Asymptomatic meningioma radiosurgery

In a Systematic Review and Meta-Analysis Zhang et al. stated that Stereotactic radiosurgery is a rational treatment for incidental meningioma in consideration of the higher tumor control rate and acceptable complications compared with treatment via observation. The integration of risk factors such as the absence of calcification, T2 hyperintensity, and initial large tumor size may contribute to accurately predicting rapid tumor growth [1].

It results in relatively low morbidity in previously untreated meningiomas and serves as an appealing alternative treatment modality for recurrent meningiomas in asymptomatic patients [2].

Iwai et al. recommended early radiosurgery for asymptomatic cavernous sinus meningiomas [3].

Compared with published rates of symptom development in patients with untreated meningiomas, results in a study by Salvetti et al. indicated that patients with asymptomatic lesions may benefit from prophylactic radiosurgery prior to the appearance of symptoms. Additionally, GKS is a treatment option that offers low morbidity [4].

They retrospectively analyzed their prospectively kept database on patients treated with Gamma Knife surgery and found 42 consecutive patients who had been treated for asymptomatic meningiomas over a 14- year period. The diagnosis was suspected from an imaging study or was confirmed by a previous surgery. Over a mean imaging and clinical follow-up period of 59 and 76 months, respectively, only 1 tumor (2.4%) increased in size. Interestingly, 2 patients without tumor growth demonstrated clinical symptomatology related to the tumor. Only 1 patient showed possible signs of radiation-induced injury. The actuarial tumor control rates were 100%, 95.7%, and 95.7% at 2, 5, and 10 years, respectively. This paper, which is very well written and very well discussed, is timely because it addresses a very important clinical issue—whether asymptomatic meningiomas should or should not be treated. In addition, the study confirms that radiosurgery is an effective and safe treatment modality to achieve “control” of meningiomas. This finding, of course, is not new, and there is plenty of evidence in the literature to that effect. The study has some limitations, such as its retrospective nature, possible biases, and a follow-up that, although relatively complete, was somewhat short for a benign tumor and not ideal in that many of the patients, because of the widespread referral pattern, were not seen in follow-up at the authors’ institution. Perhaps the major limitation is the small number of patients, but we assume that at this very busy radiosurgical center, the small number of treated asymptomatic meningiomas is a reflection of this group’s very conservative attitude about treating asymptomatic patients with meningiomas. The authors discuss these limitations very well. We would also add that their definition of a “stable” tumor, which most would interpret as no growth at all, is a bit generous in that they allow growth up to 15% of the initial tumor volume. The authors’ indications for treating patients fell into 4 categories—residual tumor after surgery, recurrent tumor after surgery, documented tumor growth, or patient preference—which unfortunately creates a relatively heterogeneous cohort. There needs to be no discussion about treating tumors with documented recurrence or growth. The issue of whether to treat or to observe residual tumor after surgery can be discussed with the larger issue of whether or not to treat asymptomatic meningiomas. More controversial, in our minds, is the issue of treating in response to patient preference. This is an indication that lends itself to abuse in many settings given the relatively good safety profile of radiosurgery. However, knowing the well-earned, excellent reputation of this group, We suspect that they were very careful in this respect and treated patients under the rubric of

patient preference only in those cases in which they truly did not know whether treatment or no treatment was the preferred option. We are sure, for example, that they would not offer radiosurgery to an elderly patient with an asymptomatic, 1-cm, calcified convexity meningioma even if such a patient would prefer to have that treatment. It is important to know that in this series of 42 patients, 11 (26.2%) were treated because of documented tumor growth and 5 (11.9%) because of recurrent tumor. We have every reason to expect that since these tumors had grown, they would have continued to grow if left untreated, and yet only 1 tumor (we are not told if this tumor fell in the category with proven tumor growth or not) grew significantly after treatment; this is fairly convincing evidence of the effectiveness of radiosurgery in controlling tumor growth. The fact that 23 tumors (54.7%) in this series showed a > 15% reduction in tumor volume serves as further evidence of the effectiveness of radiosurgery. Moreover, there was no growth or new symptom in any of the 7 cases of tumors in the cavernous sinus, a location where other studies have shown that at least half of the patients experience new symptomatology and/or tumor growth over the follow-up period if left untreated.

Elhammady and Heros would like to expand on the authors' discussion of whether asymptomatic meningiomas should or should not be treated. Obviously, they all agree that not all asymptomatic meningiomas should be treated; therefore, it is important to analyze what characteristics of the patient and the tumor are predictive of tumor growth or symptom development in those who present with an asymptomatic meningioma [5)].

A study of Kim et al., aimed to verify the effect of proactive Gamma Knife surgery (GKS) in the treatment of asymptomatic meningioma compared with the natural course without any therapeutic intervention.

From January 2006 to May 2017, 354 patients newly diagnosed with asymptomatic meningioma were reviewed and categorized into GKS (n = 153) and observation (n = 201) groups. Clinical and radiological progression rates were examined, and changes in volume were analyzed.

Clinical progression (i.e., clinician-judged progression), combining symptomatic progression (n = 43) and clinician-judged increase in size using images routinely acquired (n = 34), occurred in 4 patients (2.6%) and 73 patients (36.3%) in the GKS and observation groups, respectively ($p < 0.001$). The clinical progression-free survival (PFS) rates in the GKS and observation groups were 98.7% and 64.6%, respectively, at 5 years ($p < 0.001$), and 92.9% and 42.7%, respectively, at 10 years ($p < 0.001$). The radiological tumor control rate was 94.1% in the GKS group, and radiological progression was noted in 141 patients (70.1%) in the observation group. The radiological PFS rates in the GKS and observation groups were 94.4% and 38.5%, respectively, at 5 years ($p < 0.001$), and 88.5% and 7.9%, respectively, at 10 years ($p < 0.001$). Young age, absence of calcification, peritumoral edema, and high T2 signal intensity were correlated with clinical progression in the observation group. Volumetric analysis showed that untreated tumors gradually increased in size. However, GKS-treated tumors shrank gradually, although transient volume expansion was observed in the first 6 months. Adverse events developed in 26 of the 195 GKS-treated patients (13.3%), including 1 (0.5%) major event requiring microsurgery due to severe edema after GKS. Peritumoral edema was related to the development of adverse events ($p = 0.004$).

Asymptomatic meningioma is a benign disease; however, nearly two-thirds of patients experience tumor growth and one-third of untreated patients eventually require neurosurgical interventions during watchful waiting. GKS can control tumors clinically and radiologically with high probability.

Although the risk of transient adverse events exists, proactive GKS may be a reasonable treatment option when there are no comorbidities limiting life expectancy [6].

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