Chordomas and Chondrosarcomas of the Skull Base: An Updated SEER Database Analysis

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Background

- Chondrosarcomas and chordomas are rare tumors of the skull base, each accounting for less than 1% of all skull base tumors.[1]
- Their proximity to critical neurovascular structures makes diagnosis and treatment difficult.
- There is a relative lack of standardized guidelines, and treatment decisions often rely on institutional experience.
- Surgery remains the cornerstone of treatment for both diseases, while the role of adjuvant radiation is debated.[2,3]
- Survival outcomes are not well characterized in large, population-based cohorts.

Objective

- Define the incidence of skull base chordomas and chondrosarcomas in a national cohort.
- Assess survival outcomes at 1, 5, and 10 years.
- Compare treatment patterns and their association with survival.

Methods

- The SEER database was queried for patients diagnosed with chordomas and chondrosarcomas of the skull base between 2000 and 2021.
- Chi-square and t tests were used to compare demographics, incidence, and treatment.
- Z test was used to compare survival proportions at 1-, 5-, and 10-year intervals

Results

Incidence & Demographics

	Chondrosarcomas (n = 798)	Chordomas (n = 1330)
Age at diagnosis, n (%)		
< 30	152 (19%)	261 (20%)
30-49	274 (34%)	428 (32%)
50-69	264 (33%)	450 (34%)
70 +	108 (14%)	191 (14%)
Sex, n (%)		
Male	366 (46%)	714 (54%)
Female	432 (54%)	616 (46%)
Race, n (%)		
White	670 (84%)	1090 (82%)
Non-white	128 (16%)	240 (18%)

Figure 1. Demographic characteristics of patients with skull base chordomas and chondrosarcomas, including age distribution, sex, and race at diagnosis. Percentages are reported for each tumor type.

Overall Survival

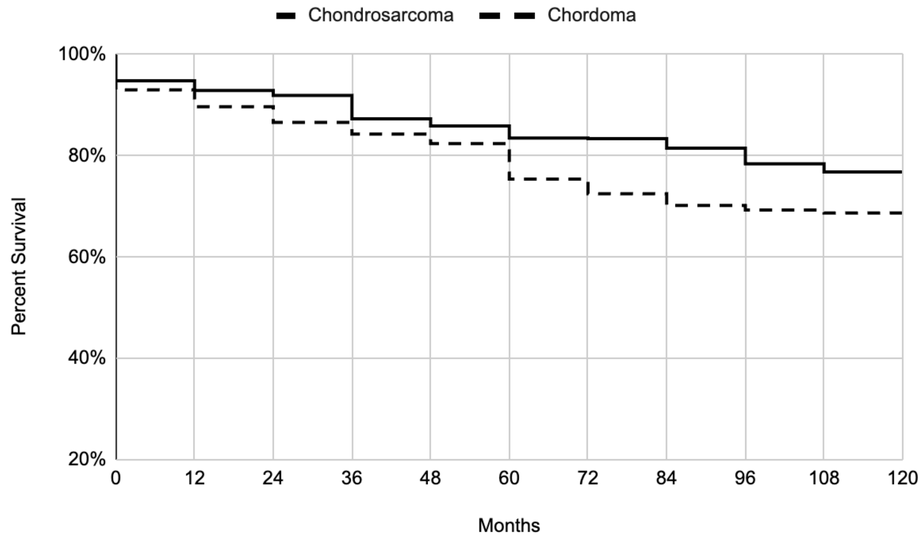

Figure 2. Disease-specific survival for skull base chordomas and chondrosarcomas
Disease-specific survival curves show higher long-term survival in chondrosarcoma patients compared to chordoma patients. Five-year survival was 87.7% versus 81.9% (p<0.01); 10-year survival was 77.4% versus 66.0% (p<0.01).

Treatments & Outcomes

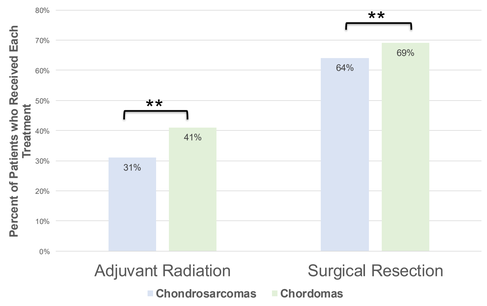

Figure 3. Treatment patterns among patients with skull base chordomas and chondrosarcomas.
A greater proportion of chordoma patients underwent surgery (69% vs 64%) and postoperative radiation (41% vs 31%).

**p<0.01

Treatments & Outcomes

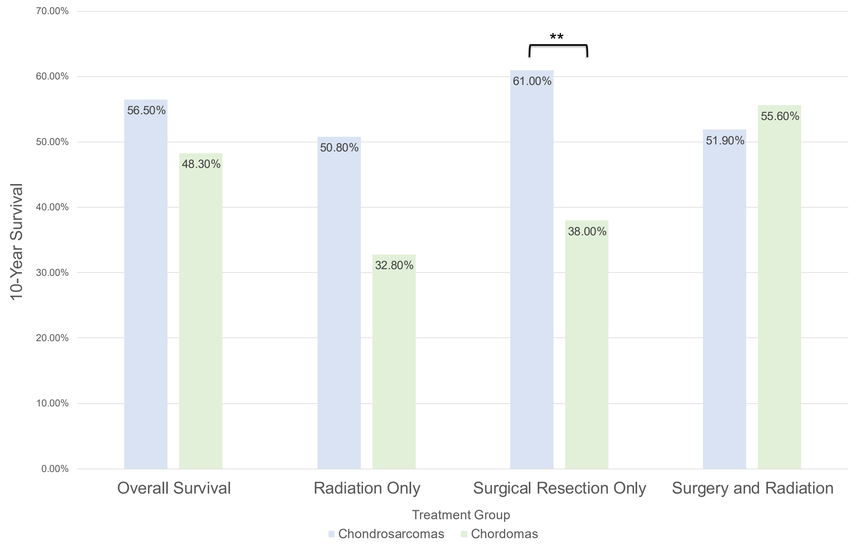

Figure 4. Ten-year survival by treatment modality in skull base chordomas and chondrosarcomas.
Age-standardized observed survival is shown. Surgery without radiation was the only treatment comparison to reach statistical significance, with better outcomes for chondrosarcomas than chordomas (61% vs 38%, p<0.01). Patients who received radiation therapy as primary treatment without surgery had poorer survival in both populations. Chordoma patients had the highest survival when treated with surgery and adjuvant radiation, whereas chondrosarcoma patients had the highest survival when treated by surgical resection only.

Conclusions

- Chordomas occur more frequently than chondrosarcomas in the skull base.
- Surgical resection is associated with improved survival in both tumor types.
- Chondrosarcoma patients showed lower survival with surgical resection and adjuvant radiation compared to surgery alone, however this finding is likely confounded by disease burden.
- Chordoma patients received surgery and adjuvant radiation at higher rates than chondrosarcoma patients, yet long-term survival remained lower compared with chondrosarcoma patients.

Future Research

Further studies are needed to evaluate the impact of tumor size and location on surgical feasibility, as well as to clarify the role of adjuvant radiation in survival outcomes. Prospective or risk-adjusted analyses may also help define recurrence patterns and guide more standardized management strategies.

References
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