Experiences and outcomes of organ-sparing surgery for testicular tumour with benign tendency

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Abstract

Introduction: We retrospectively investigated and summarized our experiences and the outcomes of organ-sparing surgery (OSS) for testicular tumour with benign tendency.
Methods: From April 2000 to March 2012, 11 selected patients with testicular tumour underwent OSS. Preoperative and postoperative organ functional and oncologic indexes were analyzed and compared.
Results: All operations were completed without conversion to radical orchiectomy. Intraoperative frozen section and routine postoperative pathology showed tumours with benign tendency. The normal appearance of the scrotum and functional integrity of the testis were preserved. Preoperative and postoperative serum sex hormone levels, international index of erectile function (IIEF-5) scores, and semen quality were not significantly different. Tumour recurrence or metastasis did not occur during follow-up.
Conclusions: Our results showed the feasibility and safety of OSS to treat testicular tumour with benign tendency. With careful selection and rigorous follow-up, some testis tumor can be treated with OSS to maximally maintain normal appearance and function of the testis. The retrospective single-centre study and small sample size are main limitations. More evidence is needed to establish the large-scale application of OSS.

Introduction

Testicular tumour is the most common solid tumour in men aged 15 to 30.[1] Radical orchiectomy is the first-line therapy for testicular tumour.[1] Organ-sparing surgery (OSS) is occasionally performed for the tumour in solitary testis or bilateral testicular tumours. In the last 2 decades, OSS has been frequently used to treat testicular tumour due to improved preoperative screening technologies and intraoperative frozen section procedure.[2,3] There has been little information about the organ functional and oncologic outcomes after OSS. In this study, we present our retrospective experiences of OSS for testicular tumour, and investigate the feasibility and safety of OSS in clinical application.

Methods

Approval for the study was granted by the ethics committee of Nanjing Medical University (China) and informed written consent was received from patients.

Patients

From April 2000 to March 2012, 11 patients at our centre with testis tumour were recruited for this study. The mean age was 26 (range: 16–47) years. None of them had a family history of testicular tumour or any obvious symptoms, such as testicular pain or swelling, fever, and cough. They underwent detailed preoperative examinations, including a careful physical examination on the scrotum and inguinal region, testicular tumour marker test, chest X ray, scrotal Doppler ultrasound, and pelvic computed tomography (CT). These tests confirmed a local mass in the testis (≤30% of the volume) with no distant metastasis. The preoperative serum α-fetoprotein (AFP), chorionic gonadotrophin (HCG), and lactate dehydrogenase (LDH) levels were normal.

Surgical procedures

After induction of general anesthesia, the patients were placed in the supine position. A 3-cm vertical scrotal incision was made to gradually expose the dartos, epithelium of guard, albuginea, and the tumour (Fig. 1, part A). The mass and surrounding 2-mm tissue were then resected completely (Fig. 1, part B). After frozen section examination confirmed the benign tendency of the mass, we sutured the surgical margin with absorbable sutures to recover the normal appearance of the testis (Fig. 1, part C). The drainage tube was indwelled routinely (Fig. 1, part D) and

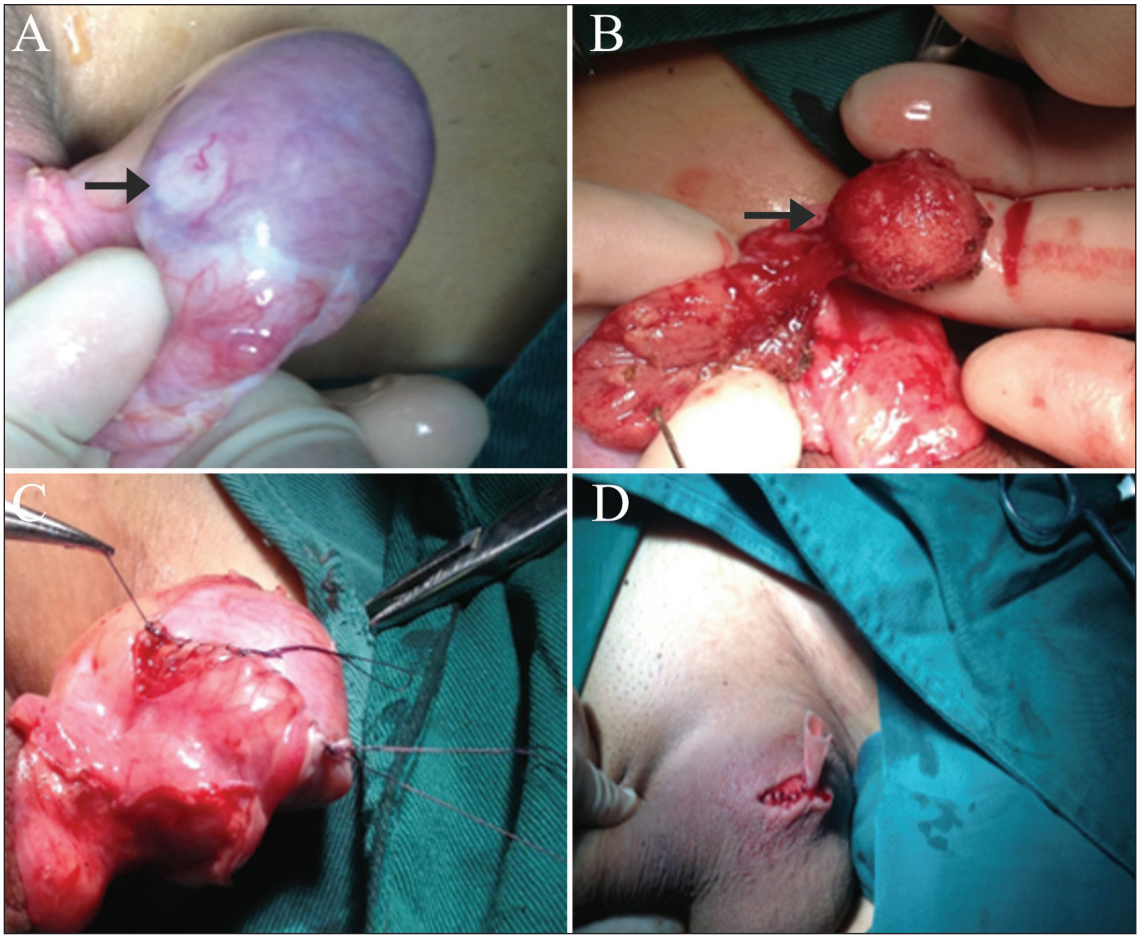

Fig. 1. The procedure of organ-sparing surgery. A: A 3-cm vertical scrotal incision was made to gradually expose the dartos, epithelium of guard, albuginea, and the tumour. B: The mass and the surrounding 2-mm tissue were removed completely. C: The surgical margin was sutured to recover the normal appearance of the testis. D: The drainage tube was indwelled routinely. The arrow indicates the tumour.

follow-up was performed between 12 to 60 months later (median: 31.7).

Outcomes analysis

Preoperative and postoperative (6 months after operation) serum sex hormone levels, erectile function using the International Index of Erectile Function (IIEF-5) scores, and semen quality were recorded for further analysis and compared. Data were expressed as mean ± standard deviation. All data were initially tested to check normality and homogeneity of variance. T-test was performed for the comparison of two groups. Statistical significance was set at $p < 0.05$.

Results

Demographic and clinical characteristics of 11 patients are presented in Table 1. Two cases had bilateral testis mass. One patient had the mass in the congenital solitary testis. Intraoperative frozen section and routine postoperative pathology showed 2 testicular mixed sex cord/gonadal stromal tumours, 3 Sertoli cell tumours, and 6 testicular epidermoid cysts. All operations were completed without conversion to radical orchiectomy. There were no intraoperative and postoperative complications. Serum sex hormone levels, IIEF-5 scores, and semen quality 6 months after surgery did not reveal significant differences compared with preoperative findings (Table 2, Table 3, Table 4). Patients had normal scrotal appearance and erectile function. Tumour recurrence or metastasis did not occur during the 12 to 60-month follow-up.

Discussion

Radical orchidectomy is the standard treatment for testicular tumour. However, it leads to serious trauma on patient physiology and psychology, especially in young and unmarried patients.[2,4] Removal of one testis has been reported to

Table 1. Demographic and clinical characteristics of 11 patients

Age (year; mean ± SD)	25.8 ± 9.9
Lesion laterality (n)	
Left	4
Right	5*
Bilateral	2
Complication (n)	0
Follow-up (month; mean ± SD)	31.7 ± 15.8
Recurrence or metastasis (n)	0

*One of the 5 cases had the mass in the congenital solitary testis. SD: standard deviation.

Table 2. Preoperative and postoperative comparison of sex hormone levels*

	Preoperatively	Postoperatively	*p* value
FSH (IU/L)	8.529 ± 3.575	8.696 ± 2.999	0.811
LH (IU/L)	5.058 ± 2.103	4.770 ± 2.070	0.240
T (nmol/L)	13.796 ± 5.548	14.056 ± 5.138	0.898
PRL (mIU/L)	197.869 ± 51.380	189.881 ± 36.884	0.639
P (nmol/L)	1.326 ± 0.776	1.370 ± 0.688	0.865
E2 (pmol/L)	99.388 ± 40.178	101.575 ± 33.983	0.864

*$p < 0.05$ was considered statistically significant. FSH: follicle-stimulating hormone; LH: lutinizing hormone; T: testosterone; PRL: prolactin; P: progesterone; E2: Estradiol.

injury normal spermatogenesis.[5] OSS is considered only for testicular tumour in the solitary testis or bilateral testicular tumour. Recently, OSS has been frequently reported to treat local testicular tumour or non-palpable mass.[6,7] In recent years, we have performed OSS on selected patients with testicular tumour. The following is our experiences on OSS.

Before surgery, patients should undergo detailed examinations. Only small testicular tumours with benign tendency were considered to OSS. OSS is widely used in many solid tumours in recent years. Unlike other urogenital tumours, such as renal carcinoma and bladder cancer, orchiectomy is the preferred treatment for testicular tumour. According to European Association of Urology guidelines, OSS can be attempted in synchronous bilateral testicular tumours or metachronous contralateral tumours. It can also be done in a tumour in a solitary testis with normal preoperative testosterone levels, when tumour volume is less than 30% of the testicular volume, and when surgical rules are respected.[8] Our cases do not meet these specifications. However, detailed preoperative examinations suggest the benign tendency of testicular mass. Our patients were unmarried or sexually active. Maximal organ retention was beneficial to patient physical and mental health. Based on the above considerations, OSS was attempted. For reducing the risk of malignant tumour treated with OSS, the mass was gently isolated and resected with surrounding 2-mm tissue. Intraoperative frozen section, a gold standard to determine the nature of the mass, was adopted for every case as another decisive index to judge further surgical procedure.[9] If the frozen section showed malignant tendency, radical orchidectomy was performed immediately. For cases with negative pathological results, OSS was sufficient without additional therapies.[3] During surgery, the vertical scrotal incision was made to expose the affected testis. This incision avoided the possible damage to spermatic cord and facilitated possible exploration to contralateral testis. Testicular intraepithelial neoplasia (TIN) in residual testicular tissues or contralateral testis might lead to recurrence. The existed TIN weakens normal spermatogenesis.[10] OSS could not remove all TIN because the TIN distributed dispersedly and indistinguishably. Rigorous follow-up is therefore necessary. In the present study, no recurrence occurred during the 12- to 60-month follow-up. The normal appearance of the scrotum was maintained. Our results demonstrated the feasibility and safety of OSS to treat testicular tumour with benign tendency. Some cases can avoid unnecessary orchidectomy with careful selection and rigorous follow-up. However, the limitations and inclusion criteria should be emphasized very carefully.

Preserving testicular function is an important issue. Erectile dysfunction (ED) after radical orchidectomy is common. The psychological ED rate is 37% in patients undergoing bilateral orchidectomy.[11] Testicular prosthesis implanting can recover the normal scrotal appearance and improve erectile function.[12] However, price and conservative ideologies hindered its wider application, especially in developing countries, such as China. Postoperative hormone disorder is another cause affecting erectile function. The vast majority of testosterone is derived from leydig cells. Orchidectomy will lead to testosterone deficiency and damaged erectile function. In patients with radical orchidectomy, sexual desire rate and erectile dysfunction rate are 34.5% and 31.5%, respectively.[13] Even artificial testosterone supplements are not satisfactory because native testosterone levels are regulated

Table 3. Preoperative and postoperative comparison of IIEF-5 scores*

	Preoperatively	Postoperatively	*p* value
Total scores	976	960	
Average scores	20.33 ± 1.53	20.00 ± 2.65	0.067

*$p < 0.05$ was considered statistically significant. IIEF-5: International Index of Erectile Function.

Table 4. Preoperative and postoperative comparison of semen quality analyses*

	Preoperatively	Postoperatively	*p* value
Semen volume (mL)	4.00 ± 1.00	3.83 ± 1.44	0.742
Total sperm (106/ejaculate)	606.51 ± 313.41	543.01 ± 176.24	0.528
Sperm concentration (106/mL)	139.25 ± 53.52	153.85 ± 28.52	0.715
Motility a + b (106/ejaculate)	445.68 ± 261.31	386.51 ± 116.57	0.557

*$p < 0.05$ was considered statistically significant.

by the hypothalamus-pituitary-gonadal axis. Superabundant supplementation would cause unwanted complications, such as hyperlipidemia, atherosclerosis, and other cardiovascular diseases.[14] OSS can avoid these issues due to the maximal retention of testicular tissues. In our present study, patients with OSS maintained normal sex hormone levels and erectile function.

Furthermore, fertility after testicular surgery deserves special attention. The testis is the only organ for spermatogenesis. Orchidectomy will lead to the inability of spermatogenesis. OSS can meet the fertility demand of young and unmarried patients with testicular tumour. Although OSS is thought to impair spermatogenesis through destroying blood-testis barrier and producing anti-sperm antibodies, other studies have different conclusions. In a recent study, the anti-sperm antibody level between orchidectomy and OSS was not statistically significant.[15] The present study also showed that patients with OSS have stable semen quality compared with their preoperative levels. Our data demonstrate that OSS can effectively preserve the functional integrity of the testis.

Our study has its limitations. It is a retrospective single-centre study on the outcomes of OSS to testicular tumour. Although ensuring the uniformity of surgical procedure and data collection, we found that geographic limitations and methodology may cause bias. In addition, small sample size limits the large-scale application of our conclusions. However, the low incidence of testicular tumour, together with our strict inclusion criteria, leads to the fewer selected cases for OSS.

Conclusion

OSS is a feasible and safe treatment for local testicular tumour with benign tendency. OSS can affectively maintain normal appearance and function of the testis. For patients with fertility demand and concern about erectile function and semen quality, OSS and rigorous follow-up are the preferred treatment.

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