

Conditional survival and functional outcome following surgical treatment for sacral chordoma: a monocentric retrospective review of 115 consecutive cases

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Background

Repeated cohort studies have consistently demonstrate quality of surgical margin at initial surgery is the primary factor to improve survival and local control for patients with sacral chordoma. Conditional survival is a measure of prognosis for patients who have already survived certain period of time; however, data on conditional survival after sacrectomy for patients with sacral chordoma are lacking. Based on current evaluation system, it is difficult to accurately anticipate and detect minor changes in functionality after sacrectomy.

Questions/Purposes

The purpose of this study is to: (1) determine the conditional survival probability and how effect of prognostic factors changing over time in patients undergoing surgical resection for sacral chordoma; and (2) critical evaluate the postoperative motor, bowel and bladder function by a newly-designed scoring method and clarify the relationship between overall postoperative function and preserved sacral nerve.

Patients and Methods

One hundred and fifteen patients with sacral chordoma received surgical treatment between Jul 2003 and Dec 2012 were reviewed and the actuarial survival was estimated. The 5-year conditional survival was calculated based on Kaplan-Meier survival analysis. Effect of prognostic factors on conditional survival was also explored. A newly designed score method was proposed and adopted in current study to critically evaluate the function outcome after resection of sacrum. The mean follow-up was 59.3 months (range, 15-130 months).

Results

The 5-year conditional overall survival decreased with each additional year in the first four years and increased slightly in the fifth year (Fig 1). The 5-year survival decreased from 80.7% at diagnosis to 62.7% at the fourth year and improved to 70.9% at the fifth year. Patients with adequate surgical margin displayed a higher 5-year survival than those with inadequate margin (86.3% versus 67%, $p=0.009$) at diagnosis and the difference was most significant between the third and fourth year after diagnosis. Conditional survival estimates for patients received surgeries elsewhere was lower than that of newly diagnosed at baseline (64.1% versus 90.2%, $p=0.012$) and the survival disadvantage diminished 5 years after diagnosis (66.8% versus 71.1%, $p>0.05$). The proposed score system for function evaluation well distinguished different level resections. The overall function results for preservation of bilateral S1, S2 and S3 were 39.5%, 60.0% and 81.5% respectively (Fig 2). Preservation of unilateral S3 nerve significantly decreased the incontinence ($p=0.01$) and sensation ($p=0.02$) compared with preservation of bilateral S3 nerve roots.

Conclusions

The 5-year conditional survival for sacral chordoma decreased with each additional year and started to improve since fourth year. Also the impact of surgical margin and previous surgery influencing conditional survival was not

linear over time. The level of nerve root resections corresponded with the overall function scores according to the proposed scoring method.

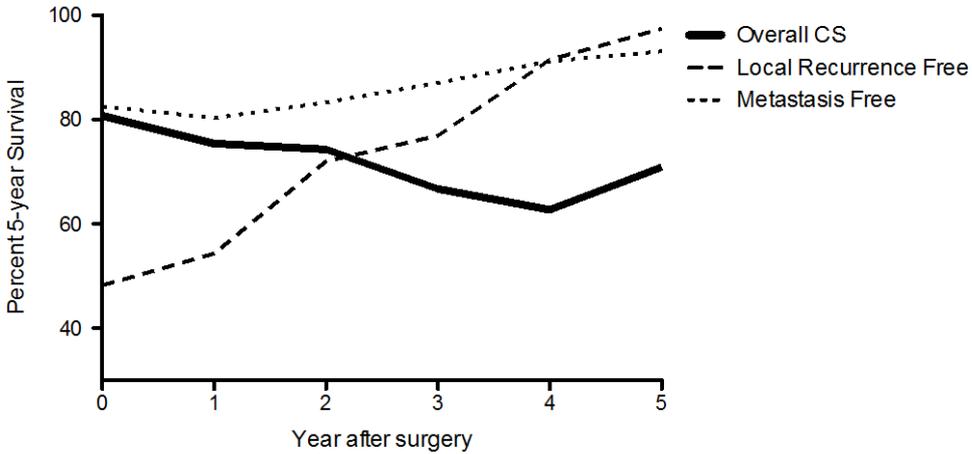


Fig. 1 Conditional survival given the patient has survived 0 to 5 years after diagnosis. The conditional recurrence-free and metastasis-free survival increased with each additional year since diagnosis.

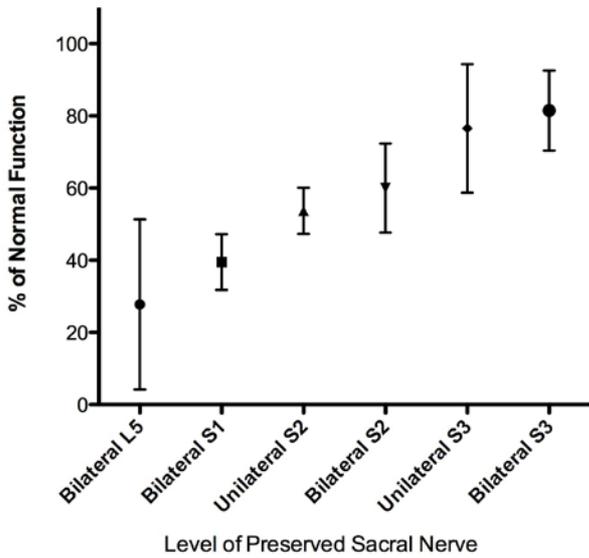


Fig. 2 Postoperative overall function, including motor, bladder and bowel, correlated with the level of sacral nerve preservation (mean with standard deviation).