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Case Report

Acquired Cryptorchidism in a Boy with Disorder of Sex Development

Fumi Matsumoto[1], Katsuji Yamauchi[1], Futoshi Matsui[1], Kenji Shimada[1], and Shinobu Ida[2]

[1]*Department of Urology, Osaka Medical Center and Research Institute for Maternal and Child Health, Osaka, Japan*

[2]*Pediatric Gastroenterology and Endocrinology, Osaka Medical Center and Research Institute for Maternal and Child Health, Osaka, Japan*

Abstract. Recently, it has been reported that boys with severe hypospadias are at increased risk for acquired cryptorchidism. The reports suggested that prenatal and postnatal androgen disruption might be correlated with this condition. We experienced a case of ovotesticular disorder of sex development (DSD), which was ultimately diagnosed at surgery for acquired cryptorchidism. Ascent of the scrotal contents of the left side was detected in a 7-yr-old boy with the 46, XX karyotype, who had a history of perineal hypospadias repair. Intraoperative findings revealed the left gonad consisted of 2 segments, and this was histologically diagnosed as ovotestis by biopsy specimen. Resection of the ovarian segment was performed simultaneously. Exploration of the contralateral gonad showed the same findings. This is the first report of acquired cryptorchidism observed in a patient with DSD presenting with ambiguous genitalia.

Key words: acquired cryptorchidism, hypospadias, disorder of sex development, ambiguous genitalia

Introduction

Acquired cryptorchidism is the ascent of a previously fully descended testis that can no longer be manipulated to the base of the scrotum. Although some anatomical characteristics of acquired cryptorchidism have been reported (1, 2), its exact pathogenesis remains unclear. Recently, Tasian *et al.* (3) and Itesako *et al.* (4) reported that boys with severe hypospadias are at increased risk for acquired cryptorchidism. They suggested that prenatal and postnatal androgen disruption might be correlated with this condition. Here, we present a case of ovotesticular disorder of sex development (DSD), which was ultimately diagnosed at surgery for acquired cryptorchidism.

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Correspondence: Dr. Fumi Matsumoto, Department of Urology, Osaka Medical Center and Research Institute for Maternal and Child Health, 840 Murodo-cho, Izumi, Osaka 594-1101, Japan
E-mail: fumim@mch.pref.osaka.jp

Case Report

Ascent of the scrotal contents of the left side was detected in a 7-yr-old boy, who had a history of hypospadias repair, at a regular follow-up examination in our hospital. There was no particular family history. He was born with

Table 1 Results of hCG stimulation: The maximum serum testosterone concentration decreased with time

	Age at stimulation		
	8 mo	3 yr	9 yr
Testosterone (ng/dl)*	235	53	49.8

*After stimulation with hCG at 3,000 units/m^2/d given on three consecutive days.

perineal hypospadias at a gestational age of 38 wk and weighed 2,774 g. At birth, bilateral gonads were palpable in the scrotum, and subsequently, presumed testes were identified by physical findings and ultrasound. Chromosome studies on peripheral blood lymphocytes showed a 46,XX karyotype. Laboratory data including the serum testosterone level were equivalent to those of a normal male neonate. The baby was assigned a male gender according to the clinical diagnosis of XX male. Staged hypospadias repair and resection of the Mullerian remnants were performed at 1, 2 and 3 yr of age respectively. Bilateral gonads were confirmed to be in the scrotum at the time of each surgery. He showed no response to human menopausal gonadotropin stimulation at the age of 2 yr. Stimulation with human chorionic gonadotropin (hCG) was performed at 8 mo and 3 and 9 yr of age respectively. The maximum serum testosterone concentration decreased with time (Table 1).

He underwent left orchidopexy at the age of 7 yr. The left gonad passed through the inguinal canal and was located in the superficial inguinal pouch. The gubernaculum attached to the bottom of the scrotum. The prosessus vaginalis was closed. Intraoperative findings revealed that the left gonad consisted of 2 segments associated with epididymis-like duct structures. The smaller segment was pale, firm and located near the head of the epididymis (Fig. 1). Histopathological findings of a biopsy specimen showed that the smaller segment was an ovary and that the larger one was a testis. Resection of the ovarian

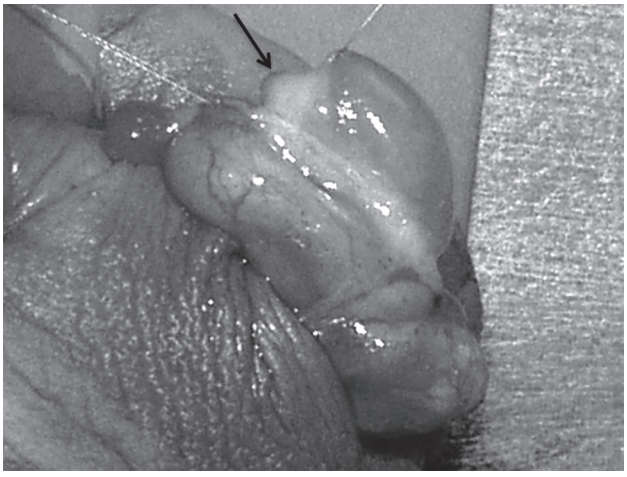

Fig. 1 Macroscopic appearance of ovotestis: A smaller segment of ovarian tissue (arrow) was pale, firm and located near the head of the epididymis.

segment was performed simultaneously. Exploration of the contralateral gonad showed the same findings, and a tiny ovarian segment was also removed. The postoperative course was uneventful. Since 13 yr of age, he has showed a normal development for a pubertal boy, although the bilateral gonads were small (6 ml). His serum testosterone level at 14 yr of age was normal (505.2 ng/dl), but his LH (13.8 mIU/ml) and FSH (39.1 mIU/ml) levels were significantly high.

Discussion

In clinical practice, acquired cryptorchidism is occasionally observed in boys with hypospadias. Recently, Tasian *et al.* (3) reported that boys with a history of severe hypospadias are at increased risk for acquired cryptorchidism. In their study, the incidence of acquired cryptorchidism in boys with proximal hypospadias was 14%, while that of the normal control was 0.3%. Itesako *et al.* (4) showed that the risk for acquired cryptorchidism increases directly with hypospadias severity. However, it is not clear why boys with severe hypospadias are at a high risk of developing acquired cryptorchidism.

They suggested that the role of prenatal and postnatal androgen disruption may explain the association between hypospadias and acquired cryptorchidism. It is well known that hypospadias has been associated with some hormonal impairment during gestation (5). On the other hand, acquired cryptorchidism is likely to be observed in boys with conditions such as small penis (6) and Down's syndrome (7), who are suspected of having reduced androgen activity.

Ovotesticular DSD, defined as the presence in the same individual of ovarian tissue containing ovarian follicles and testicular tissue containing seminiferous tubules, replaced the term "true hermaphrodite" in 2006 (8). Most children with ovotesticular DSD have presented with ambiguous genitalia as neonates or infants. The most common gonads found in the affected patients have been ovotestes in Japan (9). According to previous reports, testicular tissue becomes dysgenetic and germ cells disappear with age (10). In present case, the patient had severe hypospadias, and his response to human chorionic gonadotropin stimulation became poor at an older age, which indicates reduced prenatal and postnatal androgen activity. It is also suspected that impairment of testicular function caused ascent of a previously fully descended testis. However, excessive stimulation at puberty may contribute to maintain normal testosterone production in this case.

In conclusion, we report acquired cryptorchidism in a boy with ovotesticular DSD. Definite diagnosis of ovotesticular DSD was made by gonadal biopsy at orchidopexy for acquired cryptorchidism. This is the first report of acquired cryptorchidism observed in a patient with DSD presenting with ambiguous genitalia. Boys with DSD may be at high risk of acquired cryptorchidism. Testicular location in such cases should be monitored regularly until puberty.

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