

Impact of Surgical Margins in Chest Wall Chondrosarcomas: A CanSaRCC Study

Aaron Gazendam¹, Hagit Peretz Soroka², Ryan Trenholm³, Caroline Holloway⁴, George Basile⁵, Marcelo Cypel², Abha Gupta², Anthony Griffin¹, Peter Ferguson¹, Annie Arteau⁶, Anthony Bozzo⁷, Michael J. Monument⁸, Joel Werier⁹, Alexander Ednie³, David Wilson³

¹Sinai Health System, Toronto, Ontario

²University Health Network, Toronto, Ontario

³Nova Scotia Health Authority

⁴BC Cancer, Vancouver, British Columbia

⁵Hôpital Maisonneuve-Rosemont, Montreal, Quebec

⁶Université Laval, Quebec City, Quebec

⁷McGill University, Montreal, Quebec

⁸University of Calgary, Calgary, Alberta

⁹The Ottawa Hospital Research Institute, Ottawa, Ontario

Significance & Hypothesis

Chest wall chondrosarcoma is the most common primary malignant bone tumour of the thoracic cage. Given that these tumours are resistant to chemotherapy and radiotherapy, surgical resection with negative margins remains the cornerstone of treatment. Historically, wide resections with large margins have been recommended to minimize recurrence, though these procedures can require extensive chest wall resection and complex reconstruction, resulting in substantial morbidity. The optimal margin width required for adequate oncologic control remains uncertain. We hypothesized that tumour biology rather than margin width primarily determines survival outcomes, while modest negative margins may be sufficient for local control.

Innovation

This study represents one of the largest contemporary multi-institutional analyses of primary chest wall chondrosarcoma using data from the Canadian Sarcoma Research and Clinical Collaboration (CanSaRCC). By examining surgical margins as a continuous clinical variable across multiple sarcoma centers, this study provides modern evidence to guide surgical planning and balance oncologic clearance with preservation of chest wall function.

Approach

A retrospective cohort study was conducted using the CanSaRCC registry across nine Canadian sarcoma centers. Adult patients with pathologically confirmed primary chest wall chondrosarcoma who underwent curative-intent surgical resection between 2000 and 2024 were included. Surgical margins were categorized as positive, <4 mm, or ≥4 mm based on the minimum measured distance from tumor to the resection margin. Primary outcomes included overall survival (OS), disease-free survival (DFS), and local recurrence-free survival (LRFS). Survival analyses were performed using Kaplan–Meier methods, and multivariable Cox regression models were used to identify independent predictors of survival and recurrence.

Results

Among 147 patients (median age 54 years (range; 21–85), 16% had positive margins, 52% <4 mm, and 24% ≥4 mm. At five years, OS and DFS were 77% (±4.8%) and 68% (±5.2%), respectively, for the entire cohort. Independent predictors of worse overall survival included tumour size ≥10 cm (HR 3.23, p=0.021) and grade III tumors (HR 12.40, p<0.001) but not margin size (margin ≥4mm; HR 0.70, p=0.512). Margins ≥4 mm significantly reduced local recurrence (HR 0.12, p = 0.023).

Discussion & Impact

In primary chest wall chondrosarcoma, tumour biology—particularly grade and tumour size—appears to drive systemic outcomes rather than the absolute width of surgical margins. While margins ≥4 mm improve local control, wider resections may not translate into improved survival. These findings support surgical strategies that achieve clear but balanced margins, allowing preservation of chest wall structure and function while maintaining oncologic safety.

Table 1. Cox regression analysis evaluating predictors of disease-free survival				
Variable	Hazard Ratio	95% CI		P Value
		Lower	Upper	
Age (per decade)	1.23	1.00	1.46	0.052
Closest Surgical Margin				
Positive (ref)				
<4mm	0.69	0.30	1.61	0.395
≥4mm	0.625	0.25	1.55	0.310
Histologic Grade				
I (ref)				
II	3.37	1.55	7.34	0.002
III	8.63	3.07	24.23	<0.001
Tumour Size				
<5cm (ref)				
5-10cm	2.05	0.86	4.89	0.105
≥ 10cm	6.57	2.45	17.61	<0.001

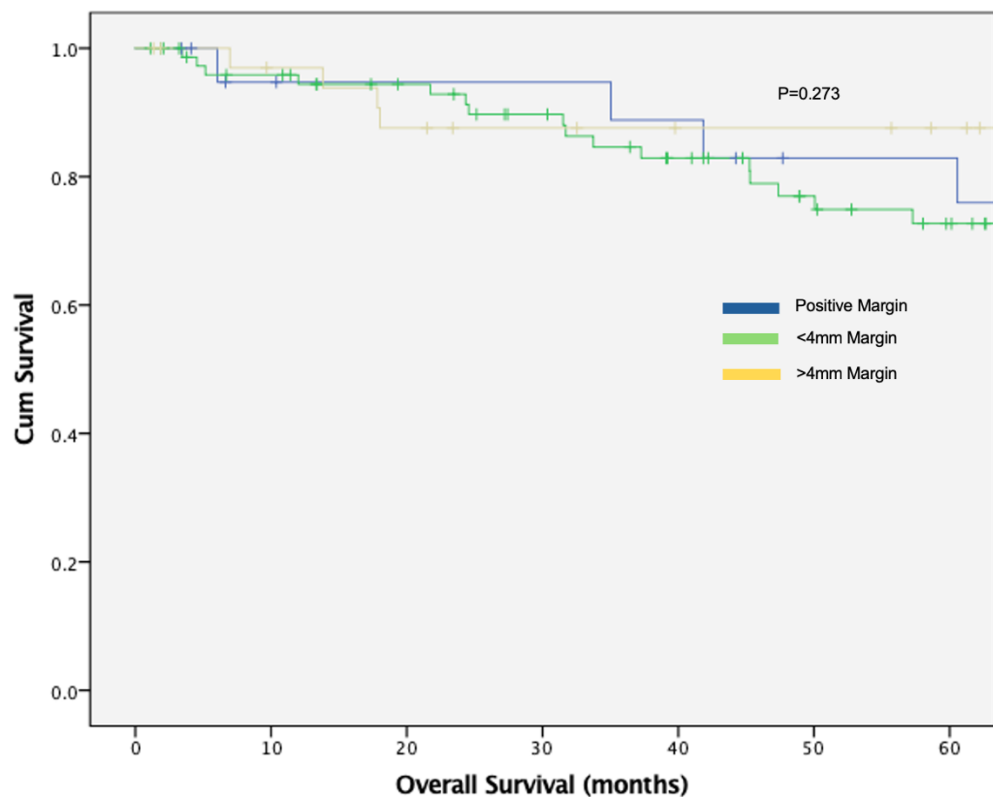


Figure 1. Overall survival stratified by closest surgical margins