

Resections of pelvic bone and sacrum, Ljubljana experience

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From 1976-1996, 85 patients with tumors in the pelvic region were operated on, of these 70 were pelvic bone resections and 15 hemipelvectomies. Of the 70 patients who underwent a pelvic bone resection there were 45 primary malignant bone tumors, 11 locally advanced soft-tissue sarcomas, 3 locally advanced primary carcinomas and 11 benign locally aggressive bone lesions. Of the 15 patients who underwent a hemipelvectomy 11 had primary bone sarcomas and 3 soft tissue sarcomas. The overall survival of patients with malignant tumors who were resected and those who underwent a hemipelvectomy was similar (at 5 years 50% for resected, 60% for those with hemipelvectomy; $p=0.27$). The quality of life after anterior and posterior resections is from good to excellent, when no major nerves have been sacrificed.

Key words: bone neoplasms; pelvic bones resection; hemipelvectomy

Introduction

The Institute of Oncology Ljubljana is the oldest institution of this sort in the territory of the former Yugoslavia. Until the late 1960's, it was mainly a radiotherapeutic institution, later to become a comprehensive cancer center with a fairly strong surgical oncology unit. Twenty years ago a multidisciplinary team for bone and soft-tissue sarcoma treatment was formed. The first hind-quarter amputation in the institute was performed in 1976 and the first pelvic resection in 1979. This report presents the experience of the very same surgical team in treating tumors of the pelvic region.

Patients and methods

From 1976-1996, 85 patients with tumors in the pelvic region were operated on, of these 70 had pelvic bone resection and 15 hemipelvectomy. The resection itself was accomplished by an oncologic

surgeon and the reconstruction by an orthopedic one.

A quarter of the patients had already undergone a previous surgery elsewhere, while many of the remaining ones had been referred to us as unresectable. Of the 70 patients who underwent a pelvic bone resection there were 45 with primary malignant bone tumors (17 chondrosarcomas, 7 osteosarcomas, 7 chordomas, 6 Ewings and 8 tumors of other type), 11 with locally advanced soft-tissue sarcomas, 3 with locally advanced primary carcinomas and 11 with benign locally aggressive bone lesions (prevailing osteblastomas). Of the 15 patients who underwent a hemipelvectomy 11 had primary bone sarcomas and 3 soft tissue sarcomas.

The resected patients (70) were 1 - 77 years old (mean 38 yrs); of these, 33 were females and 37 males. Almost all of them had large tumors (only one was T₁). At the time of surgery 2/70 patients had metastatic spread in the lymph nodes and 5/70 distant metastases. In the pathologist's report 13/70 had satellite nodules around the tumor and 4/70 blastomatous venous thrombi. In slightly more than half of the cases the malignancy grade was high; 32/70 tumors were growing over the midline. Half of the patients had been treated by chemotherapy and/or radiotherapy prior to resection.

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The time needed for resection was 2-18 hours (mean 7.6 hours). Blood replacement during the procedure was 350-27.300 ml (mean 4600 ml).

In order to classify our procedures we added another two segments to the frontal, acetabular and posterior pelvic segments as classified by Enneking,^{1,2} i.e., the sacral and lumbar. Because of the tumor's extent a partial resection of the lumbar vertebrae was required in 14/70 cases, together with the resection of other parts of the pelvis. In 30/70 cases the resection affected only one segment (sacrum in 12/30), in 21/70 two segments, in 17/70 three, in 1/70 four, while in 1/70 cases all five segments were affected.

In some cases, besides bone resections, a resection of visceral organs (large bowel 6/70, urinary bladder 2/70), thigh muscle groups (7/70) and/or nerve roots was necessary.

Due to the usually enormous deficits of soft tissues after tumor resections, the reconstructions were as simple as possible. In our opinion, there is no need for bone reconstruction of the frontal part of the ring and after posterior resections, with a narrow bone-bridge remaining. After complete dorsal resections, simple autotransplants were used, while after incomplete acetabular and lumbo-sacral resections, homotransplants were occasionally used. After real "inner hemipelvectomies" the femur was attached to the bone remnants by simple means.

Results

There were 3 serious intraoperative complications encountered: a complete rupture of the external iliac artery - successfully taken care of, a massive bleeding causing postoperative ARDS and death, and an unsuccessful vessel reconstruction resulting in immediate hemipelvectomy.

Postoperative bleeding and deep infections requiring reoperation, sepsis, ARDS and multiorgan failure were among the most common severe postoperative complications, which affected one third of the patients (23/70). They ended with death within the first month after the resection in 3/70 patients (4.3 %), including the patient with intraoperative massive bleeding and 2 other patients who died within the following two months. A definite hemipelvectomy was the final outcome of postoperative complication in 2/70 patients.

Late complications consisted of deep infections, usually osteitis, requiring reoperation in five patients.

The group of 11 patients with benign lesions were excluded from the survival analysis. There were no serious postoperative complications encountered, and all the patients are alive without local recurrence.

Of the 59 patients resected for malignant tumors, 2 had R₂, 13 R₁ and 44 R₀ resections.

The median follow up is 62 months (2-174 mos). Figure 1. shows the overall survival of all 59 resected patients, Figure 2. the overall survival of the patients with R₀ and R₁ resections, and Figure 3. the overall survival of patients with resection vs. those with hemipelvectomy (n=15). Table 1 shows the recurrence rate (local, local and distant, distant) in the resected patients with N₀ M₀ disease (n=50) with respect to R₀ or R₁ operation. Overall survival was calculated using the Kaplan-Meier method. The differences are not statistically significant.

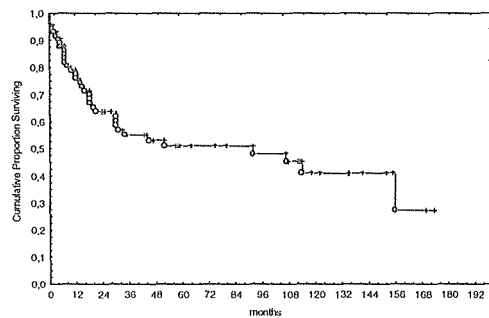


Figure 1. Overall survival of all patients with malignant tumors of the pelvic region treated by resection (n=59)

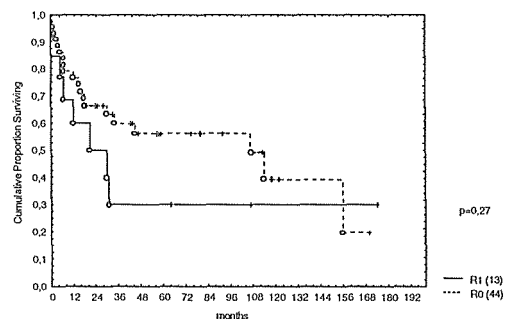


Figure 2. Overall survival of patients with malignant tumors of the pelvic region treated by resection according to the type of surgery (R₀=44, R₁=13)

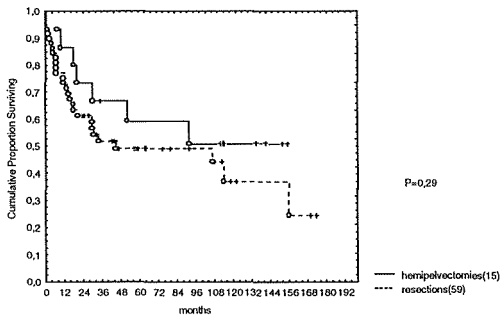


Figure 3. Overall survival of all patients with malignant tumors of the pelvic region treated by resection (n=59) and those treated by hemipelvectomy (n=15)

Conclusion

The quality of life after anterior and posterior resections is from good to excellent, when no major nerves have been sacrificed. The functioning of the limb after real inner hemipelvectomy is worse, but the majority of the patients gain some active mobility of the newly formed fibrous joint as well as full weight bearing. Even after a resection of one major nerve these patients live better than after a hemipelvectomy. Patients with high bilateral sacrum resections have problems with mictu-

rition and rarely with defecation. In terms of survival, the results of resections are not considerably worse than those after a mutilating procedure. Many of the medially lying tumors can not be treated by the latter. No matter how demanding resection procedures can be for all members of the surgical team, the effort seems to be justified by the results obtained.

Table 1. Recurrence rate in 50 M₀ patients resected for tumors in the pelvic region (NED=no evidence of disease, LR=local recurrence, M=metastases)

| | NED | LR | LR+M | M | All |
|-----------|----------|--------|----------|----------|-----------|
| R0 | | | | | |
| resection | 20 (51%) | 2 (5%) | 8 (21%) | 9 (23%) | 39 (100%) |
| R1 | | | | | |
| resection | 6 (55%) | 0 (0%) | 3 (27%) | 2 (18%) | 11 (100%) |
| All | 26 (52%) | 2 (4%) | 12 (24%) | 11 (22%) | 50 (100%) |

References

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