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Incidental Meningiomas

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Incidental Meningiomas

Florence Lefranc

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. **Eur Assoc NeuroOncol Mag 2013; 3 (3): 97–9.**

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-

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radiological signs would appear in < 50 % of cases (0–40 % of patients showing radiological development) [8–11, 15]. A large series was published by Yano et al in 2006 [8]. Even if this series is based on 2-D monitoring of radiological meningioma progression this series reports 67 asymptomatic patients for whom monitoring of > 5 years is available [8]. 25 of the 67 patients (37 %) showed tumour growth during radiological monitoring [8]. Clinical symptoms appeared in 11 out of these 67 patients (16 %) [8]. Ten of the 25 patients with radiological progression showed clinical signs. Conversely, one patient presented clinical signs although his meningioma showed no progression under imaging examination [8]. Radiological and clinical developments are therefore not directly related. In the largest and most recent study on the topic published to date, Oya et al [19] reported their results in 244 patients who harboured 273 incidental meningiomas. A ≥ 2 -mm increase in maximal diameter was observed in 120 tumours (44 %) with a mean follow-up period of 3.8 years [19].

In the study of the Yano group, the average size of symptomatic meningiomas (4.3 ± 1.3 cm) was larger than that of the asymptomatic meningiomas (2.4 ± 0.9 cm) [8]. From these data, the authors suggest that asymptomatic meningiomas that increase in size up to a diameter > 4 cm should be accompanied by symptoms. Conversely, even if meningiomas progress in size, the increase should not lead to clinical symptoms as long as they remain < 3 cm in diameter [8]. A recent review of the literature concerning untreated clinical signs of meningiomas suggests that meningiomas that do not exceed 2.5 cm in diameter do not cause symptoms within 5 years of being discovered [20].

The critical size of a meningioma in connection with the appearance of symptoms is not elucidated [21] because the latter depends on many factors that include in particular: (1) size at the time of initial diagnosis [8, 12, 13, 15, 20], (2) the location of the lesion [22, 23], (3) the presence of a consecutive oedema of the brain [19], and (4) the possibility of venous invasion and secondary infarction.

■ 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, 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 asso-

ciated 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 malignancy 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 straightaway 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 me-

ningiomas 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.

References:

1. Couldwell WT. Asymptomatic meningiomas. *J Neurosurg* 2006; 105: 536–7.
2. Rohringer M, Sutherland GR, Louw DF, et al. Incidence and clinicopathological features of meningioma. *J Neurosurg* 1989; 71: 665–72.
3. Staneczek W, Janisch W. Epidemiologic data on meningiomas in East Germany 1961–1986: incidence, localization, age and sex distribution. *Clin Neuropathol* 1992; 11: 135–41.
4. Nakasu S, Hirano A, Shimura T, et al. Incidental meningiomas in autopsy study. *Surg Neurol* 1987; 27: 319–22.
5. Radhakrishnan K, Mokri B, Parisi JE, et al. The trends in incidence of primary brain tumors in the population of Rochester, Minnesota. *Ann Neurol* 1995; 37: 67–73.
6. Vernooij MW, Ikram MA, Tanghe HL, et al. Incidental findings on brain MRI in the general population. *N Engl J Med* 2007; 357: 1821–8.
7. Kuratsu JI, Kochi M, Ushio Y. Incidence and clinical features of asymptomatic meningiomas. *J Neurosurg* 2000; 92: 766–70.
8. Yano S, Kuratsu JI; The Kumamoto Brain Tumor Research Group. Indications for surgery in patients with asymptomatic meningiomas based on an extensive experience. *J Neurosurg* 2006; 105: 538–43.
9. Olivero WC, Lister JR, Elwood PW. The natural history and growth rate of asymptomatic meningiomas: a review of 60 patients. *J Neurosurg* 1995; 83: 222–4.
10. Braunstein JB, Vick NA. Meningiomas: the decision not to operate. *Neurology* 1997; 48: 1459–62.
11. Go RS, Taylor BV, Kimmel DW. The natural history of asymptomatic meningiomas in Olmsted County, Minnesota. *Neurology* 1998; 51: 1718–20.
12. Niino M, Yatsushiro K, Nakamura K, et al. Natural history of elderly patients with asymptomatic meningiomas. *J Neurol Neurosurg Psychiatry* 2000; 68: 25–8.
13. Herscovici Z, Rappaport Z, Sulkes J, et al. Natural history of conservatively treated meningiomas. *Neurology* 2004; 63: 1133–4.
14. Firshing RP, Fischer A, Peters R, et al. Growth rate of incidental meningiomas. *J Neurosurg* 1990; 73: 545–7.
15. Yoneoka Y, Fujii Y, Tanaka R. Growth of incidental meningiomas. *Acta Neurochir (Wien)* 2000; 142: 507–11.
16. Nakamura M, Roser F, Michel J, et al. The natural history of incidental meningiomas. *Neurosurg* 2003; 53: 62–71.
17. Zeidman LA, Ankenbrandt WJ, Du H, et al. Growth rate of non-operated meningiomas. *J Neurol* 2008; 255: 891–5.
18. Chang V, Narang J, Schultz L et al. Computer-aided volumetric analysis as a sensitive tool for the management of incidental meningiomas. *Acta Neurochir (Wien)* 2012; 154: 589–97.
19. Oya S, Kim SH, Sade B, et al. The natural history of intracranial meningiomas. *J Neurosurg* 2011; 114: 1250–6.
20. Sughrue ME, Rutkowski MJ, Aranda D, et al. Treatment decision making based on the published natural history and growth rate of small meningiomas. *J Neurosurg* 2010; 113: 1036–42.
21. Hashiba T, Hashimoto N, Izumoto S, et al. Serial volumetric assessment of the natural history and growth pattern of incidentally discovered meningiomas. *J Neurosurg* 2009; 110: 675–84.
22. Bindal R, Goodman JM, Kawasaki A, et al. The natural history of untreated skull base meningiomas. *Surg Neurol* 2003; 59: 87–92.
23. Van Haverbergh T, Carvalho G, Tatagiba M, et al. Natural history of petroclival meningiomas. *Neurosurgery* 2003; 52: 55–62.
24. Abeloos L, Lefranc F. [What should be done in the event of incidental meningioma?]. *Neurochirurgie* 2011; 57: 78–81.
25. Cebula H, Pham TQ, Boyer P, et al. Regression of meningiomas after discontinuation of cyproterone acetate in a transsexual patient. *Acta Neurochir (Wien)* 2010; 152: 1955–6.
26. Gonçalves AM, Page P, Domigo V, et al. Abrupt regression of a meningioma after discontinuation of cyproterone treatment. *AJNR Am J Neuroradiol* 2010; 31: 1504–5.
27. Chamoun R, Krisht KM, Couldwell WT. Incidental meningiomas. *Neurosurg Focus* 2011; 31: E19.
28. Kasuya H, Kubo O, Kato K, et al. Histological characteristics of incidentally-found growing meningiomas. *J Med Invest* 2012; 59: 241–5.
29. Hazany S, Hesselink JR, Healy JF, et al. Utilization of glutamate/creatine ratios for proton spectroscopic diagnosis of meningiomas. *Neuroradiology* 2007; 49: 121–7.
30. Yue Q, Isobe T, Shibata Y, et al. New observations concerning the interpretation of magnetic resonance spectroscopy of meningioma. *Eur Radiol* 2008; 18: 2901–11.