

## POSTER 71

TITLE: Surgical Management of Radiation Associated Sarcomas of the Pelvis

AUTHORS: Nathan P Thomas<sup>1</sup>, Erik T Newman<sup>1</sup>, Santiago Lozano Calderon<sup>1</sup>

<sup>1</sup>Massachusetts General Hospital, Department of Orthopaedic Surgery

**BACKGROUND:** Radiation associated sarcomas are sarcomas arising in the setting of prior radiation treatment. These lesions are noted to be a challenging surgical entity as previous radiation and surgery can obscure surgical planes and leave tissue friable and prone to damage during surgical intervention. Furthermore, sarcomas arising in the pelvis represent a challenging clinical entity given the anatomic location and close relationship of lesions to critical anatomic structures. The resection of these lesions requires highly specialized and multidisciplinary care, both peri-operatively and intra-operatively. Although the peri-operative care of these lesions has been described, the intra-operative care and complications has been less closely evaluated.

**QUESTION/PURPOSE:** What are the intra-operative and early post-operative complications encountered during resection of radiation-associated pelvic sarcomas.

**PATIENTS/METHODS:** Records of patients undergoing resection of radiation associated sarcomas were queried from a large retrospective database of pelvic resections, performed at one tertiary academic center from 1992-2018. Soft tissue lesions of the pelvis, not involving bony structures, were excluded. Patient and surgical data were manually extracted from the electronic clinical record. Statistical analysis was performed in Microsoft Excel. This study was reviewed and approved by the institutional review board.

### RESULTS:

14 patients were included in the sample, including 6 males and 7 females with an average age of 37.9 years (range 11-74). Patients were an average 12.14+/-6.2 years from initial radiation treatment. There were 12 cases of primary lesions and 1 recurrent sarcoma, requiring extended hemipelvectomy. Pathology details of initial lesion, radiation treatment, and subsequent pathology can be seen in table 1.

Table 1. Original pathology, radiation, and radiation-induced pathology

Original Pathology	Time from diagnosis (yr)	Original Radiation Dose	Histology
Cervical cancer	19	45	Pleomorphic spindle cell sarcoma (Grade 3/3)
Uterine leiomyosarcoma	6	50.4	Leiomyosarcoma (Grade 3/3)
Reticulum cell sarcoma	22		Angiosarcoma (Grade 1/3)
Wilms tumor	16	20	Recurrent malignant peripheral nerve sheath tumor (Grade 2/3)
Rhabdomyosarcoma	7		
Ewing sarcoma	4	55.8	Osteosarcoma (Grade 2/3)
Cervical adenocarcinoma	19	50.4	Osteosarcoma (Grade 3/3)
Medullary blastoma	14	36	Osteosarcoma (Grade 2/3)
Vaginal adenocarcinoma	19		Osteogenic sarcoma
Sacral chordoma	10	66.2	Malignant fibrous histiocytoma (Grade 3/3)
Prostate adenocarcinoma	6	49	Pleomorphic fibroblastic sarcoma (Grade 3/3)

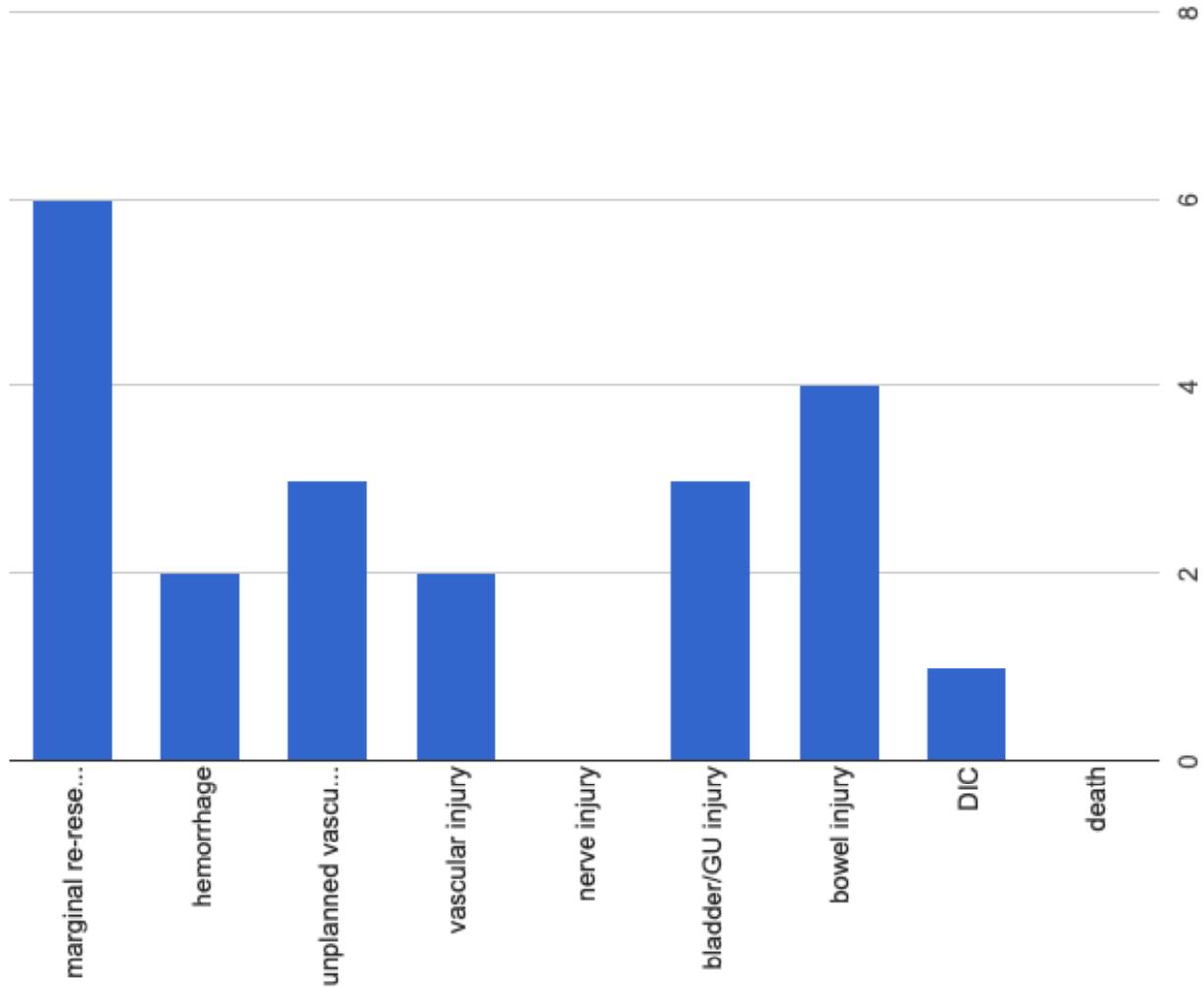
Leukemia	15	14	Osteosarcoma (Grade 3/3)
Ewing sarcoma	7	55.8	Rhabdomyosarcoma
Ewing sarcoma	6	55.8	Rhabdomyosarcoma

4/14 Cases were performed in a staged manner over 2 operative days. 10 patients underwent internal hemipelvectomy (7 type I, 3 type IIA, 3 type IIB, 3 type III, 4 type IV), 3 underwent external hemipelvectomy (1 extended, 2 standard), while 1 underwent sacrectomy. All lesions were resected with intended wide or radical margins. 7/14 of patients underwent reconstruction following resection.

Mean intra-operative blood loss was 5L (range 1.05-18L). Mean intra-operative transfusion was 11 units (range 2-47 units). The operative services included general surgery (11/14 cases), spine (5/14), plastic surgery (4/14) and urology (1/14) in addition to orthopedic oncology.

Intra-operative complications were noted in 10/14 resections. The distribution can be seen in figure 1, with positive margins (6/14) and bowel injury (4/14) being the most common complications. Other complications included: hemorrhage, unplanned resection of vascular structures, vascular injury requiring repair, bladder/genitourinary injury requiring repair, and intra-operative disseminated intravascular coagulation (DIC). All complications were noted during tumor resection.

Figure 1. Distribution of intra—operative complications



Sepsis was the most common early post-operative complication (4/14), followed by myocardial infarction (2/14), hemorrhage (1/14), and death (1/14).

#### CONCLUSION:

Resection of radiation associated sarcomas is associated with a high degree of operative difficulty and a high rate of intra-operative complications (10/14 cases). As the most common complications seen are bowel injury and positive margins, this study highlights the essential need for general surgical and skilled pathology partners. This study provides guidance to the anticipated intra-operative and early post-operative care of a relatively rare, but challenging clinical entity. Further work is needed to match radiation associated cases with similar pelvic resection cases for primary tumors.