Glomus Jugulare Tumors: Certain clinical and radiological aspects observed following Gamma Knife Radiosurgery

By

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Background:

These tumors are rare, slow growing tumors that arise from the paraganglion cells of glossopharyngeal or vagus nerves, the cells contain chromaffin and may secrete catecholamines. They have an estimated incidence of one per 1.3 million population.

Lower cranial nerves may be involved with deficit caused by the mass effect and the most common symptoms are loss of hearing, pulsatile tinnitus, facial palsies, and larger tumors gives symptoms of brainstem compression.

The classical treatment has been surgery with or without radiotherapy. Because of the location, local anatomy and vascularity of these tumors, post-operative complications in the form of new cranial neuropathy are not uncommon. In addition, total removal is not always possible.
Materials and Methods:

There were 14 patients, 9 females and 5 males; selected from a total of 27 referred patients.

Grounds for refusing a patient were as follows: In 8 patients the tumor was too large. In 2 patients the tumor was largely extracranial and inaccessible to the Gamma Knife. In two patients investigations were requested but the patients never returned. In one case metal clips placed at the time of surgery produced artifacts which made geometrically accurate imaging impossible.
• Glomus tumors are well demarcated on MR images and rarely invade the brain, which makes them ideal candidates for treatment with radiosurgery because it allows steep dose decrease at the margins.

(Ringer et al., Minim Invasive Neurosurg. 2001)
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Leksell Gamma Knife® C

Automatic Positioning System

Cobalt-60 sources

Beam channel

Helmet with collimators

Helmet supports

Plastic cover

Treatment couch with mattress

Protection panels

Shielding doors

Helmet in treatment position

South & East Mediterranean College of Oncology

26 – 28 March 2008
Cairo - Egypt
Results:

The mean follow up period was 28 months (range 6 to 60 months). All the tumors except one were Fisch Type D and the mean volume was 14.2 cm$^3$ (range 3.7 cm$^3$ to 28.4 cm$^3$). The mean prescription dose was 13.6 Gy (range 12 to 16 Gy).

In three patients previous surgery had confirmed the diagnosis. In the remainder the diagnosis was based on MR findings and a typical angiogram with blood supply mainly by the ascending pharyngeal artery.
Results: (cont.)

No tumor has continued to grow. Eight are smaller and 6 unchanged in volume. Two patients with bruit have no improvement in symptoms. All the other 12 patients have symptomatic improvement of dysphagia in 5, dysphonia in 4, facial numbness in 3, ataxia in 3, and tinnitus in 2. Single patients have experienced improvement of vomiting, vertigo, tongue fasciculation, hearing, headache, facial palsy, and an accessory paresis.
Results: (cont.)

One patient developed a transient facial palsy. Symptomatic improvement began commonly before any reduction in tumor volume could be detected radiologically. The mean time to clinical improvement was 6.5 months whereas the mean time to shrinkage was 13.5 months.
Illustrated Case:

Axial Images for Dose Planning

Coronal Reconstruction

Sagittal Reconstruction
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Before treatment 6 months after treatment
Conclusions:

Gamma Knife treatment of glomus jugulare tumors is associated with a high incidence of clinical improvement with few complications. Clinical improvement would seem to be a more sensitive early indicator of therapeutic success than radiological volume reduction. Further follow up will be needed.
Thank You