applied to 66%; subtotal resection had applied to 34% of the patients. The patients received radiotherapy (median 60 Gy in 2 Gy fraction dose) or radiochemotherapy. The evaluation of tumour specimens was performed by immunohistochemically of 92, 62 and 59 patients for OPN, CA IX, and HIF-1α, consecutively. The expression was determined by assessing the percentage of positive tumour cells (1−10%=1+, 11−49%=2+, ⩾50%=3+) and the staining intensity (weak=1+, moderate=2+, intensive=3+). Immunoreactive score (IRS) ranging from 0 to 9, was calculated by multiplying positive percentage and intensity scores. The markers were considered as positive staining when the IRS was ⩾1.
Results: OPN, CAIX and HIF-1α immunopositivity were found in 43.5%, 81% and 71% of the patients. The positive expression of OPN showed correlation with high recursive partitioning analysis classification (RPA: ⩽4 vs >4, p = 0.017), high tumour grade (3 vs 4; p = 0.006) and positive HIF-1α expression (p = 0.048). In univariate analysis, positive staining of OPN (p = 0.007) and CAIX (p = 0.008) with >50 years of age, karnofsky performance status ⩽70, grade 4, RPA ⩽4, subtotal surgical excision, presence of residive disease had negative impact on overall survival. In multivariate survival analysis, positive OPN expression (p = 0.009), >50 years of age and ⩽70 performance status were found as significant prognostic variables.
Conclusions: Our results suggest that OPN expression may be used as a prognostic indicator and it may also be a promising target molecule for hypoxia-directed treatment approaches for malign gliomas. However, further studies are needed to confirm our results.

8721 POSTER

Treatment of Cerebral Glioblastoma in Elderly Patients

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Background: The management of elderly patients with glioblastoma (GBM) is controversial, and benefits versus side effects of adjuvant treatments remain debated. We analyzed our series of high-grade gliomas in the elderly, who received adjuvant therapy after surgery.
Materials and Methods: A total of 62 patients older than 70 years were treated for malignant gliomas at our institution between 2005 and 2010. Forty patients (65%) were male and 22 (35%) female. The median age was 73 years (range 70−78). All patients showed a good performance status (KPS ⩾ 70).
Results: GBM was histologically proven in all cases. Forty-seven patients (75%) achieved a gross-total resection; 8 (13%) a subtotal one, according to post-operatives MRI scans. Biopsy was carried out in 7 (12%) patients. Among 62 patients, 45 (75%) received radiotherapy (RT) plus adjuvant Temozolomide (TMZ), 9 (13%) underwent RT alone, and 8 (13%) received only adjuvant TMZ. Between the group that received RT plus adjuvant TMZ, 12 patients had conventional RT of 60 Gy according to Stupp protocol (TMZ 75 mg/m^2 in the concomitant phase, and TMZ at the dose of 150 mg/m^2 for 5 days every month for at least 6 cycles). Thirty-tree patients received a short-course RT of 45 Gy, with 3 fraction/day at 2.5 Gy per 3 consecutive days (22.5 Gy total), associated to concomitant TMZ at the dose of 150 mg/m^2 for 5 days. A second cycle of hypofractionated RT and concomitant TMZ is repeated after 28 days from the first one, followed by at least 6 cycles of TMZ in the adjuvant setting.
Three patients submitted to the Stupp protocol stopped the therapy due to severe thrombocytopenia (1) and pneumonia (2). The median OS for patients who underwent TMZ plus RT (including both conventional and hypofractionated schedule) was 11.6 months (range 4−53). The median survival for patients who underwent RT only was 7.8 months, and for patients who had chemotherapy alone was 8 months. No significant difference was observed between the Stupp subgroup versus hypofractionated RT one in terms of survival.
Conclusions: RT plus concomitant chemotherapy could be considered an effective treatment in elderly patients with a good performance status. This combined approach proved a better overall survival compared to patients who receive radiotherapy or TMZ alone. Hypofractionated RT schedule allows the RT doses to be delivered over a shorter period of time, minimizing the side effects on patients, with a better quality of residual life.

8722 POSTER

Stereotactic Radiotherapy of Meningiomas − a Long-term Follow-up Study With Regard to Local Control, Survival and Morbidity

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Background: To analyze the long-term results in terms of efficacy of patients with a meningioma treated with fractionated stereotactic radiotherapy (SCRT).
Patients and Methods: Seventy-two patients treated with fractionated stereotactic radiotherapy between 1996 and 2008 at MAASTRO clinic (n = 45) and in Zurich (UHZ) (n = 27) were included. Patients received SCRT either as primary treatment (n = 46), as an adjuvant therapy following a subtotal resection (n = 19) or for recurrent tumours after a complete primary resection (n = 7). 49 of 72 tumours (68%) (21 UHZ, 28 MAASTRO) were located in the skull base region (cavernous sinus and pontine angle). The mean planning target volume was 31.0 ml (range 3- 115 ml). The median total dose was 54 Gy (range 50.4–59.4 Gy). Follow-up examination included MR-imaging and clinical work-up. Radiological control was defined as either complete response, partial response or stable disease. Data were analyzed using the Kaplan–Meier method.
Results: The median follow up was 4.13 years (range 0.66−11 years). Overall survival for patients with a WHO grade I and II meningioma was 92% and 75% at 3 years and 79% and 75% at 5 years, respectively. Progression-free survival for benign (grade I) meningiomas was 95% at 3 years and 95% at 5 years, and 40% for atypical meningiomas at 3 years. 98.4% of patients had either stable or improved (51.6%) clinical symptoms after radiotherapy. The majority of symptoms improved within 24 months after radiotherapy. Local control is significantly better if patients are irradiated immediately i.e. within three months after diagnosis compared to a watchful waiting policy (p = 0.017). Local control was significantly different between centres (p = 0.006/UHZ 70.4%, MAASTRO 95.3%), where in subgroup analyses only planning tumour volume (PTV) (p = 0.011/UHZ 24.5 ml, MAASTRO 36.2 ml) and median length of follow-up (p = 0.010/UHZ 63 mo, MAASTRO 44 mo) differed significantly. Grade IV toxicity was observed in 3 (4.2%) patients.
Conclusions: SCRT is a viable and successful therapy. Moreover, it is a safe and reliable non-invasive treatment for tumours that cannot be resected due to high risks involved.

8723 POSTER

Spot Scanning Proton Beam Therapy for Intracranial Meningioma − Long Term Results From the Paul Scherrer Institute

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Background: To assess the long term clinical results of spot scanning based proton therapy (PT) in the treatment of intracranial meningiomas.
Material and Methods: Thirty nine patients with meningioma (histologically proven 34/39) were treated with PT between July 1997 and January 2010. Thirty two (82.1%) patients were treated as primary treatment (exclusive PT, *n* = 8; postoperative PT, *n* = 24). Mean age was 48.3±17.9 years and 32 (82.1%) patients had skull base lesions. For patients undergoing surgery, 24 and 10 patients had a diagnosis of WHO grade I and II/III meningioma, respectively. The female to male ration was 3.3. The median administered dose was 56.0 GyE (range, 52.2–66.6) at 1.8−2.0 GyE per fraction. Gross tumour volume (GTV) ranged from 0.76 to 546.5 cm^3 (median, 21.5). Late toxicity was assessed according to CTCAE version 3.0. Mean follow-up time was 62.0 months and all patients were followed for >6 months.
Results: Six patients presented with tumour recurrence and 6 patients died during follow-up, of which 4 of tumour progression. Five-year actuarial local control and overall survival rates were 84.8% and 81.8%, respectively, for the entire cohort and 100% for benign histology. Cumulative 5-year grade ⩾3 late toxicity-free survival was 84.5%. On univariate analysis, LC was negatively influenced by WHO grade ($p = 0.001$), GTV ($p = 0.013$) and male gender ($p = 0.058$).
Conclusions: SSPT is a safe and effective treatment for patients with untreated, recurrent or incompletely resected intracranial meningiomas. WHO grade and tumour volume was an adverse prognostic factor for local control.