POSTER 88

Incidence and Histologic Subtypes of Subsequent Malignant Neoplasms Among Young Osteosarcoma Survivors

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Background: Since the advent of effective systemic chemotherapy and limb salvage surgery, the overall survival for young people with osteosarcoma (OS) has plateaued at an estimated 70-80% at 5 years. For these OS survivors, it is imperative to better understand the long-term risks they may encounter, including subsequent malignant neoplasms (SMN). Our study describes the histologic subtypes and timing of subsequent cancers in patients diagnosed with OS before age 30.

Questions/Purposes: What are the types of SMNs young OS survivors develop? What is the mean time between primary OS diagnosis and SMN presentation? Are there differences between those people who develop OS only and those who develop OS and a SMN?

Patients and Methods: Patients under 30 years-old, who were diagnosed with OS between 1976 and 2016, were identified using the Surveillance, Epidemiology, and End Results (SEER) 2018 database. Demographic data, primary tumor site, stage, treatment type and any additional cancer diagnoses were collected. This cohort was stratified into those with OS as their only diagnosis and those who developed at least one SMN. Those who had another malignancy prior to developing OS, but who developed a subsequent unique malignancy, were included. The demographic data and clinical characteristics of OS cases with a SMN were compared to patients who developed OS and no SMN. A p-value of <0.05 was considered statistically significant. Survival after SMN and OS only was estimated using the Kaplan-Meier method.

Results: SEER database analysis identified 3,806 patients with a diagnosis of OS; 3,686 (96.9%) patients diagnosed with OS only and 120 (3.2%) patients with OS who developed at least one SMN. Twelve of the patients with a SMN had a malignancy prior to OS diagnosis; soft tissue sarcoma being the most common initial diagnosis (n=9). The mean age at OS diagnosis in those with a SMN was 15.6 years [range: 4-29 years]. There was no statistically significant difference in age at diagnosis compared to those with OS only.

There was a statistically significant difference in sex between groups with 73 (59.8%) females in those with a SMN compared to 1588 (43.1%) in the OS only cohort (p-value < 0.001). There was a trend toward a greater percentage of non-Hispanic patients 99 (82.5%) in the SMN cohort than those with OS only 2571 (74.7%) (p-value 0.051).

The SMN diagnoses for the 120 patients with OS included 37 (30.8%) acute myeloid leukemia (AML), 18 (15%) breast cancer, 13 (10.8%) soft tissue sarcomas, and 10 (8.3%) thyroid carcinomas (Table 1). The mean time from OS to SMN varied by type of cancer; mean time to AML was 42.4 months, to breast cancer was 221.3 months, to soft tissue sarcoma was 149.9 months, and to thyroid cancer was 98.5 months. Figure 1 demonstrates worse survival of those who developed a SMN after OS diagnosis when compared with the OS only cohort. Fifteen of the 120 survivors of OS with SMNs experienced a 3rd unique cancer and three experienced a 4th unique cancer.

Conclusions: Young OS survivors who develop a subsequent malignancy are most likely to develop AML within 5 years completing treatment. However, other cancers such as sarcomas and breast cancer can occur decades after OS diagnosis. Survivors who develop SMN often have a poor prognosis. Therefore, continued follow-up of young OS survivors remains crucial. Longitudinal survivorship programs may provide this benefit to screen young OS survivors for SMNs.

Table 1. SMN Diagnoses of 120 patients diagnosed with OS before age 30

SMN	N	%	Time to Dx (months)
AML	37	30.8	42.4
Breast	18	15.0	221.3
STS	13	10.8	149.9
Thyroid	10	8.3	98.5
GI	9	7.5	176.8
GU	7	5.8	145.3
Brain Tumor	6	5.0	68.2
Lung	5	4.2	105.8
ALL	4	3.3	64.5
Melanoma	4	3.3	71.8
Unspecified Malignancy	3	2.5	81.0
NHL	2	1.6	66.5
Ewing Sarcoma	1	0.8	71
Chondrosarcoma	1	0.8	74

AML-Acute Myeloid Leukemia, NHL – Non-Hodgkins Lymphoma,
STS – Soft Tissue Sarcoma, GI – Gastrointestinal, GU- Genitourinary

Figure 1. Kaplan-Meier survival estimates for OS survivors with OS only vs those who developed a SMN