Supplementary Materials: CNS Invasion in Meningioma—How the Intraoperative Assessment Can Improve the Prognostic Evaluation of Tumor Recurrence

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Table S1. Cohort characteristics and univariate analysis of tumor recurrence restricted to cases treated after the implementation of the WHO classification of 2007 (Chi-Square test).

Variable	Complete Cohort				5-year Follow-up Cohort			
	N (%)	Tumor Recurrence N (%)		*p*-value	N (%)	Tumor Recurrence N (%)		*p*-value
		Yes	No			Yes	No	
Gender								
Female	895 (73.6)	114 (12.7)	781 (87.3)	.0001*	277 (70.7)	114 (41.2)	163 (58.9)	.0004*
Male	321 (26.4)	70 (21.8)	251 (78.2)		115 (29.3)	70 (60.9)	45 (39.1)	
Tumor localization								
Skull base	633 (52.1)	109 (17.2)	524 (82.8)	.0007*	212 (54.1)	109 (51.4)	103 (48.6)	.0140*
Convexity/falx	456 (37.5)	70 (15.4)	386 (84.7)		156 (39.8)	70 (44.9)	86 (55.1)	
Spinal	127 (10.4)	5 (3.9)	122 (96.1)		24 (6.1)	5 (20.8)	19 (79.2)	
Simpson grade								
1	286 (24.1)	24 (8.4)	262 (91.6)	< .0001*	76 (20.0)	24 (31.6)	52 (68.4)	< .0001*
2	332 (28.0)	19 (5.7)	313 (94.3)		72 (19.0)	19 (26.4)	53 (73.6)	
3	248 (20.9)	39 (15.7)	209 (84.3)		84 (22.1)	39 (46.4)	45 (53.6)	
4	319 (26.9)	99 (31.0)	220 (69.0)		148 (39.0)	99 (66.9)	49 (33.1)	
5	0 (-)	0 (-)	0 (-)		0 (−)	0 (−)	0 (−)	
CNS invasion by histopathological assessment								
Yes	63 (5.2)	21 (33.3)	42 (66.7)	< .0001*	29 (7.4)	21 (72.4)	8 (27.6)	.0043*
No	1153 (94.8)	163 (14.1)	990 (85.9)		363 (92.6)	163 (44.9)	200 (55.1)	
CNS invasion by intraoperative assessment								
Yes	275 (23.5)	51 (18.6)	224 (81.5)	.0454*	96 (26.0)	51 (53.1)	45 (46.9)	.1542
No	894 (76.5)	122 (13.7)	772 (86.4)		273 (74.0)	122 (44.7)	151 (55.3)	
CNS invasion by combined assessment								
Yes	301 (25.8)	60 (19.9)	241 (80.1)	.0036*	108 (29.3)	60 (55.6)	48 (44.4)	.0318*
No	868 (74.3)	113 (13.0)	755 (87.0)		261 (70.7)	113 (43.3)	148 (56.7)	
CNS invasion intraoperatively not seen on histopathology								
Yes	238 (20.4)	39 (16.4)	199 (83.6)	.4396	79 (21.4)	39 (49.4)	40 (50.6)	.6178
No	931 (76.6)	134 (14.4)	797 (85.6)		290 (78.6)	134 (46.2)	156 (53.8)	
CNS invasion double positive (histopathology and intraoperatively)	37 (3.2)	12 (32.4)	25 (67.6)	.0021*	17 (4.6)	12 (70.6)	5 (29.4)	.0449*
	1132 (96.8)	161 (14.2)	971 (85.8)		352 (95.4)	161 (45.7)	191 (54.3)	

Yes							
No							
WHO Classification	1066 (87.7)	129 (12.1)	937 (87.9)	< .0001*	311 (79.3)	129 (41.5)	182 (58.5)	<.0001*
2007	147 (12.1)	53 (36.1)	94 (64)		79 (20.2)	53 (67.1)	26 (32.9)
I	3 (0.3)	2 (66.7)	1 (33.3)		2 (0.5)	2 (100.0)	0 (0)
II							
III							
WHO Classification	1035 (85.1)	122 (11.8)	913 (88.2)	< .0001*	300 (76.5)	122 (40.7)	178 (59.3)	<.0001*
2016	178 (14.6)	60 (33.7)	118 (66.3)		90 (23.0)	60 (66.7)	30 (33.3)
I	3 (0.3)	2 (66.7)	1 (33.3)		2 (0.5)	2 (100.0)	0 (0)
II							
III							

Asterisk (*): statistically significant result.

Table S2. Characteristics of meningiomas with invasive growth according to the type of assessment (Chi-Square test).

		CNS Invasion			*p*-value
	N (%)	Histopathology Assessment	Intraoperative Assessment	By Both Assessments	
Gender					
Female	245 (65.9)	11 (40.7)	208 (69.6)	26 (56.5)	
Male	127 (34.1)	16 (59.3)	91 (30.4)	20 (43.5)	
Tumor localization					
Skull base	142 (38.2)	15 (55.6)	117 (39.1)	10 (21.7)	
Convexity/falx	226 (60.8)	12 (44.4)	178 (59.5)	36 (78.3)	0.0037*
Spinal	4 (1.1)	0 (−)	4 (1.3)	0 (−)	
WHO classification					
2007					0.0402*
I	271 (72.9)	15 (55.60	240 (80.3)	16 (34.8)	
II	100 (26.9)	12 (44.4)	58 (19.4)	30 (65.2)	
III	1 (0.3)	0 (−)	1 (0.3)	0 (−)	
Histology					
I					<0.0001*
Angiomatous	7 (1.9)	0 (−)	7 (2.3)	0 (−)	
Fibroblastic	17 (4.6)	0 (−)	16 (5.4)	1 (2.2)	
Lymphocyte rich	0 (−)	0 (−)	0 (−)	0 (−)	
Meningothelial	157 (42.2)	4 (14.8)	144 (48.2)	9 (19.6)	
Metaplastic	5 (1.3)	1 (3.7)	4 (1.3)	0 (−)	<0.0001*
Microcystic	11 (3.0)	0 (−)	11 (3.7)	0 (−)	
Psammomatous	9 (2.4)	0 (−)	9 (3.0)	0 (−)	
Secretory	16 (4.3)	2 (7.4)	13 (4.4)	1 (2.2)	
Transitional	32 (8.6)	1 (3.7)	31 (10.4)	0 (−)	
NOS	17 (4.6)	7 (25.9)	5 (1.7)	5 (10.9)	
II					
Atypical	94 (25.3)	12 (44.4)	52 (17.4)	30 (65.2)	
Chordoid	6 (1.6)	0 (−)	6 (2.0)	0 (−)	
Clear Cell	0 (−)	0 (−)	0 (−)	0 (−)	
III					
Anaplastic	0 (−)	0 (−)	0 (−)	0 (−)	
Papillary	0 (−)	0 (−)	0 (−)	0 (−)	
Rhabdoid	1 (0.3)	0 (−)	1 (0.3)	0 (−)	

Asterisk (*): statistically significant result.