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CASE REPORT

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Testicular sperm extraction after laparoscopic orchiectomy for bilateral postpubertal intra-abdominal cryptorchidism: What chance of sperm retrieval?

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Summary

Infertility occurs in up to 54% of men with bilateral undescended testes. Orchiectomy is considered the best therapeutic approach, especially when cryptorchidism is diagnosed in adulthood, due to a high risk of malignancy. A 33-year-old man was referred with a clinical presentation of empty scrotum and an ultrasonography and magnetic resonance imaging evaluation of intra-abdominal bilateral cryptorchidism. Follicle-stimulating hormone was 23.20 IU/L, luteinising hormone was 14.10 IU/L, total testosterone was 12.1 nmol/L, and 17-beta-oestradiol was 0.16 nmol/L. Semen analysis showed absolute azoospermia. Tumour marker levels were in the normal range. Testicular volume was 4.0 ml for right testis and 4.6 ml for left testis. The patient underwent a laparoscopy bilateral orchiectomy and subsequently a testicular sperm extraction (TESE), in the purpose to finding mature spermatozoa. The biological examination revealed the presence of immature sperm cells, not efficient for a cryopreservation. The histologic analyses show a pattern of Sertoli cell-only syndrome and maturation arrest. TESE might be a good option for patients with absolute azoospermia and cryptorchidism, especially if bilateral. The procedure, performed after orchiectomy, is safe and does not have any impact on patient's health, although it is important to clarify the very low potential of sperm recovery.

KEYWORDS

azoospermia, cryptorchidism, orchiectomy, sperm retrieval, testicular sperm extraction

1 | INTRODUCTION

Cryptorchidism is one of the most common genitourinary anomalies in male infants, which occurs in 2%–8% of boys born at term (Virtanen et al., 2007). The disorder can be bilateral (1.9%) or unilateral (3%) (Golladay & White, 2002). It is usually a condition identified and treated in childhood, but it can be rarely seen in adults over 18 years of age, reporting an overall incidence of 0.7% (Raina & Rajfer, 1998). Previous studies have shown that fertility parameters decrease, depending on how long the testis remains undescended (Pettersson, Richiardi, Nordenskjold, Kaijser, & Akre, 2007). Indeed, infertility occurs until 9% of men with history of unilateral cryptorchidism and 54% of men with bilateral undescended testes (Cortes, Thorup, Lindenberg, & Visfeldt, 2003). Additionally, 20% of patients with cryptorchidism have azoospermia, while 3%–8% have oligo-terato-asthenospermia (Lee & Coughlin, 2001). Previous studies have found predictive factors for poor sperm quality, including age at orchidopexy, testicular location at surgery, follicle-stimulating hormone (FSH) levels and testicular volume (Gracia, Sanchez Zalabardo, Sánchez García, García, & Ferrández, 2000; Vernaeve et al., 2004). Early investigation and treatment of

impalpable testes are fundamental to increase the possibility of fertility and to permit an adequate follow-up for possible testicular cancer. The risk of malignant progression in abdominal testis may be as high as 5%, increasing with age (Richie & Steele, 2002). Moreover, the condition of intra-abdominal testis is also associated with higher incidence of hernia, torsion and testicular atrophy (Welvaart & Tijssen, 1981).

2 | CASE REPORT

A 33-year-old Caucasian man referred to our attention for a history of couple infertility. He was diagnosed for absolute azoospermia, determined by two semen analyses including a centrifugation step at high speed. In anamnesis, he underwent orchidopexy of the left testicle before puberty. There were no ongoing pathologies and no additional reason for infertility. He reported the complete absence of both testicles in the scrotum from the past years. To determine the location of cryptorchid testes, physical examination, inguinal–abdominal ultrasonography and magnetic resonance imaging (MRI) of the abdomen were performed. The physical examination revealed bilateral nonpalpable testis in a clinical rare presentation of empty scrotum. On the basis of ultrasonography, the cryptorchid right testis, estimating a size of 29 × 16 × 16 mm and a volume of 4.0 ml, was located in the abdomen, medially to the external iliac vessels and above the bladder, not in relation to the internal inguinal ring. The cryptorchid left testis, having a dimension of 28 × 20 × 18 mm and volume of 4.6 ml, was located at the entrance of the internal inguinal ring. There was not any blockage in the seminal pathway. Serum samples were taken from the patient to determine hormone levels and tumour markers (Table 1). FSH was 23.20 IU/L, luteinising hormone (LH) was 14.10 IU/L, total testosterone was 12.1 nmol/L, and 17-beta-oestradiol was 0.16 nmol/L. Tumour marker levels [alpha-fetoprotein (α-FP), beta-human chorionic gonadotrophin (β-HCG), and lactate dehydrogenase (LDH)] were in the normal range. A genetic analysis (including karyotype with the examination of microdeletions for chromosome Y and mutation of cystic fibrosis transmembrane conductance regulator genes) was performed, revealing no abnormalities. The need for surgery was explained to the patient, highlighting the risk of cancer evolution and the possibility, albeit rare, of retrieving spermatozoa from the testes after orchiectomy. The patient chose orchiectomy as treatment option and signed an informed consent. He underwent a bilateral orchiectomy with laparoscopic-assisted technique (Figures 1 and 2) and a bilateral testicular prosthesis insertion, using a small size, through a low inguinal incision (Figure 3). The specimens were removed trough the 10-mm port site without widening the incision, due to the small size of each testis, found to be atrophic (Figure 4). It was requested an intra-operative

TABLE 1 Baseline blood parameters of the patient

Parameter	Value	Normal range
FSH (IU/L)	23.20[a]	1.7–11.0
LH (IU/L)	14.10[a]	0.6–7.0
TT (nmol/L)	12.10	10.4–34.6
17-Beta-oestradiol (nmol/L)	0.16	<0.20
α-FP	2.9	0.0–5.8
β-HCG	< 1	<1
LDH	205	84–246

α-FP, α-fetoprotein; β-HCG, β-human chorionic gonadotrophin; LDH, lactate dehydrogenase; FSH, follicle-stimulating hormone; LH, luteinising hormone; TT, total testosterone.
[a]Outside the normal range.

FIGURE 1 Laparoscopic orchiectomy

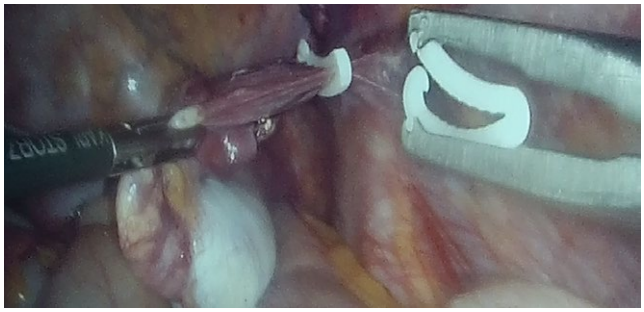

FIGURE 2 Clamp of spermatic cord

FIGURE 3 Testicular prosthesis implantation

FIGURE 4 Atrophic testis

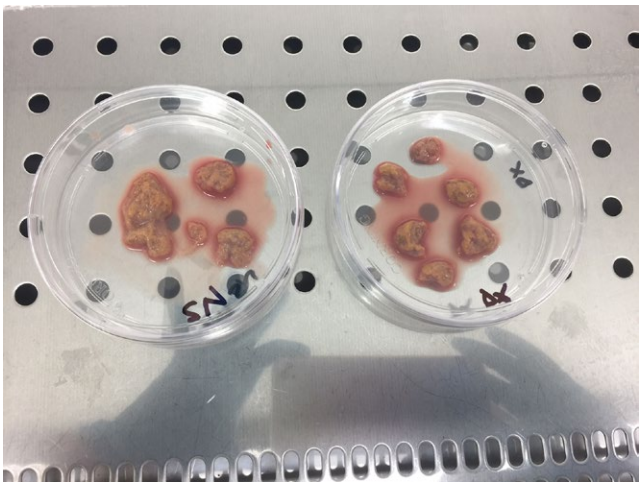

FIGURE 5 Samples of testis excised with testicular sperm extraction (TESE) from each side

testicular sperm extraction (TESE) at the time of orchiectomy, to finding spermatozoa sufficient for a cryopreservation. On the operating table, each testicle was opened trough a single large equatorial incision and six large samples of roughly 10 × 10 × 8 mm were sharply excised from each side. Each specimen, immediately transferred to the biologist, was placed in sterile Petri dishes with 2.5 ml of flushing buffered medium and stretched by sterile slides under a stereomicroscopy (Figures 5 and 6). Subsequently, the suspension was directly observed and evaluated under inverted microscopy at 200×, revealing the presence of germinal cells but the absence of mature spermatozoa (Figures 7 and 8). Therefore, cryopreservation was not possible. Then, the residual testicles were sent to the histopathological evaluation, sectioned at tiny levels, and stained at haematoxylin and eosin.

The histopathology finding shows a pattern of aspermatogenesis (including Sertoli cell-only syndrome, tubular sclerosis and atrophy) and sperm maturation arrest. No evidence of malignancy was observed. (Figure 9)

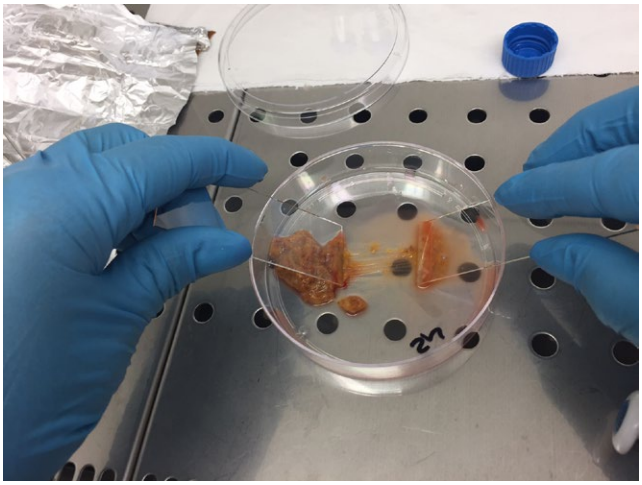

FIGURE 6 Testicular tissue stretched by sterile slides

3 | DISCUSSION

In the developed world, it is rare to see a patient with undescended bilateral testis presenting in adulthood. The reasons for this are multifactorial, but the main are the lack of sexual education among the general population and poor access to healthcare facilities (Rangarajan & Jayakar, 2007). Indeed, only few studies investigated the management of older patients with cryptorchidism and their risk to progress a testicular cancer, because patients in the Western word are generally identified and treated in childhood, due to good attentiveness of the problem (Singh, Bajaj, Kaur, Mishra, & Riar, 2013). The treatment of cryptorchidism in postpuberal age remains controversial (Desai, Prabhu, & Supe, 2002; Rangarajan & Jayakar, 2007). The possible therapeutic options are orchiectomy, orchidopexy and close observation. Some authors recommended orchidopexy as the treatment of choice even in adults, in the purpose of preserve the hormonal function

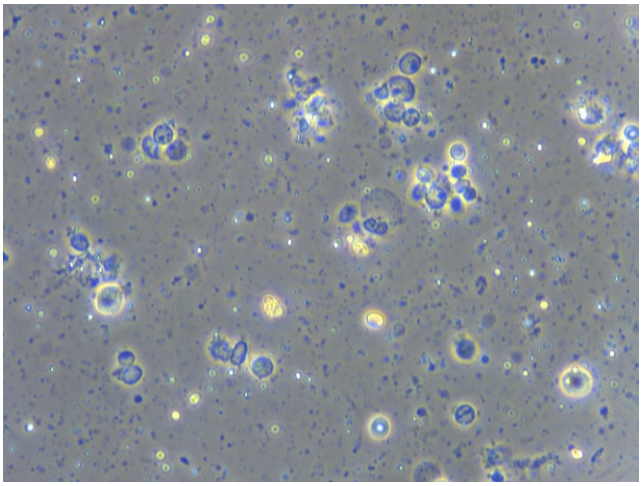

FIGURE 7 Biological evaluation revealing the presence of germinal cells but the absence of mature spermatozoa

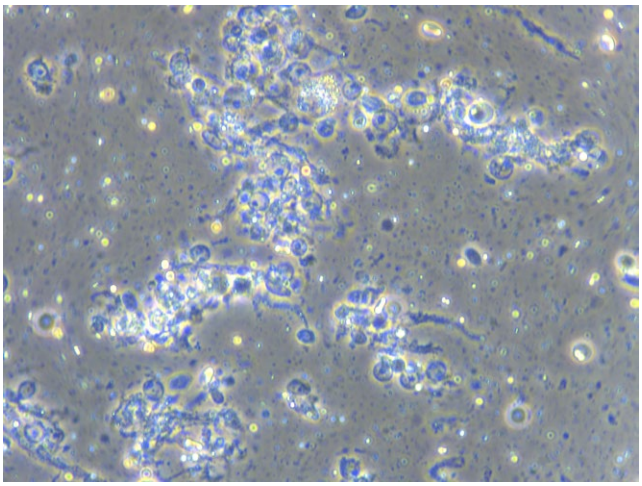

FIGURE 8 Biological evaluation revealing the presence of sperm immature cells, not efficient for cryopreservation

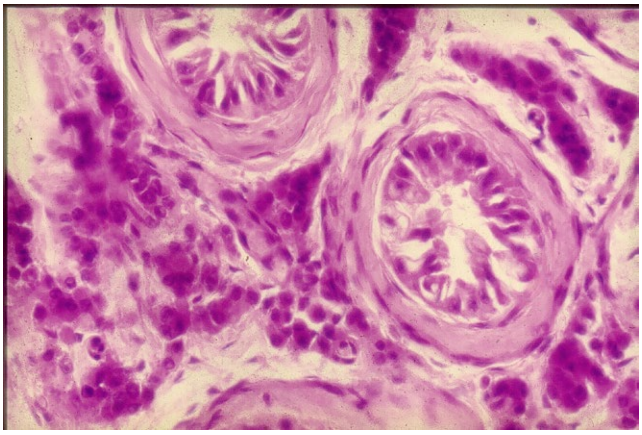

FIGURE 9 Histologic evaluation revealing Sertoli cell-only syndrome and sperm maturation arrest

of the testis (Shin, Lemack, & Goldstein, 1997). However, one of the more important problems in the management of cryptorchidism in adults is the increased risk of testicular cancer. It occurs 35–48 times more likely than in the normally descended testicle, considering that 11% of all testicular tumours happens in cryptorchid testes (Abratt, Reddi, & Sarembock, 1992). Several studies suggested that the risk of testicular tumour increases with the age of treatment (Herrinton, Zhao, & Husson, 2003; Møller, Prener, & Skakkebaek, 1996). For this reason, orchiectomy is indicated in our patient, although the histologic analyses did not reveal neoplastic cells. In particular, in cases of intra-abdominal testicle, in addition to the possibility of cancer, it must be added the risk of testicular torsion (Rangarajan & Jayakar, 2007). Furthermore, also in case of unilateral cryptorchidism, there is an increased risk of cancer in the contralateral normally descended testicle. Our patient reported a history of intra-abdominal undescended testes from infancy with a risk considerably increased of malignancy progression, so he was highly discouraged to perform orchidopexy. Moreover, a conventional orchidopexy cannot produce good results in case of intra-abdominal testis, because frequently, the testicular vessels are short. Cortesi et al. (1976) were the first to use laparoscopy as a diagnostic tool for impalpable testes. Nowadays, laparoscopic orchiectomy is considered the gold standard for cryptorchidism intra-abdominally in adults, ranging accuracy 88%–100% (Moore, Peters, Bauer, Mandell, & Retik, 1994). Also Hennigan and Young (1992) and Sousa et al. (2000) found laparoscopic orchiectomy very effective for impalpable testes in adults. As previously stressed, undescended testis may cause infertility. Only few studies analysed the sperm retrieval with TESE following orchidopexy (Chiba, Ishikawa, Yamaguchi, & Fujisawa, 2009), and only four case reports have been published, describing a term pregnancy after postpubertal orchiopexy (Giwercman, Hansen, & Skakkebaek, 2000; Heaton, Davenport, & Pryor, 1993; Lin, Hsu, Wu, & Lin, 2001; Shin et al., 1997). While the possibility of finding spermatozoa with TESE in cryptorchids who underwent orchidopexy in the pre-pubertal period was found to be 52% and 74%, as reported in previous studies (Vernaeve et al., 2004), this ratio decreased to 4% in another study that evaluated postpubertal age (Irkilata et al., 2005). To evaluate the overall fertility potential, it is recommended that the contralateral testis should also be explored. In fact, we performed a bilateral TESE, although there were some predictive factors of extremely low potential of sperm recovery, according to how reported in literature. Our patient reported high value of FSH and low testicular volume that prove damage in the spermatogenesis process. Usually, TESE was performed in cases of testicular cancer underwent orchiectomy (Onco-TESE). Nevertheless, only one study, conducted by Irkilata HC et al., analysed the research of spermatozoa after TESE in adult patients who underwent orchiectomy for cryptorchidism, demonstrating a sperm retrieval only in one of 25 TESE (4%) and a predominant histopathological assessment of seminiferous tubular atrophy (Irkilata et al., 2005). According to our histologic result, the finding of impaired spermatogenesis in cryptorchidism relates with morphological observations of other studies, in agreement with the understanding that cryptorchidism reflects a primary testicular maldevelopment. How reported by Ferhat Ateş et al., the most common pathologies of 244 adult patients underwent orchiectomy for unilateral cryptorchidism were SCOS and maturation arrest (Ateş et al., 2016). As shown by Rogers et al. (1998) and Ford, Parkinson, and Pryor (1985), with increasing age in undescended testicles, the basal membrane thickens, the seminiferous tubules diameter decreases and fibrosis develops in the interstitium. Also Koni et al. (2014) evaluated histopathological features of uncorrected undescended testis presenting at postpuberal age, revealing that 51% of cases presented germ cells at different maturation levels, but all containing immature spermatozoa, while 45% did not have basal membrane thickening. The use of immature spermatozoa in intracytoplasmic sperm injection (ICSI) is controversial. In our case, the biological analyses discovered the presence of few sperm immature cells, not efficient for a cryopreservation.

4 | CONCLUSION

Testicular sperm extraction might be a good option for patients with absolute azoospermia and intra-abdominal cryptorchidism, especially if bilateral, to find spermatozoa efficient for cryopreservation. The procedure performed after orchiectomy is safe and does not have any impact on patient's health. However, it is important to clarify the very low potential of sperm recovery, so much to suggest to the couple, firstly, a heterologous insemination.

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