Population-Based Results in the Management of Sinonasal and Ventral Skull Base Malignancies

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KEYWORDS

• Population-based analysis • Registry data • Anterior skull base malignancy
• Ventral skull base malignancy

KEY POINTS

- In the United States, population-based analyses of sinonasal malignancies have relied on the Surveillance, Epidemiology, and End Results (SEER) registry developed and maintained by the National Cancer Institute, representing 17 geographic areas in the United States and accounting for 26.2% of the population.
- Many clinically useful analyses that include epidemiologic and survival information regarding 13 distinct malignant histologies are made possible through the use of registry data.
- Although these analyses are powerful, important limitations, such as selection and confounding bias, omission of chemotherapy data, type of surgical approach used, and timing of radiation treatment, should be considered.

INTRODUCTION TO POPULATION-BASED ANALYSES AND REGISTRY DATA

Population-based cancer registries allow for collection, classification, and consolidation of cases on the scale of populations, outside the limits of any individual institution. This provides a method for measuring and studying patterns of disease over time across state lines, borders, and geographic locations inclusive of a wide spectrum of demographics and genetic compositions.[1]

In the United States, population-based analyses in surgical oncology have relied in part on the use of the Surveillance, Epidemiology, and End Results (SEER) registry developed and maintained by the National Cancer Institute. This database has

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Abbreviations	
AJCC	American Joint Committee on Cancer
API	Asian/Pacific Islander
DLBCL	Diffuse large B-cell lymphoma
DSS	Disease-free Survival
EBV	Epstein-Barr virus
ENB	Esthesioneuroblastoma
EMP	Extramedullary plasmacytoma
ENKTL	Extranodal natural-killer/T-cell lymphoma
NHW	Non-Hispanic white individuals
NPC	Nasopharyngeal carcinoma
OS	Overall survival
RS	Relative survival
RT	Radiation Therapy
SCC	Squamous cell carcinoma
SEER	Surveillance, Epidemiology, and End Results
SNAC	Sinonasal adenocarcinoma
SN-ACC	Sinonasal adenoid cystic carcinoma
SNEC	Sinonasal neuroendocrine tumor
SN-MEC	Sinonasal mucoepidermoid carcinoma
SN-RMS	Sinonasal rhabdomyosarcoma
SNUC	Sinonasal undifferentiated carcinoma

allowed for investigations into the course and treatment outcomes of specific malignancies that are more broadly generalizable than studies from individual institutions. The SEER registry began collecting data in 1973 and currently represents 17 geographic areas in the United States accounting for 26.2% of the population.[2–4] Although the data are considered highly valid, there is a slight overrepresentation of those living below the poverty level, inhabiting urban centers, born in foreign countries, and with education levels below a high-school diploma.[2] Information in the registry includes patient demographics, tumor histology, sites of involvement, extent of disease, use of surgical and/or radiation therapy (RT) modalities of treatment within 4 months of diagnosis, and patient survival, among other parameters.[2] Importantly, however, tumor stage is not always reported, particularly along TNM specifications, and metastases are not specifically defined. Furthermore, preexisting comorbidities, use of chemotherapy, and type of surgical intervention are not reported in the registry.

There are important caveats to consider when assessing applicability of conclusions drawn from population-based analyses as it pertains to the use of registry data. The SEER registry in particular, although clearly a powerful tool, is nonetheless vulnerable to all types of bias, particularly selection and confounding bias.[3,5–7] For instance, the decision-making process leading one patient to receive surgical treatment instead of, or in conjunction with, another treatment modality is not captured by the registry. Similarly, observational studies run the risk of drawing invalid inferences with incomplete control of confounding variables, such as comorbidities, which have a tendency to be undercoded.[2]

An important limitation in the SEER registry is the omission of chemotherapy treatment.[4] The contribution of chemotherapy either as a primary or adjuvant therapy on survival cannot be assessed. For instance, the impact of chemotherapy on lymphoma, which is this entity's treatment of choice, cannot be determined with registry data. Also more subtle comparisons, such as the impact of the BRAF deletion characteristic of mucosal melanoma and its reduced chemo-sensitivity,[8] could not be studied.