Testis sparing surgery for sequential bilateral testicular tumors

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Objective: *We present our experience in performing testis sparing surgery (TSS) to treat sequential bilateral testicular tumors.*
Material and methods: *We performed TSS on two patients with bilateral sequential testicular tumors.*
Results: *A 43-year-old patient (Case 1) and a 33-year-old patient (Case 2) had previous inguinal orchiectomy for seminoma. The patients were diagnosed with secondary testicular tumors in the contralateral testes on follow up. They were treated with TSS after frozen section analysis of the peritumoral testicular tissue. Pathologic evaluation of the removed tumors revealed immature teratoma and Leydig cell tumor. Both patients are disease free without local recurrence and do not have erectile dysfunction, and thus do not need androgen replacement therapy after a follow up of 6 months and 44 months, respectively.*
Conclusions: *TSS after frozen section analysis appears to be a safe and feasible procedure that, in carefully selected cases, offers adequate cancer control, preserves sexual function, and provides psychological benefits.*

Key Words: bilateral testicular tumors, testis sparing surgery, partial orchiectomy

Introduction

Testicular tumors that involve both testes can be either synchronous or metachronous, and the standard treatment of choice is inguinal orchiectomy with high ligation of the spermatic cord.[1,2] However, the loss of both testes leads to infertility, with potential lifelong dependency on androgen replacement therapy, and, especially in younger men, potential negative psychological consequences. Testis sparing surgery (TSS) for patients with bilateral testicular tumors is reported to provide substantially less treatment related morbidity without compromising long term, cancer free outcomes.[3-7] We describe two cases of patients with bilateral sequential testis tumors who underwent TSS.

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Case 1

A 43-year-old patient with previous right orchiectomy presented with left scrotal pain, Table 1. Ultrasonography and magnetic resonance imaging revealed a 24 mm x 23 mm x 15 mm mass in the left testicular lower pole. The patient's serum testosterone was below normal (205 ng/dl; normal range, 262 ng/dl to 1593 ng/dl). We performed TSS. The intraoperative appearance of the tumor is shown in Figure 1. Pathologic evaluations revealed an immature teratoma.

Three months after surgery, the patient had normal serum levels of the germ cell tumor markers alpha-fetoprotein (AFP), β-human chorionic gonadotropin (β-HCG), and lactate dehydrogenase (LDH), and also had a normal thoracic, abdominal, and pelvic computerized tomography (CT) scan. Doppler ultrasonography of the patient's left testis showed

TABLE 1. **Characteristics of two patients treated with testis sparing surgery**

Case	**1**	**2**
Primary testis tumor		
Age (years)	43	33
Tumor site	Right testis	Left testis
Admitting symptom	Painless testicular mass	Painless testicular mass
Tumor type	Seminoma	Seminoma
Tumor treatment	Orchiectomy, retroperitoneal radiotherapy (2000 cGy)	Orchiectomy, systemic chemotherapy (BEP)
Time elapsed after the primary tumor (months)	70 (Metachronous)	1 (Metachronous)
Secondary (contralateral) testis tumor		
Tumor site	Left testis	Right testis
Admitting symptom(s)	Left scrotal pain	Right scrotal pain and mass
Preoperative serum tumor marker levels*	Normal	Normal
Tumor type	Immature teratoma	Leydig cell tumor
Tumor size (mm)	24 x 23	8.6 x 5.7
Presence of concomitant CIS	No	No
Tumor treatment	Tumor enucleation	Tumor enucleation
Postoperative follow up		
Postoperative serum tumor marker levels*	Normal	Normal
Local recurrence	No	No
Blood supply to the remaining testis on Doppler USG	Normal	Normal
Serum testosterone level	Below normal	Normal
Decrease in serum testosterone level	23% (205 ng/dl → 158 ng/dl)	15% (452 ng/dl → 383 ng/dl)
Erectile dysfunction	No	No
Current IIEF Score	55	57
Need for postoperative testosterone replacement	No	No
Spermiogram	Azoospermia	Not performed
Follow up (months) (primary/secondary tumors)	76/6	46/44

*Tumor markers = alpha-fetoprotein (AFP), β-human chorionic gonadotropin (β-HCG), and lactate dehydrogenase (LDH); BEP = bleomycin, etoposide, cis-platinum; CIS = carcinoma in situ; IIEF = International index of erectile function; USG = ultrasonography

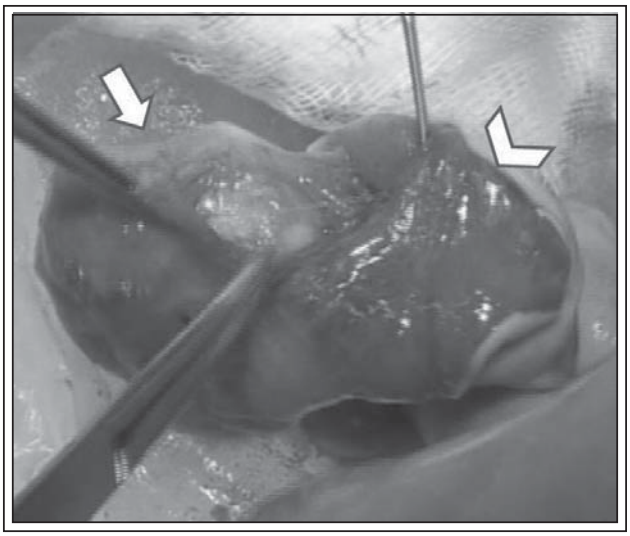

Figure 1. Intraoperative appearance of the tumor, located in the lower pole of the right testis, on which we performed partial orchiectomy. (Arrow = tumor; arrowhead = normal parenchyma).

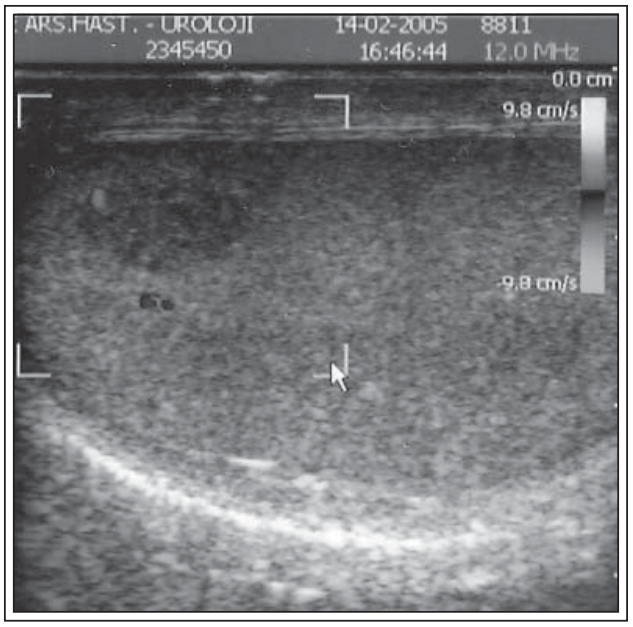

Figure 2. Scrotal ultrasonograph showing an 8.6 mm x 5.7 mm mass in the right testicular upper pole.

that it was 33 mm x 24 mm x 15 mm with a normal parenchyma and perfusion.

Six months after surgery, the patient's left testicle was normal upon physical examination, and his serum testosterone level was below normal (158 ng/dl). At a 6 month follow up examination, the patient did not have erectile dysfunction, and did not require androgen replacement therapy.

Case 2

A 33-year-old patient with a history of left orchiectomy presented with right scrotal pain and mass, Table 1. Ultrasonography revealed an 8.6 mm x 5.7 mm mass in the right testicular upper pole, Figure 2. We performed TSS. Pathologic examination showed a Leydig cell tumor. At a 44 month follow up examination, the patient was tumor free, did not have erectile dysfunction, did not require androgen replacement therapy, and had a normal serum testosterone level.

Surgical technique

The surgeon, using 2.5-fold binocular magnification, performed an inguinal incision and then occluded the spermatic cord with a nontraumatic clamp. The patient's testis was removed and packed in ice slush for 15 minutes to provide cold ischemia. The patient's tunica albuginea was incised horizontally, and a solid mass was detected. Partial orchiectomy was accomplished by removing the nodular tissue along with a few millimeters of adjacent normal parenchyma, Figure 1.

Examination of frozen tissue sections revealed that the tumor in Case 1 was an immature teratoma, and the tumor in Case 2 was a Leydig cell tumor. In each case, biopsies taken from the tumor bed were negative for carcinoma in situ (CIS).

The patient's spermatic cord was declamped, the tunica albuginea was closed, and the testis was replaced into the scrotum. Postoperative followup was uneventful for both patients.

Discussion

Although removal of the testis is the standard treatment of choice for patients with suspected testicular tumors, performing a bilateral orchiectomy would leave the patients with anorchia resulting in infertility, lifelong androgen dependency, and, especially in younger men, potential psychological problems. On the other hand, promising results have been reported with TSS for testicular tumors.[1-7]

The German Testicular Cancer Study Group's recommendations for performing TSS are: first, tumors should be less than 20 mm; second, tumors should not be close to the rete testis; third, spermatic cord clamping should be performed under cold ischemia; fourth, intraoperative tumor bed biopsies should be performed; fifth, postoperatively, local radiotherapy should be administered to the residual testis tissue to eradicate

TABLE 2. **Summary of selected published series of patients with testis tumors treated with testis sparing surgery**

Ref. No.	Year	N	Max. tumor size (mm)	Local recurrence n (%)	CIS n (%)	Testis ablation n (%)	Subnormal testosterone n	Postop. testosterone replacement n	Follow up mean (range) mths
3	1995	14	30	-	11 (78.6)	2 (14.3)[A]	2	1	27 (4-151)
4	1997	13	30	1 (7.7)	6 (46.2)	-	-	-	62 (14-163)
5	2003	30	30	1 (3.3)	10 (33.3)	2 (6.7)[B]	-	NR	46 (10-105)
6	2004	8	NR	-	-	-	-	NR	88 (5-264)
7	2007	17	31	-	-	-	1	NR	91 (12-192)
Our series	2008	2	24	-	-	-	1	No	23.5 (3-44)

A = patients with postoperative low serum testosterone levels necessitating ablation of the testis; B = testis ablation was performed due to positive surgical margins and low serum testosterone levels, respectively; CIS = presence of concomitant testicular carcinoma in situ.

possible CIS and to avoid local tumor recurrence; and last, patients should be closely followed.[8]

In our two patients, the maximum tumor sizes were 24 mm and 8.6 mm, and the tumors were not located close to the rete testis. According to published reports, tumors as large as 30 mm and even larger can be successfully removed by TSS, which we think depends on the experience of the surgeon and the resectability of the tumor. We obtained 15 minutes of cold ischemia with ice slush and performed intraoperative tumor bed biopsies. We evaluated the frozen sections, and all were negative in terms of tumor and CIS. Tokuc et al demonstrated the accuracy of frozen section examination of testicular tumors and showed that frozen section examinations can accurately diagnose testicular cancer.[9] Therefore, we did not administer postoperative local radiotherapy to the residual testis. The histopathologic diagnoses of the removed tumors were teratoma in Case 1 and Leydig cell tumor in Case 2. Postoperatively, serum levels of the germ cell tumor markers AFP, β-hCG, and LDH were normal in both patients. If elevated levels are detected, we recommend complete resection of the residual testis.

The major aim of treating testis tumors is to cure the disease, that is, to provide the patient with long term cancer free survival without any local or distant recurrence. According to the published literature, local cancer recurrence seems to be higher in series of patients with a higher incidence of CIS in the testis, Table 2. CIS has been suggested to have the potential to progress to become an invasive germ cell tumor. Thus, administering local radiotherapy to the residual testis is suggested for patients with CIS in the testis.10 Obviously, the presence of residual tumor in the residual testis is another major risk factor for local recurrence. In our patients, no CIS was detected in tumor bed biopsies with negative surgical margins, and TSS was performed including the tunica albuginea and a few millimeters (a safe rim of less than 1 cm) of adjacent, normal parenchymal testis tissue. Although some authors recommend routine local radiotherapy to the residual testis irrespective of the tumor type,[3,4,8] we prefer to administer local radiotherapy to patients with CIS. Another important issue is the possible negative impact of local radiation to the testosterone-producing Leydig cells in the residual testis that might lead to a need for androgen replacement,[11] which we think is a contradiction for performing TSS. Currently, neither of our two patients has erectile dysfunction or needs androgen replacement therapy.

Conclusion

Testis sparing surgery appears to be a safe, feasible procedure that provides adequate cancer control as well as benefits such as preserved sexual function and fertility and a positive impact on the psychological make up of patients, especially in younger men. Therefore, we recommend this procedure in carefully selected patients in whom synchronous or metachronous bilateral testis tumors are detected. □

References

1. Dieckmann KP, Boeckmann W, Brosig W, Jonas D, Bauer HW. Bilateral testicular germ cell tumors. Report of nine cases and review of the literature. *Cancer* 1986;57(6):1254-1258.

2. Fordham MV, Mason MD, Blackmore C, Hendry WF, Horwich A. Management of the contralateral testis in patients with testicular germ cell cancer. *Br J Urol* 1990;65(3):290-293.
3. Weissbach L. Organ preserving surgery of malignant germ cell tumors. *J Urol* 1995;153(1):90-93.
4. Heidenreich A, Höltl W, Albrecht W, Pont J, Engelmann UH. Testis-preserving surgery in bilateral testicular germ cell tumours. *Br J Urol* 1997;79(2):253-257.
5. Steiner H, Höltl L, Maneschg C, Berger AP, Rogatsch H, Bartsch G, Hobisch A. Frozen section analysis-guided organ-sparing approach in testicular tumors: technique, feasibility, and long-term results. *Urology* 2003;62(3):508-513.
6. Shukla AR, Woodard C, Carr MC, Huff DS, Canning DA, Zderic SA, Kolon TF, Snyder HM 3rd. Experience with testis sparing surgery for testicular teratoma. *J Urol* 2004;171(1):161-163.
7. Giannarini G, Mogorovich A, Menchini Fabris F, Morelli G, De Maria M, Manassero F, Loggini B, Pingitore R, Cavazzana A, Selli C. Long-term followup after elective testis sparing surgery for Leydig cell tumors: a single center experience. *J Urol* 2007;178(3 Pt 1):872-876.
8. Heidenreich A, Weissbach L, Höltl W, Albers P, Kliesch S, Köhrmann KU, DIeckmann KP; German Testicular Cancer Study Group. German Testicular Cancer Study Group. Organ sparing surgery for malignant germ cell tumor of the testis. *J Urol* 2001;166(6):2161–2165.
9. Tokuc R, Sakr W, Pontes JE, Haas GP. Accuracy of frozen section examination of testicular tumors. *Urology* 1992;40(6):512-516.
10. Dieckmann KP, Skakkebaek NE. Carcinoma in situ of the testis: review of biological and clinical features. *Int J Cancer* 1999;83(6):815-822.
11. Petersen PM, Giwercman A, Daugaard G, Rørth M, Petersen JH, Skakkeaek NE, Hansen SW, von der Maase H. Effect of graded testicular doses of radiotherapy in patients treated for carcinoma-in-situ in the testis. *J Clin Oncol* 2002;20(6): 1537-1543.