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Surgical treatment of primary central conventional chondrosarcoma of pelvic bone: an evaluation of outcome in four European centers of orthopaedic oncology

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Introduction: The pelvis is among the preferential sites for primary central conventional (grade 1-3) chondrosarcoma of bone. To date, no effective adjuvant treatment modalities exist and therefore, resection with clear surgical margins is the mainstay of treatment. Studies focusing on outcome after surgical treatment of pelvic primary central conventional chondrosarcoma are lacking.

Methods: We retrospectively evaluated all consecutive patients who underwent surgical resection of primary central conventional chondrosarcoma of pelvic bones from 1985-2013, in four European centers of orthopaedic oncology. Aims were to assess (1) oncological outcome and (2) risk factors for local recurrence and impaired survival. Minimum follow-up was 24 months.

Results: Ninety-six patients (68 male, 71%) with a median age of 53 years (15-78) years were included. Lesions were grade 1 in 17 patients (18%), grade 2 in 57 (59%) and grade 3 in 22 (23%). Margins were wide in 59 (62%), marginal in 23 (24%), questionable in 4 (4%) and intralesional in 10 (10%; including three curetted grade 1 lesions). At review, 62 patients (65%) were alive with a median follow-up of 7.9 years (2.1-27.4): 48 continuously NED (50%), 11 NED following treatment of local recurrence or metastases (11%), three AWD (3%). Thirty-four patients (35%) had died (27 DOD, 28%), after a median of 3.6 years (0.0-15.1). Local recurrences were diagnosed in 32 patients (33%), after a median of 16 months (4 months-27.3 years). Twenty-three patients (24%) underwent hindquarter amputation: 15 as a primary treatment (16%), five for recurrences (5%) and three for infection (3%). Mean disease-free survival was 20.7 years for grade 1, 12.8 years for grade 2 and 5.1 years for grade 3 lesions ($p<0.001$). Patients with a recurrence had significant worse overall survival (mean 18.3 vs 10.0 years, $p<0.001$). Tumor grade and surgical margins independently influenced disease-free survival (table 1).

Conclusion: Tumor grade and surgical margins are independent factors influencing the risk of disease progression in primary central conventional chondrosarcoma of the pelvic bones. As tumor recurrence strongly influences overall survival, it is essential to obtain wide margins during primary resection in order to gain control over these challenging lesions.

Covariables	HR	95% CI		p
		Lower	Upper	
Tumor grade: 1	Ref	-	-	-
Tumor grade: 2	3.6	1.1	11.2	0.03
Tumor grade: 3	14.8	4.2	52.2	<0.001
Margins: wide	Ref	-	-	-
Margins: marginal	2.3	1.1	5.0	0.03
Margins: questionable	8.1	2.1	31.4	0.002
Margins: intralesional	3.0	1.1	8.4	0.03

Table 1. *Results of Cox regression analysis with disease-free survival as the end-point, and tumor grade and resection margins as covariables*