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. 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. Orchidopexy 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 undergo bilateral orchidopexy. Preoperative and postoperative mean testicular volumes were 4.5 (s.d.: 3.1, 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. Current guidelines recommend that orchiopexy should be performed before the age of 18 months. Most published data indicate that testes remaining undescended at a postpuberal age are nonfunctional and that fertility rates are not improved after postpuberal repair. 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. 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. 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. In these six cases, one patient produced a naturally conceived pregnancy, and four patients achieved pregnancy through assisted reproduction.

In our group, ejaculated spermatozoa were obtained from three patients after orchidopexy. One patient was married and naturally
In summary, our study indicates that ejaculated spermatozoa can be obtained from adults after orchiopexy 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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