Intracranial meningioma

- Peptide Receptor Radionuclide Therapy in Patients with Advanced, Recurrent or Progressive Meningioma: An Updated Systematic Review and Meta-Analysis
- Neuroradiological Evaluation of Anatomo-Morphometric Arcuate Fascicle Modifications According to Different Brain Tumor Histotypes: An Italian Multicentric Study
- Posterior parasagittal meningiomas display aggressive features independent of size: a multicenter analysis
- The role of nuclear medicine in central nervous system evaluation
- Advancing Neurosurgical Oncology and AI Innovations in Latin American Brain Cancer Care: Insights from a Center of Excellence
- Integrated proteomic and targeted Next Generation Sequencing reveal relevant heterogeneity in lower-grade meningioma and ANXA3 as a new target in NF2 mutated meningiomas
- Comparative analysis of transformer-based deep learning models for glioma and meningioma classification
- Investigation of the frequency of meningothelial hyperplasia and its clinicopathological correlation in patients diagnosed with subdural hematoma

Epidemiology

Excluding autopsy data, meningiomas comprise approximately 22% of primary intracranial tumors. If autopsy data are included, the overall incidence of meningiomas is 2.3-5.5 cases per 100,000 persons.

Meningiomas in children are rare, constituting less than 5% of all pediatric brain tumors and less than 2% of all meningiomas. Multiple meningiomas (synchronous or metachronous) are even more uncommon, typically occurring due to radiation exposure or in patients with phacomatoses like Neurofibromatosis II.

Classification

see Intracranial meningioma classification.

Natural History

Intracranial meningioma natural history.

Metastases

Extracranial meningioma metastases (EMM) occur in 0.1% of intracranial meningioma patients and are more commonly seen in those with atypical and anaplastic histologies. While the lungs and pleura

are the most common site of EMM, intraspinal and vertebral EMM also occur and are not well described in the literature. Although the presence of EMM can worsen prognosis, no standard of care has been established for EMM management. All patients treated for recurrent atypical/anaplastic meningiomas between January 1985 and July 2014 at Memorial Sloan Kettering Cancer Center were screened for intraspinal and vertebral EMM. Of these patients, 2 were identified as having recurrent meningioma complicated by vertebral or intraspinal EMM. A review of the literature was also conducted. The PubMed database was screened for intraspinal and vertebral EMM cases reported in the literature from 1985 to 2015. Nineteen articles were identified from the literature and included 24 individual cases with a total of 34 vertebral or intraspinal EMM. Forty-two percent (10/24) of patients with vertebral or intraspinal EMM had WHO Grade I tumors. Furthermore, 25% (6/24) of vertebral and intraspinal EMM occurred after the primary tumor but prior to any recurrence. This paper highlights that vertebral and intraspinal EMM can occur in patients with WHO Grade I meningiomas and can occur before tumor recurrence. This challenges the notion that EMM are seen primarily in high-grade atypical and anaplastic meningiomas [1].

Etiology

Meningioma Etiology.

Clinical features

see Intracranial meningioma clinical features.

Diagnosis

see Intracranial meningioma diagnosis.

Treatment

see Intracranial meningioma treatment.

Complications

Conventional open surgery of large meningiomas has proven to be challenging even in experienced hands. Intense retraction and dissection around neurovascular structures increase morbidity and mortality.

Large size of tumors, difficulties in resection and preexisting conditions are primary causes of a high rate of operative morbidity in elderly patients receiving meningioma removal [2].

Postoperative hematoma (POH)

Removal of an intracranial meningioma carries a higher risk of post-operative hemorrhage compared to surgery for other intracranial neoplasms.

21 patients (7.1 %) of 296 patients developed a post-operative intracranial hematoma requiring surgical evacuation. Age was significantly higher in the hematoma group 62.4 +/- 14.0 years compared to patients without post-operative hematoma 56.1 +/- 12.0 ($p < 0.05$; t-test). Patients older than 70 years had a six-fold increased risk to develop a post-operative hematoma (Chi2 test, 95% CI 1.949-13.224). Patients with post-operative hemorrhage had significant lower post-operative prothrombin time, fibrinogen and platelets immediately after surgery and lower platelets at day 1. None of the other parameters, including pre-operative routine coagulation values, differed significantly between patients with and without post-operative hemorrhage. Three patients with post-operative hematoma showed platelet dysfunction and three patients showed decreased FXIII activity. Of those patients with post-operative hemorrhage at three months follow up three patients (13%) succumbed from reasons not directly related to hemorrhage, one patient remained GOS 2 (4.3%), four patients (17.4%) were GOS 3 and 15 (65.4%) patients had favorable outcome (GOS 4 [one patient] and GOS5 [14 patients]). Meningioma surgery carries a higher risk for post-operative hematoma in the elderly. Thrombocytopenia and other hemostatic disorders were frequently associated with post-operative hemorrhage after meningioma surgery, while no surgical factors could be defined. Extending coagulation tests and specific replacement therapy may prevent hematoma formation and improve the patients outcome [3)].

Five hundred and five operations for intracranial meningiomas were complicated by 18 postoperative hematomas (POH)–3.56%. The POH were more frequently encountered in older patients and/or patients with atherosclerosis, arterial hypertension and diabetes. Longer lasting operations especially cases with intraoperative fall of blood pressure were more often complicated by POH. The POH were more frequently observed following total excision than partial removal and after convexity meningioma operations than other locations. The outcome of the operations complicated by POH was related to the time of their clinical manifestation and removal [4)].

Postoperative seizures

Fourteen factors possibly correlated with early postoperative seizures in a cohort of 209 elderly patients who had undergone meningioma resection, as analyzed by multifactorial stepwise logistic regression. Phenobarbital sodium (0.1 g, intramuscularly) was administered to all 209 patients 30 min prior to undergoing surgery. All the patients had no previous history of seizures. The correlation of the 14 clinical factors (gender, tumor site, dyskinesia, peritumoral brain edema (PTBE), tumor diameter, pre- and postoperative prophylaxes, surgery time, tumor adhesion, circumscription, blood supply, intraoperative transfusion, original site of the tumor and dysphasia) was assessed in association with the risk for post-operative seizures. Tumor diameter, postoperative prophylactic antiepileptic drug (PPAD) administration, PTBE and tumor site were entered as risk factors into a mathematical regression model. The odds ratio (OR) of the tumor diameter was >1, and PPAD administration showed an OR >1, relative to a non-prophylactic group. A logistic regression equation was obtained and the sensitivity, specificity and misdiagnosis rates were 91.4, 74.3 and 25.7%, respectively. Tumor diameter, PPAD administration, PTBE and tumor site were closely correlated with early postoperative seizures; PTBE and PPAD administration were risk and protective factors, respectively [5)].

Thromboembolic events

Meningiomas are associated with the highest postoperative rate of venous thromboembolic events (VTE) among all intracranial tumors.

Prophylaxis

Intraoperative leg-elevation, intermittent pneumatic compression (IPC), early heparin administration and low-molecular-weight heparin (LMWH) [6].

Recurrent meningioma

see Recurrent meningioma

Case series

see Intracranial meningioma case series.

Case reports

A 42-year-old man presented with occasional headache. Neurological examination was negative. CT scans showed a mass lesion located in temporal region with homogeneous hyperdensity and foci calcification. The patients MRI studies demonstrated the lesion was hypointense on T1-weighted and T2-weighted MR images. After administration of Gd-DTPA, the lesion revealed neither enhancement nor dural tail sign. After gross total excision of the lesion was accomplished, histopathological examination confirmed the diagnosis of hyalinedegeneration-rich fibrous meningioma, which represented a distinctive pathologic manifestation.

This report illustrates common meningiomas possess the rare occurrence of uncommon neuroimaging characteristics and pathological features. According to radiological and pathological features, the causes of rare imaging characteristics were discussed [7].

1)
Singh R, Ryan C, Chohan MO, Tisnado J, Hadjigeorgiou GF, Bilsky MH. Intracranial meningioma with vertebral or intraspinal metastases: report of 2 cases and review of the literature. J Neurosurg Spine. 2016 Jul 15:1-7. [Epub ahead of print] PubMed PMID: 27420397.
2)
Zeng C, Wang S, Zhao YL, Zhang D, Wang R, Zhao JZ. [Ninety cases of postoperative complications in elderly patients after surgical removal of meningiomas]. Zhonghua Yi Xue Za Zhi. 2010 Feb 2;90(5):298-300. Chinese. PubMed PMID: 20368048.
3)
Gerlach R, Raabe A, Scharrer I, Meixensberger J, Seifert V. Post-operative hematoma after surgery for intracranial meningiomas: causes, avoidable risk factors and clinical outcome. Neurol Res. 2004 Jan;26(1):61-6. PubMed PMID: 14977059.

4)
Arnaudova V, Romansky K. Postoperative hematomas following 505 operations for intracranial meningiomas. Zentralbl Neurochir. 1989;50(2):99-100. PubMed PMID: 2624029.
5)
Zhang BO, Wang D, Guo Y, Yu J. Clinical multifactorial analysis of early postoperative seizures in elderly patients following meningioma resection. Mol Clin Oncol. 2015 May;3(3):501-505. Epub 2015 Jan 22. PubMed PMID: 26137257.
6)
Eisenring CV, Neidert MC, Sabanés Bové D, Held L, Sarnthein J, Krayenbühl N. Reduction of thromboembolic events in meningioma surgery: a cohort study of 724 consecutive patients. PLoS One. 2013 Nov 14;8(11):e79170. doi: 10.1371/journal.pone.0079170. eCollection 2013. PubMed PMID: 24244441; PubMed Central PMCID: PMC3828295.
7)
Zhang Q, Wang X. A distinctive pathological meningioma completely without enhancement and dural tail sign on imaging findings. World Neurosurg. 2017 Feb 27. pii: S1878-8750(17)30272-3. doi: 10.1016/j.wneu.2017.02.099. [Epub ahead of print] PubMed PMID: 28254600.