Incidental Meningiomas

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Abstract: Background: The growing use of magnetic resonance and computed tomography imaging has facilitated the diagnosis of brain tumours even before the presence of clinical signs. A significant proportion of incidental lesions identified will be meningiomas, at a point for consideration that > 40 % of the diagnosed meningiomas are not associated with clinical signs.

The natural history of incidental, asymptomatic, intracranial meningiomas is to be better understood for the development of the treatment strategy: what is the tumour growth rate? How many asymptomatic tumours do eventually become symptomatic?

Method: We performed a literature review trying to answer the questions.

Results: In case of incidental meningioma, the elements to consider are its location, size, and radiological aspect, the patient’s age and the risk of complications from eventual surgery, any unknown symptoms, multiplicity of lesions, the possibility of malignancy, and other pathological conditions that mimic meningiomas. Radiological characteristics associated with low tumoural growth rate are the presence of calcifications and hypointense regions on T2-weighted MR images. On the radiological aspect, it seems that > 60 % of asymptomatic meningiomas will not grow in size. However, some of them grow rapidly and some meningiomas even of small size will be treated with regard to their location or due to the risk that they might produce neurological deficits.

Conclusion: We are in favour of careful follow-up and neurosurgical consultation for all patients with an incidental meningioma.

Key words: incidental meningiomas, natural history, radiological findings, treatment

Incidence of Asymptomatic Meningiomas

The use of magnetic resonance imaging (MRI) for justified indications such as unusual headaches, epileptic seizures, or a neurological deficit has facilitated the diagnosis of meningiomas. Such imaging during medical checkups nonetheless helps detect a significant proportion of meningiomas incidentally in asymptomatic patients [1, 2]. In times prior to the development of medical imaging, the incidence of meningioma among the general population was 2.3/100,000 inhabitants [2]. An epidemiological study conducted in Germany between 1961 and 1986 found an annual incidence of meningioma of 1.85/100,000 people [3]. Approximately 50 % of the meningiomas in this study were discovered during autopsy, explained by the fact that these lesions are typically slow-growing tumours that remain asymptomatic for a long time [3]. The rate of meningiomas diagnosed during autopsy series is 3 % for patients aged > 60 with a tendency to find larger-sized meningiomas the older the patient is [4]. In another study conducted at the Mayo Clinic, the incidence of meningiomas discovered during autopsy was 5.9/100,000 people [5].

Since the advent of the cerebral CT scan and MRI, the number of diagnosed cases of asymptomatic meningioma has sharply increased. In a recent, prospective, population-based study in the Netherlands involving 2000 people ≥ 45 years of age, the prevalence of benign brain tumours was 1.6 %, with meningiomas being the most common (0.9 %) [6]. These meningiomas ranged from 5–60 mm in diameter and their prevalence was 1.1 % in women and 0.7 % in men. In the study by Kuratsu et al [7], of 504 patients with meningiomas admitted in 27 hospitals in the Kumamoto region of Japan between 1989 and 1996, 196 were asymptomatic, ie, 39 %, of whom 117 were < 70, and 79 > 70. In reviewing the rates per year, the authors noted an increase in the rate of discovery of asymptomatic meningiomas from 34.6 % between 1989 and 1992 to 44 % between 1993 and 1996 [7]. These data were confirmed in 2006 by the Yano group [8]. Of 1434 patients with meningiomas admitted between 1989 and 2003, 603 were asymptomatic, equalling 42 % of the population studied [8].

We used the PubMed database to review the different published series concerning asymptomatic meningiomas and their natural history.

Natural History of Asymptomatic Meningiomas

The first studies to investigate the radiological development of asymptomatic meningiomas are based essentially on the diameter of the tumour or on the measurements of 2 different axes establishing its volume [8–13]. These studies analyse growth in 2 dimensions. New software has in time been introduced in medical imaging devices and can calculate the volume of a lesion with greater precision. These studies report volumetric growth of the meningioma in 3 dimensions [7, 14–18]. Zeidman et al [17] showed that the average volumetric growth in a limited series of 21 patients was significantly higher than that in 2-D, suggesting that as meningioma can grow in different directions, the volumetric measurement yields more information and is more efficient for monitoring tumoural growth. This observation was recently confirmed by Chang’s group [18] on a series of 31 patients.

According to studies, imaging monitoring shows a growth of asymptomatic meningiomas in a variable percentage of 24–44 % of patients [7–13, 15, 19]. The reported series often concern limited groups of patients and the duration of monitoring in particular is variable. In case of imaging development, neu-
Radiological and Clinical Signs Associated with the Growth Rate of Asymptomatic Meningiomas

The radiological characteristics identified as being associated with slow tumoural growth are: (1) the presence of calcification in the meningioma [7, 8, 12, 13, 16, 19] and (2) the hypointense character thereof in the MRI’s T2 sequences [7, 8, 12, 13, 16, 19]. Clinical characteristics associated with slower growth of the meningioma are more advanced age and small size of the meningioma at the time of diagnosis [12, 13, 15, 16, 19].

What Should Be Done When an Incidental Meningioma Is Discovered?

It appears that the majority of patients diagnosed with an asymptomatic meningioma can be at first closely monitored radiologically and clinically [8, 15]. This is particularly true for small-sized meningiomas, especially in older patients in whom meningioma growth is slower [16] and surgery is associated with a higher morbidity [7, 8]. However, patients with a rapidly or significantly growing meningioma or patients who become symptomatic should be referred for treatment.

To determine the therapeutic strategy or monitoring of an asymptomatic meningioma, it is necessary to take into consideration the characteristics of the meningioma, its location, size, radiological characteristics (calcification, hypointense in sequence T2 of the MRI), the presence of a perilesional oedema, the possibility of malignity or another histological type, and the characteristics of the patient (age, general state of health, case history, and life expectancy) [24]. The patient’s history of prescriptions is important because spontaneous regressions have been reported when the patient stops taking cyproterone acetate [25–27]. It is also necessary to verify that the patient is really asymptomatic by means of a clinical neurological examination conducted in accordance with the location of the lesion, such as a neuro-ophthalmological as well as a neuropsychological examination.

The opinion of a neurosurgeon is desirable at the time when an asymptomatic meningioma is detected [24]. Some meningiomas will, irrespective of their size, have to be treated depending on their location and risk of provoking neurological disorders. It appears in fact that nearly 50 % of meningiomas discovered incidentally are treated either by surgery or, most often, by radiosurgery from the outset or by a multidisciplinary approach (surgery followed by radiosurgery) [7].

This situation may be encountered when an asymptomatic patient presents straightforward with a large, non-calcified meningioma surrounded by an oedema. Treatment should take into consideration the patient’s age, life expectancy, anaesthesiological risks, and the higher probability of growth for a non-calcified meningioma. A multidisciplinary approach is essential in such a situation. Even though the morbidity rate is lower in patients with an asymptomatic meningioma than in those with a symptomatic lesion the results show that an asymptomatic meningioma is not without risk, especially in patients > 70. A meningioma residue may very well remain in place to avoid excessive surgical risks. Monitoring is indicated or additional treatment by radiosurgery is envisaged for such a residue.

Another situation is the diagnosis of a limited-size meningioma of the cranial base, compatible with radiosurgery or a minimum distance from the optic nerve. In such a case, radiosurgical treatment may be discussed from the outset.

When a strategy for the monitoring of asymptomatic meningioma is decided on by the neurosurgeon, initial clinical and imaging examinations are extremely important because even though the majority of meningiomas are benign tumours, there is a small proportion of aggressive lesions that require rapid and multidisciplinary treatment. MRI examination is advised within 3–4 months after diagnosis [1]. One fourth of meningiomas that show signs of growth might belong to the atypical or malignant grade [28]. In such situations, it is very important to have arguments to gauge the nature of the non-
operated tumour. To that end, spectro-MRI sequences that detect the metabolites dissolved in the tissues in a non-invasive manner can prove very useful [29, 30].

**Conclusion**

Imaging monitoring of asymptomatic meningiomas shows growth in a variable percentage of patients [7–13, 15, 19]. Nevertheless, in case of imaging development, neurological signs appear in < 50%.

A meningioma’s growth rate is an important factor in determining whether a lesion should be treated. The use of volumetric analysis could prove a useful tool for neurosurgeons [17, 18].

It seems advisable to obtain a neurosurgeon’s opinion for an incidental meningioma. The treatment of asymptomatic meningiomas remains controversial and should be defined individually for each patient by considering the characteristics of the meningioma and of the patient. Some recommendations can be made on the basis of the data of our review.

Conservative treatment should be recommended for asymptomatic patients > 70 with a small calcified meningioma. Conversely, surgical treatment could be opted for more easily in patients < 60 with a large convexity lesion. These patients actually have a lower surgical risk but a greater risk for meningioma growth and longer monitoring. Surgery is also recommended when the patient becomes symptomatic or the meningioma grows, is surrounded by oedema, has a mass effect on the brain, or shows signs of malignity.

**Conflict of Interest**

None.

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**References:**