Brain metastasis is associated with worse prognosis in patients with non-small cell lung cancer (NSCLC). However, recent advances in molecular targeted therapy are rapidly changing the treatment strategy for NSCLC. Here, we conducted a retrospective study of brain metastasis to clarify the prognosis and risk factors in NSCLC patients with synchronous brain metastasis. Seventy-four patients who were treated at our institute between Jan 2013 and Apr 2019 were included. The association between overall survival (OS) and clinical and pathological features, such as neurological symptoms, brain metastasis pattern, histology, EGFR and ALK mutation status, number of intracranial metastases, extracranial systemic metastasis, Karnofsky performance status (KPS) at diagnosis, and initial therapy, were examined. OS was calculated from the date of diagnosis with brain metastasis to the date of last follow-up. The median OS of 74 NSCLC patients with synchronous brain metastasis had a median OS of 23.0 months. This much longer OS may reflect recent advances in treatment, particularly the availability of molecular targeted drugs. Lung-mol GPA score was considered as a useful tool to estimate the prognosis; thus, the information of KPS score, extracranial metastasis, brain metastases numbers, and driver mutation status are essential to build a treatment strategy for synchronous brain metastasis from NSCLC.

MET-04
EVALUATION OF PERITUMORAL BRAIN PARENCHYMA USING CONTRAST-ENHANCED IMAGING FOR DIFFERENTIATING METASTATIC BRAIN TUMORS AND GLIOBLASTOMAS

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Introduction: Metastatic brain tumors and glioblastomas commonly revealed heterogeneous enhancement lesions with peritumoral brain edema on magnetic resonance imaging (MRI). In particular, distinguishing solitary metastatic brain tumor from glioblastoma is difficult when conventional MRI. Fast imaging employing steady-state acquisition (FIESTA) can emphasize the water content signal with a high spatial resolution. In this study, we evaluate a role of contrast-enhanced FIESTA (CE-FIESTA) by focusing on the peritumoral brain parenchyma between metastatic brain tumors and glioblastomas. Materials and Methods: We included patients who underwent initial surgery and were histologically diagnosed with metastatic brain tumor (43 cases) or glioblastoma (14 cases) between November 2008 and May 2016. We evaluated CE-FIESTA findings of peritumoral brain parenchyma. Next, we performed an observer performance study with neuroradiologists based on the findings of peritumoral brain parenchyma between metastatic brain tumors and glioblastomas. Results: CE-FIESTA revealed hyperintense rim in peritumoral brain parenchyma. We classified hyperintense rim in three groups, as follow: type A, no hyperintense rim; type B, partial hyperintense rim; and type C, extended hyperintense rim. Regarding the diagnosis of metastatic brain tumors, the observer performance demonstrated high sensitivity (88.1%), specificity (93.3%) and accuracy (93.0%) of type C on CE-FIESTA, and thus, CE-FIESTA could distinguish metastatic brain tumors from glioblastomas with high accuracy. Conclusions: CE-FIESTA may provide useful information for distinguishing metastatic brain tumors from glioblastomas, focusing on the differences in the peritumoral brain parenchyma.

MET-05
PRELIMINARY REPORT OF RADIOThERAPY FOR BRAIN METASTases FROM Gastro-INTESTINAL CANCERs USING MASK SYSTEM OF LekkSS Gamma Knife Icon

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OBJECT: Lekss Gamma Knife Icon enables us to apply new methods of immobilization using mask fixation and the option of fractionated treatment. This provides exceptional accuracy and precision of radiosurgery, making it a possibility for many more patients and many more difficult cases to be treated. METHODS: We retrospectively analyzed 50 patients (71 times) with brain metastases from gastro-intestinal cancers who underwent Gamma Knife Icon using mask fixation between September 25th, 2017 and June 30th, 2019 at Rakusai Shimizu Hospital. The patients had small, few, newly diagnosed, and non-eloquent area tumors were treated in a single session. If the tumor volume was larger than 5.0 mL, recurrence, or the location was in an eloquent area, we applied a fractionated schedule.
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 (3) 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 1-4 (median 5) and median tumor size was 8.1 (0.03-5.5). Median survival times after Ikon treatment was 13.5 months and local control rate after 6-month Ikon treatment was 80%. CONCLUSIONS: Although these results are limited to short periods, survival rates, local control rates and qualitative survival rates 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 heterogeneity 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 (= 2.1cm³/year) was the strongest indicator for symptom development. In the group of AVC >=2.1cm³/year, progression free rate was 69.0% at 3 years, and reached to 53.4% 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 was 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-L1 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-L1 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 was 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-ml 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 uneventful and periodic follow-up was conducted. 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 hemorrage 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 described as mixed meningioma with malignant change, whose Ki-67 index was 100%. 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 case 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 48 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 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.