

If the tumor number was large, we selected a multisession schedule. The most common origin was colon (19 patients), followed by rectum (11), stomach (7), esophagus (5) and others (8). RESULTS: 13 cases were treated in a single session, 53 with fractionation, and five with multiple sessions. We selected fractionated schedules as follows; 7.0 Gy x 5Fr (5–10 ml), 4.2Gy x 10Fr (10–20ml), 3.7Gy x 10Fr (20–30ml), 3.2Gy x 10Fr (30ml-) for malignant tumors, and 2.7Gy x 10Fr for benign tumors. Median tumor number was two (1–40) and median tumor size was 8.1 (0.03–67.5) ml. Median survival times after Icon treatment was 13.5 months and local control rate after 6-month Icon treatment was 80%. CONCLUSIONS: Although these results are limited to short periods, survival rates, local control rates and qualitative survival rated in patients unsuitable for stereotactic radiosurgery, such as those with large, recurrent, and eloquent site lesions, were within the acceptable ranges.

MENINGIOMA (MNG)

MNG-01

NATURAL HISTORY OF ASYMPTOMATIC MENINGIOMAS: REVIEW WITH META-ANALYSES

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Frequency of meningioma as an incidental finding in neuroimaging study is increasing. It is important to characterize tumors that will grow to be symptomatic in order to select appropriate treatment and radiological follow-up because long-term observation may increase the risk of surgery due to enlargement of the tumors and aging of patients. [Methods] We reviewed 26 studies that analyzed natural courses in asymptomatic or untreated meningiomas. RESULTS: In time-growth rate analysis, nearly 70% of meningiomas showed radiological progression defined by a volume criteria and the rate approached plateau at 5–6 years. About half of incidental meningiomas presented a decelerating growth pattern or no growth while less than one-fourth of them grew exponentially. Growth pattern change could be affected by the length of follow-up period. Radiological progression, growth speed (annual volume change (AVC) or relative growth rate (RGR)) and symptomatic progression had each different factor related to their progression. Younger age, non-calcification and high intensity on T2 weighted image related to radiological progression and rapid growth speed but not to symptomatic progression. Tumors in men and larger size were likely to be symptomatic in meta-analysis. AVC ($\geq 2.1\text{cm}^3/\text{year}$) was the strongest indicator for symptom development. In the group of AVC $\geq 2.1\text{cm}^3/\text{year}$, progression free rate was 69.3% at 3 years, and reached to 55.4% at 6 years whereas 100% in slower growth group. [Conclusion] Radiological features may not be useful for prediction of symptom development except for perifocal edema in a long term. This may be due to dynamic change of these radiological markers in a long term. Quantitative tumor size and growth speed especially AVC were important factors for decision of treatment.

MNG-03

PD-L1 EXPRESSION, PATIENT PROGNOSIS AND INITIAL WHO GRADE IN GRADE II/III MENINGIOMA.

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The optimal treatment for grade II/III meningioma is operation with or without radiation therapy. However, their natural course is sometimes aggressive with high recurrent rate. There is no effective treatment other than operation and radiation therapy, therefore, a new therapeutic strategy for grade II/III meningioma is urgently required. PD-1 and PD-L1 play important roles as immune-checkpoint mediators within tumor microenvironment and the antibodies to these molecules are now approved for the treatment of various kinds of cancers. In Japan, anti-PD-1 antibody and anti-CTLA-4 antibody are approved for unresectable melanoma or advanced / recurrent non-small cell lung cancer and their high effectiveness has been reported. We investigated the expression of PD-L1 (clone:28-8) in 51 cases of grade II/III meningioma by immunohistochemistry and analyzed the relationship between the expression with overall survival, progression free survival and initial WHO grade. For now, we have evaluated 25 cases of PD-L1 immunohistochemistry and PD-L1 showed positivity in 15 cases. There is no correlation observed between PD-L1 expression and patients' prognosis. Although it does not reach a significant difference, the WHO grade at the time of initial operation tends to be high in those with high PD-L1 staining rate. Similar studies that were previously reported did not use antibodies targeting clone 28-8, which was used as

a companion diagnosis for nivolumab administration, but "Correlation between PD-L1 expression and WHO grade", or "PD-L1 expression is an independent prognostic factor" have been reported. In our investigation, which was using antibodies for companion diagnosis, PD-L1 was positive in more than half of Grade II / III meningiomas and it also related to WHO grade. These results suggest the possibility that tumor immune evasion mechanisms are also working in meningiomas. At the conference, we will report it with the specific data from all cases with a literature review.

MNG-07

A CASE OF TRANSFORMED ANAPLASTIC MENINGIOMA IN 18 YEARS

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INTRODUCTION: Although 95% of meningiomas are benign tumor (WHO grade I), they rarely exist malignant transformation. It is well known that WHO II or III meningiomas rapidly grow and recurrent frequently. However, there are no common sense about duration of malignant transformation between previous reports. Here we report a case of anaplastic meningioma which showed malignant transformation in 18 years. CASE: The patient was 77-year-old man. He was pointed out as having a 20-mm mass in the left occipital convexity at brain checkup 19 years before. After 6 months, the mass was totally removed (Simpson grade I) at previous hospital. Histopathological diagnosis revealed meningioma with psammoma body, whose Ki-67 index was below 1%. Postoperative course was good and periodic follow up was abandoned. The patient presented with consciousness disturbance and right hemiparesis after 18 years from the first operation. CT scan showed a 30-mm mass with intratumoral hemorrhage and perifocal edema in the left occipital lesion. Tumor removal was performed. The border of the tumor was clear and the macroscopic view was compatible with meningioma at intraoperative findings. The tumor was removed as much as possible, but partially remained which were extended to superior sagittal sinus (Simpson grade III). Histopathological findings were anaplastic meningioma with sarcomatous change, whose Ki-67 index was 70%. His neurological abnormality improved postoperatively. DISCUSSION: In the previous report, anaplastic meningioma is a rare tumor, which is 1% of whole meningioma. The rate of malignant transformation is reported 12–38%. The cause of malignant transformation is reported to be radiation therapy, mechanical stimulation by surgical manipulation, viral infection, and loss of chromosome. Although recurrence rate is low at total resection of meningioma, there rarely exists malignant transformation after a long period of time like our case.

MNG-08

VOLUMETRIC STUDIES IN ASYMPTOMATIC MENINGIOMAS: SLOWDOWN CASES AND GROWTH ARREST CASES

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BACKGROUND: The opportunity to follow up for asymptomatic meningiomas has increased. We have reported the risk of volume increase by individual continuous volume measurement of asymptomatic meningiomas. However, We have not reached fully understanding about natural history of meningiomas. Among cases are followed up over time, there are some cases that the volume increase rates slows down or almost stops are observed. METHODS: We enrolled consecutive adult patients of asymptomatic meningiomas who follow-up for 2 years or more and 3 or more MRI scans. We performed sequential volumetric measurements on 95 patients (105 lesions) who met the criteria. We classified these transient volume curve of each lesion into three groups "Growing", "Slowdown", and "Growth arrest" for analysis. RESULTS: The average age at the first visit was 62.8 years, the average follow-up period was 61.8 months, and the male-female ratio was 20:75 (male: female). There were 67 cases (73 lesions: 70.9%) that were in increasing trend, and 19 cases of those were received resection. Eleven cases (12 lesions: 11.7%) showed a tendency of "slow down" the increase rate, and one patient who became symptomatic led to surgical excision. In 18 cases (18 lesions: 17.4%) in which almost no volume change was observed during the observation period, no cases resulted in surgical treatment. CONCLUSIONS: Among the meningiomas cases that have been followed for a long time, there are not a few those increase rate of tumor volume slows or does not change. Furthermore, most of these cases did not result in surgical treatment. The presence of these "Slowdown" and "Growth arrest" cases at a certain rate may have suggested the possibility of a Gompertz curve model as the natural course of meningiomas.