Intracranial meningioma recurrence

see also Convexity meningioma recurrence.

see also Parasagittal meningioma recurrence.

see also Atypical meningioma recurrence.

With the advance of modern irradiation techniques, the role of radiotherapy (RT) for intracranial meningioma has increased significantly throughout the past years. Despite that tumor's generally favorable outcome with local control rates of up to 90% after ten years, progression after RT does occur. In those cases, re-irradiation is often difficult due to the limited radiation tolerance of the surrounding tissue. The aim of this analysis is to determine the value of particle therapy with its better dose conformity and higher biological efficacy for re-irradiating recurrent intracranial meningioma. It was performed within the framework of the “clinical research group heavy ion therapy” and funded by the German Research Council (DFG, KFO 214).

METHODS: Forty-two patients treated with particle RT (protons (n = 8) or carbon ions (n = 34)) for recurrent intracranial meningioma were included in this analysis. Location of the primary lesion varied, including skull base (n = 31), convexity (n = 5) and falx (n = 6). 74% of the patients were categorized high-risk according to histology with a WHO grading of II (n = 25) or III (n = 6), in the remaining cases histology was either WHO grade I (n = 10) or unknown (n = 1). Median follow-up was 49,7 months.

RESULTS: In all patients, re-irradiation could be performed safely without interruptions due to side effects. No grade IV or V toxicities according to CTCAE v4.0 were observed. Particle RT offered good overall local control rates with 71% progression-free survival (PFS) after 12 months, 56,5% after 24 months and a median PFS of 34,3 months (95% CI 11,7-56,9). Histology had a significant impact on PFS yielding a median PFS of 25,7 months (95% CI 5,8-45,5) for high-risk histology (WHO grades II and III) while median PFS was not reached for low-risk tumors (WHO grade I) (p = 0,03). Median time to local progression was 15,3 months (Q1-Q3 8,08-34,6). Overall survival (OS) after re-irradiation was 89,6% after 12 months and 71,4% after 24 months with a median OS of 61,0 months (95% CI 34,2-87,7). Again, WHO grading had an effect, as median OS for low-risk patients was not reached whereas for high-risk patients it was 45,5 months (95% CI 35,6-55,3).

CONCLUSION: Re-irradiation using particle therapy is an effective method for the treatment of recurrent meningiomas. Interdisciplinary decision making is necessary to guarantee best treatment for every patient [1)].

The aim of this study was to evaluate long-term clinical outcome, prognostic factors and quality of life after adjuvant or definitive fractionated stereotactic radiotherapy (SRT) of meningioma WHO grade II and III or at recurrence. 131 patients with 138 meningioma (64 WHO grade II, 16 WHO grade III, 58 without histology) of the skull base, falx and convexity were treated between 01/2002 and 01/2015 at the Erlangen University Hospital by fractionated stereotactic radiotherapy (SRT) as primary treatment (adjuvant or definitive) and at recurrence. 53% (n = 53) lesions of patients with primary tumour received postoperative SRT and 47% (n = 47) as definitive treatment (without surgery). All 38 lesions

(100%) of recurrent meningioma underwent surgery followed by SRT. SRT was mostly given in 28, 30 or 25 fractions to a median dose of 54.0 Gy in the reference point. Progression-free-survival at 8 years for patients with meningioma at primary treatment were significantly better with 100% for patients with definitive SRT ($p = 0.008$) or 85% for patients with adjuvant SRT ($p = 0.009$) compared to 42% after treatment (surgery + SRT) of recurrence. Progression-free-survival at 8 years for patients with SRT as adjuvant treatment after gross total resection of WHO grade II meningioma were significantly better at 83% ($p = 0.016$) compared to 46% after adjuvant SRT of recurrence. In 31% of patients after primary treatment and in 38.5% after recurrence treatment an improvement of pain symptoms was achieved. The favourable prognostic factor for better PFS at recurrence treatment was tumor location (skull base or convexity better compared to the falx). Postoperative SRT of WHO grade II meningioma after gross total resection (GTR) can effectively reduce recurrence risk [2)].

The medical literature still lacks information about the impact of surgery and adjuvant treatment on the life of patients with meningioma. The clinical outcome, timing of tumor recurrence, and causes of death are often overlooked. This study evaluates these data taking into account tumor localization and histologic grade.

METHODS: The article is a cross-sectional study of patients operated on between 2000 and 2014 in a single institution. The series has 593 adult patients (442 females and 151 males) and follow-up of 68.8 ± 48.9 months. Imaging of 434 patients was reviewed and 379 patients/families interviewed.

RESULTS: Sixty-eight deaths were related to tumor treatment/progression and 36 to other causes. After 2 years of surgery, deaths not related to tumor were 7 times more frequent than were tumor-related deaths (odds ratio, 7.1; 95% confidence interval, 2.8-19.5; $P < 0.0001$). Ten-year survival was expected in 85% of patients with grade I (GI) meningioma, 35% of patients with atypic (GII) meningioma, and 0% of patients with anaplastic (GIII) meningioma. Convexity tumors had about half the risk of recurrence compared with other localizations (odds ratio, 0.4; 95% confidence interval, 0.27-0.67; $P = 0.0002$). In GI meningioma, recurrence was neither related to death nor to impairment of independent life. All patients with GII and GIII meningioma who had recurrence died. 96.3% of interviewees reported neurologic improvement or stability after the surgery.

CONCLUSIONS: Histologic grade is the most important factor for long-term survival. Complete resection has to be pursued in GII and GIII meningioma but must be carefully weighed against morbidities in GI meningioma [3)].

The clinical significance of the Simpson system for grading the extent of meningioma resection and its role as a predictor of the recurrence of World Health Organization (WHO) Grade I meningiomas have been questioned in the past, echoing changes in meningioma surgery over the years. The authors reviewed their experience in resecting WHO Grade I meningiomas and assessed the association between extent of resection, as evaluated using the Simpson classification, and recurrence-free survival (RFS) of patients after meningioma surgery. METHODS Clinical and radiological information for patients with WHO Grade I meningiomas who had undergone resective surgery over the past 20 years was retrospectively reviewed. Simpson and Shinshu grading scales were used to evaluate the extent of resection. Statistical analysis was conducted using Kaplan-Meier curves and Cox proportional-hazards regression. RESULTS Four hundred fifty-eight patients were eligible for analysis. Overall tumor recurrence rates for Simpson resection Grades I, II, III, and IV were 5%, 22%, 31%, and 35%, respectively. After Cox regression analysis, Simpson Grade I (extensive resection) was revealed

as a significant predictor of RFS (p = 0.003). Patients undergoing Simpson Grade I and II resections showed significant improvement in RFS compared with patients undergoing Grade III and IV resections (p = 0.005). Extent of resection had a significant effect on recurrence rates for both skull base (p = 0.047) and convexity (p = 0.012) meningiomas. Female sex and a Karnofsky Performance Scale score > 70 were also identified as independent predictors of RFS after resection of WHO Grade I meningioma. CONCLUSIONS In this patient cohort, a significant association was noted between extent of resection and rates of tumor recurrence. In the authors' experience the Simpson grading system maintains its relevance and prognostic value and can serve an important role for patient education. Even though complete tumor resection is the goal, surgery should be tailored to each patient according to the risks and surgical morbidity [4].

To examine whether Simpson grade and pathology location are still predictors of recurrence/progression free survival (RPFS) in WHO grade 1 cranial meningiomas.

METHODS: A retrospective case series of all WHO grade 1 cranial meningiomas undergoing surgical resection at our institution between 2002 to 2007 was performed. Demographic and outcome data included: Simpson grade, extent of resection [gross total (Simpson 1-3) and sub total (Simpson 4-5)], tumour location, timing of post-operative imaging and outpatient review, time to recurrence and subsequent management. Statistical analysis was by Kaplan-Meier survival curves.

RESULTS: 145 cases were included of which 75% were female, with an overall median age of 55 years. 24% had parasagittal, 23% convexity and 53% skull base meningioma. 21% had a grade 1 Simpson resection, 43% grade 2, 35% grade 4 and 1% grade 5. The median follow up period was 60 months with a median 5.5 outpatient appointments and 5 post-operative imaging studies. 10 cases (6.9%) had recurrence/progression at a median period of 42 months. Of these, 4 remained under active surveillance, 3 received stereotactic radiosurgery and 3 were treated with fractionated radiotherapy. 5 year recurrence/progression free survival (RPFS) for Simpson grade 1 was 96.8%, 2: 100%, 4: 82.4% and 5: 0%. Simpson grade (p=0.01) and gross total/sub total resection (p=0.001) were significant predictors of RPFS. Meningioma location was not a significant predictor of RPFS (p-value 0.836).

CONCLUSION: Simpson grade remains a significant predictor of RPFS in WHO grade 1 meningioma surgery. However, tumour location was not significant in this series. We advocate different post-operative imaging surveillance protocols depending on gross total or sub total surgical resection. [5].

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