



Original article

Surgical management and outcomes of patients with bone metastases in germ cell tumors: A case series

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Abstract

Objective: To report perioperative and oncological outcomes of patients with nodal and bone involvement treated with postchemotherapy retroperitoneal lymph node dissection (PC-RPLND) and simultaneous bone resection (BR).

Patients and methods: Between 2008 and 2016, 14 consecutive unselected TC patients with nodal and bone involvement underwent PC-RPLND and BR. Surgery was performed together with orthopedic surgeons. Standard PC-RPLNDs were performed in 4 patients. Bilateral template PC-RPLND was carried out in 10 patients. Complete BR combined with spacer implantation (XPand Cage) and posterior stabilization was performed in 6 patients. Instead, 8 patients were submitted to partial BR. Perioperative outcomes consisted of operative time, blood loss, length of hospital stay, and complications. Disease recurrence and mortality were registered.

Results: Mean operative time, blood loss, and length of hospital stay were 295 minutes, 3.7, 1, and 13 days. Additional oncological surgery was performed on 5 patients. Overall, 9 patients had adjunctive surgeries or intraoperative complications. Pathologic report consisted of teratoma in 6, cancer in 5, necrosis in 3 patients. Overall, 2, 5, and 1 patients had Clavien I, II, and IIIA complications, respectively. No perioperative mortality was recorded. Disease recurrence and death occurred in 8 and 7 patients.

Conclusions: PC-RPLND and BR is a safe, feasible, and challenging procedure. Availability of an orthopedic surgeon and stabilization of the spine are mandatory. Complete BR has therapeutic impact on patients harboring teratoma, partial BR seems to be beneficial in patients with necrosis. Patients with vital tumor will relapse irrespectively of the BR approach. © 2017 Elsevier Inc. All rights reserved.

Keywords: Germ cell tumor; Bone; Vertebral body

1. Introduction

Bone involvement in patients diagnosed with testis cancer (TC) is rare. It is reported to occur between 3% and 9% of patients [1–3]. Osseous progression is not well understood and it could arise from haematogenous dissemination or from per contiguitatem infiltration. Patients with nonseminomatous germ cell tumor (NSGCT) and bone metastases are classified as “poor prognosis” according to the International Germ Cell Cancer Cooperative Group

(IGCCCG) classification, and the predicted 5-year survival rate is 50%. In case of seminoma, IGCCCG classify patients as “intermediate prognosis” and the predicted 5-year survival rate is 80%.

To date, knowledge about outcomes of simultaneous postchemotherapy retroperitoneal lymph node dissection (PC-RPLND) and bone resection (BR) is limited to few case series [4–7]. They reported that PC-RPLND with BR and spacer implantation might be a safe therapeutic option. A multidisciplinary approach is always indicated to increase oncological resection and minimize complications. Although incomplete PC-RPLND is associated with increased frequency of infield relapses and can reduce long-term survival rate [8], none to date has addressed

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if this issue is true also in case of TC bone involvement. Any specific clinical recommendation is hard to draw at this time from published series or current guidelines [9].

Under this light, we aimed at reporting perioperative and oncologic outcomes of PC-RPLND and BR (complete vs. partial) in patients with TC nodal and bone involvement, at a single tertiary care center.

2. Patients and methods

2.1. Patient population

After ethical committee approval, 14 patients with nodal and any kind of bone involvement after chemotherapy for any TC histology, were enrolled and periodical follow-up was recorded. Staging consisted of chest/abdominal computed tomography (CT) scan, serum markers, and additional bone scan ($n = 2$). Positron emission tomography/CT scan or CT-guided biopsy were not used. Three patients reported symptoms (walking pain/limitation, flank pain, and vertebral pain). Patients were treated with PC-RPLND and BR (complete BR [cBR] and spacer implantation or partial BR [pBR]) in one session by one experienced urologist and one experienced orthopedic surgeon between 2008 and 2016. For those patients with spine involvement and cBR (43%), dorsal stabilization and staged PC-RPLND with anterior resection were performed, at a second surgery 2 weeks later. Adjuvant radiotherapy was not used. Two patients received radiotherapy during follow-up to different disease locations.

2.2. Surgical technique

After induction of general anesthesia, the patient was placed at a Trendelenburg position. A single antibiotic prophylaxis was administered. Through a xifo-suprapubic incision and after complete derotation of the intestine, ureter, great vessels, mesenteric artery, iliac vessels, and spermatic cord were identified. The posterior layer of the peritoneum was incised and the retroperitoneum was entered.

“Split-and-roll” technique was employed. Right-sided standard template resection included precaval, paracaval, retrocaval, interaortocaval regions and the area lateral to the common iliac vessels with the crossing of the ureter as caudal boundary, and the ureter serving as lateral boundary of dissection. The renal vein represented the cranial boundary of dissection, except in those patients demonstrating retrocrural or suprahilal lymph node involvement. In those patients the crura of the diaphragm represented the cranial border of dissection. Left-sided standard template resection included the preaortic area down to the inferior mesenteric artery, with the para-aortic and retroaortic areas with the ureteral crossing of the iliac artery representing the caudal and the lateral boundaries of dissection, respectively. Bilateral template resection included the right and left

dissection fields. A single-side template resection was preferentially performed if the prechemotherapy location of the residual mass corresponded to the primary landing zone of the tumor bearing testicle. A bilateral resection was performed in all cases with contralateral spread or interaortocaval location. At the end of the procedure, homolateral ureter and vascular structures were completely skeletonized.

If cBR or pBR involving more than 30% of the vertebral body was pursued, a staged orthopedic procedure was performed with posterior column stabilization and subsequent implantation of anterior spacer (XPand Cage, Globus Medical, Audubon, PA).

2.3. Covariates and outcomes

Perioperative outcomes consisted of operative time (OT), blood loss, additional oncologic surgery, intraoperative complications and adjunctive surgery, length of hospital stay (LoS), and postoperative complications categorized according to Clavien-Dindo classification. Patients underwent regularly follow-up visits, serum marker tests, and radiologic examinations, according to the EAU Guidelines [9]. On the overall population and after stratification according to BR type, means, medians, and interquartile ranges (IQR) were reported for nonnormally distributed continuous variables. Frequencies and proportions were reported for categorical variables. Independent *t*-test and chi-square were used to compare means and proportions, between cBR and pBR. Statistical analyses were performed with SPSS version 21, with a 2-sided significance level set at $P < 0.05$.

3. Results

3.1. Baseline characteristics

Table 1 depicts the demographic and tumor characteristics of the study cohort. Median age at surgery was 36.6 years (IQR: 26.7–44.5). Overall, 1 (7%) and 1 (7%) patient had seminoma and extragonadal NSGCT affecting the right os ileum, respectively. All other patients had NSGCT with vertebral involvement ($n = 12$, 86%). Salvage chemotherapy was given in 8 patients (57%) before PC-RPLND and BR (high dose: $n = 3$; 21% and conventional: $n = 5$; 36%). Marker elevation at surgery was present in 7/14 (50%) patients, 3/7 with teratoma, and 4/7 with vital carcinoma. Six out of 14 patients presented with at least an additional site of residual disease (liver 3/6, inferior vena cava thrombus 2/6, aortic wall infiltration 1/6, lung 2/6, and brain 2/6).

3.2. Perioperative outcomes

Overall, 72% of patients underwent bilateral and 28% unilateral PC-RPLND.

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