-op		3m post		6m post	
	B1	C1	B2	C2	B3	C3	B4	C4	B5	C5
`c	2.25	2	5	4.92	13.70	13.75	16.7	17.1	19.7	19.67
s	0.71	0.74	0.82	0.90	7.15	6.18	7.15	6.91	7.15	3.75
p	> 0.9999		0.824		0.9861		0.9536		0.9889	

Table 2: The value and difference of testicular volume (cm³) between groups were examined by Unpaired T test.

team	1—3m		3-6m		Pre-op		3m post		6m post	
	B1	C1	B2	C2	B3	C3	B4	C4	B5	C5
`c	0.46	0.48	0.41	0.55	0.37	0.61	0.42	0.71	0.65	0.89
s	0.19	0.21	0.11	0.08	0.09	0.10	0.09	0.12	0.17	0.19
p	0.3516		0.0306		0.0008		0.0008		0.0412	
summary	ns		*		***		***		*	

Table 3: List of partial group differences comparison.

team	C1	C2*	C1	C3*	B1	B2*	B1	B3*	B1	B5*	B3	B4#	B3	B5#	B4	B5#
p	0.2577		0.0008		0.2397		0.0611		0.0476		0.2113		0.0005		0.0024	
summary	ns		***		ns		ns		*		ns		***		**	

*Unpaired t test;

#Paired t test.

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