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LETTER TO THE EDITOR

Male Fertility

Benefits of orchidopexy on the fertility of adult men with bilateral cryptorchidism

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Dear Editor,

The incidence of cryptorchidism is approximately 0.8% at 1 year of age and remains at this level throughout adulthood. One-third of these patients have bilaterally cryptorchid testes.¹ Most patients with cryptorchidism have this condition corrected by surgery before puberty. Therefore, adult bilateral cryptorchidism (BC) is not observed frequently in clinical practice. Bilateral undescended testes are commonly associated with azoospermia and male infertility. Orchiopexy is usually considered a cosmetic operation and to reduce cancer risk when performed in adult men, and is generally thought to have no effect on spermatogenic recovery. We conducted a single-center retrospective study to evaluate the efficacy of orchidopexy and its effect on fertility in adult men with BC.

Between January 2011 and December 2016, we retrospectively reviewed the medical records of 31 adult men who underwent surgical treatment for BC at the First Affiliated Hospital, Zhejiang University School of Medicine (Hangzhou, China). Three patients were excluded because of testicular seminoma (two cases) and unilateral testicular absence (one case). All patients had a one-stage operation. All procedures in our study were performed by experienced surgeons. According to the location of testicles, preoperative examination results, and doctors' experience, open or laparoscopic surgery was selected. Twenty-three patients with BC underwent bilateral orchidopexy, whereas five patients with BC underwent unilateral orchidopexy and contralateral orchiectomy. Preoperative data collection included the location of the testis, testicular size, serum testosterone (T) levels, and semen analysis. Six patients (21.4%, 6/28) declined participation after bilateral orchidopexy. Twenty-two postoperative men had a single hospital visit in August 2017 to record medical history, physical examination, scrotal ultrasound, serum T levels, and semen analysis. The mean follow-up period after operation was 22.3 (standard deviation [s.d.]: 9.8, range: 8.5–45.0) months. All participants provided written informed consent, and all procedures were approved by the Bioethics Committee for Research on Human Beings of the First Affiliated Hospital of Zhejiang University School of Medicine.

All statistical analyses were performed with SPSS®, version 15.0 (SPSS Inc., Chicago, IL, USA). A *t*-test (paired comparisons) was used

to compare serum T levels and testicular volumes before and after surgery. Statistical significance was defined as $P < 0.05$.

Twenty-eight patients were enrolled in this study. The mean age at operation was 24.9 (s.d.: 6.0, range: 18–43) years. The preoperative locations of the 56 cryptorchid testes were inguinal (44.6%, 25/56), prepubic (21.4%, 12/56), or intra-abdominal (33.9%, 19/56). In all patients with BC, the preoperative seminal analysis showed azoospermia. Twenty-two (78.6%, 22/28) patients were followed up. Ejaculated spermatozoa were obtained in three patients (13.6%, 3/22) after orchidopexy (Table 1). To exclude the influence of orchiectomy, we only analyzed the serum T level and testicular volume in 17 patients with BC undergone bilateral orchidopexy. Preoperative and postoperative mean testicular volumes were 4.5 (s.d.: 2.4, range: 1.0–12.0) ml and 4.1 (s.d.: 2.3, range: 1.0–11.0) ml, respectively. Preoperative and postoperative mean serum T levels were 389.9 (s.d.: 118.0, range: 235.3–611.8) ng dl⁻¹ and 350.4 (s.d.: 95.3, range: 224.0–590.0) ng dl⁻¹, respectively. No significant differences were found in T levels and testicular volumes after surgery compared with those preoperatively ($P = 0.06$).

The main reasons to treat undescended testes are to increase fertility and to decrease the risks of testicular torsion, testicular injury, and testicular cancer, as well as psychological stigma.¹ Current guidelines recommend that orchiopexy should be performed before the age of 18 months. Most published data indicate that testes remaining undescended at a postpubertal age are nonfunctional and that fertility rates are not improved after postpubertal repair.² However, most patients included in this analysis exhibited unilateral cryptorchidism. Orchiopexy for adult patients is usually considered a cosmetic operation that provides a palpable testis for examination rather than to induce spermatogenesis.

Chiba *et al.*³ previously reported that 10 patients with bilateral adult cryptorchidism showed azoospermia. After orchidopexy, ejaculated spermatozoa could not be obtained from any patient. Microdissection testicular sperm extraction (TESE) was performed in four of the 10 patients, but spermatozoa could not be retrieved from any patient.³ However, recent evidence indicates that postpubertal orchiopexy may allow fertility for patients with BC. We reviewed five related reports in which six cases had shown the successful initiation of spermatogenesis after adult bilateral orchiopexy.^{4–8} In these six cases, one patient produced a naturally conceived pregnancy⁸, and four patients achieved pregnancy through assisted reproduction.^{4–7}

In our group, ejaculated spermatozoa were obtained from three patients after orchidopexy. One patient was married and naturally

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Table 1: Clinical characteristics of three patients obtained ejaculated spermatozoa

Case number	Age (year)	Preoperative			Operation	Follow-up duration (month)	Postoperative			
		T level (ng dl ⁻¹)	Location of UT, left/right	Testis volume (ml), left/right			Semen analysis	T level (ng dl ⁻¹)	Testis volume (ml), left/right	Sperm count (×10 ⁶ ml ⁻¹)
1	18	537.0	Intracanalicular/ intracanalicular	12.0/2.5	Azoospermia	Bilateral orchidopexy	36	241.0	2.3/2.5	6.3
2	31	343.6	Intracanalicular/ intracanalicular	3.8/3.6	Azoospermia	Bilateral orchidopexy	25	360.0	3.4/3.2	11.4
3	27	483.5	Intraabdominal/ intracanalicular	15.2/14.2	Azoospermia	Left: orchiectomy; right: orchidopexy	8	362.2	-/15.0	Spermatozoa visible ^a

^aSpermatozoa visible only after semen centrifugation. UT: undescended testicles; T: testosterone; -: no volume after orchiectomy

conceived 2 years after surgery, though the couple had an artificial abortion. The other two patients were unmarried. It is possible that altered environmental conditions, such as the lower temperature of testes after orchidopexy, may induce spermatogenesis. Five testicles were successfully descended by open surgery, and one testicle was removed by laparoscopy. The five treated undescended testes of the three patients were originally located in the inguinal canal. Undescended testes occupying the inguinal canal may have a higher fertility rate after orchidopexy. All three patients had T levels within the normal range. The oldest patient was 31 years of age. Youth and normal T levels may play important roles in maintaining the spermatogenic potential of testes. The shortest follow-up was 8 months, so a certain amount of time after orchidopexy may be necessary for the testes to recover spermatogenic ability.

These results showed that it is possible to obtain spermatozoa from males with BC treated by orchidopexy after puberty. The development of TESE and intracytoplasmic sperm injection (ICSI) has advanced the treatment of extreme subfertility in men. Our study in combination with recent literature⁹ indicates that orchidopexy provides the opportunity for adult men exhibiting BC to conceive naturally or by assisted reproduction. There are some limitations in our study. First, this study was retrospective, which may cause recall bias. Second, the sample size was small and follow-up time was short. We will continue to expand the sample size.

In summary, our study indicates that ejaculated spermatozoa can be obtained from adults after orchidopexy for BC, providing the opportunity for natural pregnancy or assisted reproduction.

AUTHOR CONTRIBUTIONS

XDJ, YZ, and WH contributed to the conception and design of the study. YZ, WH, and ZHH acquired the data. YZ, WH, and FFW drafted

the manuscript. MC, HSW, JJC, and FFW revised it for intellectual content. All authors read and approved the final manuscript.

COMPETING INTEREST

All authors declared no competing interests.

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