

# Role of CT-guided Intraoperative Navigation in Pelvic Tumor Resection Surgery

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**INTRODUCTION:** Pelvic bone tumors are complex musculoskeletal neoplasms that pose significant challenges due to their proximity to neurovascular structures. Pelvic tumor resections remain technically demanding due to complex anatomy (1). The development of assisted intraoperative navigation techniques and their application in pelvic tumor resections have revolutionized the surgical approach, making procedures safer, less invasive, and technically simpler (2,3). The aim of this study is to analyze surgical accuracy and survival rates in pelvic bone tumor resections performed with the aid of CT-guided intraoperative navigation.

**METHODS:** A retrospective single-center study was conducted, which included patients with malignant pelvic tumors who underwent resection between 2017 and 2023 using either traditional techniques (non-NV) or CT-guided intraoperative navigation (NV), with a minimum follow-up of one year. This study received clearance from the Institutional Review Board. The patients provided informed consent to participate in the present study and for the publication of their data in anonymous form. Local recurrence, presence of distant metastases, and overall survival were evaluated. Mann-Whitney tests were used for continuous variables, and Pearson's Chi-squared test for categorical variables. Survival curves were compared using the Kaplan-Meier method and log-rank test. Statistical significance was set at  $p < 0.05$ . Statistical analysis was performed using SPSS version 29.

**RESULTS SECTION:** A total of twenty-eight patients were included in the study (14 in the NV group and 14 in the non-NV group). The sample was represented by 46.4% male and 53.6% female, with a mean age of  $42.6 \pm 22$  years. The average tumor size was  $9.8 \pm 5.7$  cm. The mean follow-up was  $22.9 \pm 16.6$  months. The most frequent histological types were chondrosarcoma (60.7%), osteosarcoma (14.3%), and Ewing sarcoma (17.9%). Negative margins were obtained in all surgical specimens. No local recurrences occurred in the NV group, while two recurrences were observed in the non-NV group. The overall local recurrence-free survival was 92.9% (100% in NV group and 85.7% in non-NV group). Two cases of metastasis occurred in each group; metastasis-free survival was 85.7%. The overall survival was 82.1%: 92.9% in the NV group (1 death) and 71.4% in the non-NV group (4 deaths), with  $p = 0.224$ .

**DISCUSSION:** CT-guided intraoperative navigation allowed consistently negative margins and was associated with absence of local recurrence. Furthermore, a clinically relevant trend towards better outcomes was observed in the NV group. A larger patient cohort and longer follow-up are needed to determine the impact of navigation on local recurrence risk and overall survival.

**SIGNIFICANCE/CLINICAL RELEVANCE:** (1-2 sentences): CT-guided intraoperative navigation is a valid and safe tool in pelvic oncologic surgery, particularly in anatomically complex areas. Its use may reduce local recurrences, increase wide-margin resections and enhance oncological control, encouraging its wider adoption in orthopedic oncology practice.

## REFERENCES:

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## IMAGES AND TABLES:

