Size as a Risk Factor for Growth in Conservatively Managed Vestibular Schwannomas

The Birmingham Experience

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KEYWORDS

• Vestibular schwannoma • Tumor • Growth • Size

INTRODUCTION

Vestibular schwannoma (VS) is a benign primary intracranial tumor of the myelin-forming cells of the vestibulocochlear nerve, representing about 6% of all intracranial tumors.[1] The neuromas usually manifest with unilateral hearing impairment, which may go unnoticed by the patient or clinician. Early diagnosis offers patients a range of management options and may significantly reduce morbidity.[1]

The incidence of acoustic neuromas is around 13 cases/million/y, with peaks in the fifth and sixth decades of life, affecting both sexes equally.[2,3] Estimates of prevalence have so far been calculated only from large, unselected autopsy or radiology studies, with a suggested figure of 0.8%.[4]

Advances in MRI have allowed the discovery of these tumors earlier in the disease process and with more sensitivity. With reducing cost and increasing MRI availability, screening has become standard practice in patients with unilateral audiovestibular symptoms. Current published literature corroborates this increase in the diagnosis of small tumors and a decrease in the number of diagnosed large and medium-sized neuromas.[5–8]

The management strategy for VS is multifactorial, influenced by size, patient age, general health, extent of hearing loss, and the patient's own preference. With the shift to smaller tumors at diagnosis, a more conservative approach to management has been seen, allowing the observation of tumor natural history with serial scanning. Active treatment with stereotactic radiotherapy (SRT) or surgical resection may be

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delayed using a watch-and-wait policy, although this does give rise to a greater patient load and strain on resources, whereas earlier diagnosis adds to patient stress and concerns regarding growth and potential intervention.[9]

Understanding growth in conservatively managed tumors would allow better understanding of which tumors are more likely to grow, and the development of tailored imaging protocols depending on tumor characteristics and likelihood of progression. This understanding would allow optimal resource use; it would improve clinicians' ability to counsel patients as to their tumor growth prognosis; and the treatment pathway could be streamlined so that interventions, such as SRT, could be instigated earlier for tumors known to grow more aggressively.

This case series explores tumors observed in conservatively managed patients seen in a large tertiary center VS clinic service at Queen Elizabeth Hospital, Birmingham (QEHB). The authors observed whether tumor size at presentation was associated with subsequent growth rate.

METHOD

A retrospective case note review was performed using a large database containing more than 900 patients with VS managed at QEHB between 1997 and 2012. Patients from this database with tumors up to 2 cm at the cerebellopontine angle (CPA) were included because most of this group was initially managed conservatively at our unit. For the purpose of analysis, tumors were arbitrarily divided into 3 groups: those with predominant intracanalicular (IC) component, and extracanalicular tumors measuring 1 to 10 mm or 11 to 20 mm at the CPA.

Serial scans were performed as per the local protocol described by Martin and colleagues[6]: after initial diagnostic MRI, scans are repeated at 6 months after diagnosis, then at annual intervals for 2 years. A further scan is performed 2 years later, then every 5 years for life. Scans were reviewed by a single individual, to avoid interoperator variability, with measurements taken across the face of the petrous temporal bones.

Tumors that had shown more than 1-mm increase in diameter over any number of serial images were deemed to be growing. The main outcome measures of interest were the proportion (%) of tumors that had grown in each study group, and the mean growth rate of this subgroup of growing tumors (millimeters per year; measured over the duration of follow-up for a tumor).

Statistical analysis was performed using Microsoft Excel 2010. A χ^2-test was performed to compare the proportion of growing tumors between groups, and an unpaired, 1-tailed *t*-test to compare mean annual growth rates for the growing tumor subsets.

RESULTS

Five-hundred and fifty-five patients were included in the study, with 287 men and 268 women. There were 265 intracanalicular tumors, 154 tumors measuring from 1 to 10 mm and 136 tumors from 11 to 20 mm at the CPA. Demographics, along with tumor sizes and growth rates observed, are shown in **Table 1**. Of the growing tumors, those in the 11-mm to 20-mm group grew the fastest, followed by the 1-mm to 10-mm group, and then the IC tumors.

IC tumors were less likely to grow than either group of EC tumors ($P<.01$; **Table 2**). Growing tumors in the 11-mm to 20-mm group grew faster than the IC subset ($P = .04$), but not compared with the 1-mm to 10-mm subset ($P = .08$); there was no difference in growth rate between IC and 1-mm to 10-mm subsets ($P = .30$) (**Table 3**).