Case Report

Five Synchronous Paragangliomas of the Head and Neck: A Case Report

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This is a case report of synchronous bilateral carotid body tumor, bilateral jugulotympanic and left subclavian paraganglioma in a 38-year-old man who presented with a history of slow-growing bilateral neck masses for 4 years and a one-month history of right facial palsy, tinnitus, and hearing loss. A discussion of this case is followed by a review of the literature surrounding this rare clinical entity.

Keywords: *Synchronous paragangliomas, Carotid body tumor, Glomus tumor, Jugulotympanic paraganglioma*

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Paraganglioma is a benign neoplasm arising from paraganglionic cells, which derive from the neural crest cells, which are known to be the cause of pheochromocytoma in the abdomen. It is the most common benign vascular neoplasm of the neck. Paragangliomas can originate in many areas of the head and neck, and they are named after the location in which they arise. Among these cases, the carotid body tumor is the most common type found in the head and neck, followed by jugulotympanic and vagal paraganglioma. Other sites include the larynx, nasal cavity, orbit, trachea, aortic body, lung, and mediastinum.

Multicentricity has been reported in the literature with an overall incidence of approximately 10% of cases[1]. The most frequent combination of multiple tumors is bilateral carotid body tumors, some of which may be familial genetic mutations. When a familial pattern is recognized, the incidence of multiple tumors is reported to be between 30% and 50%[1]. The presence of three synchronous paragangliomas is extremely rare and is associated with jugulotympanic paraganglioma and carotid body tumor. Incidence of more than three synchronous paragangliomas has never been reported.

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In this literature, the authors review a case, which presented with five synchronous tumors including bilateral carotid body tumors, bilateral jugulotympanic paraganglioma, and unilateral subclavian paraganglioma with no familial history.

Case Report

A 38-year-old Thai male with underlying asthma was referred to our centre from the northern part of Thailand in January 2015 with right facial palsy, tinnitus and hearing loss in the right ear.

His symptoms had started 4 years previously when he found a mass on the right side of his neck that was slowly enlarging. Two years later, he found another mass on the left side of his neck, and he developed progressive hearing loss, tinnitus with intermittent mucoid and bloody discharge from his right ear. At that time, he did not seek any medical treatment. He had

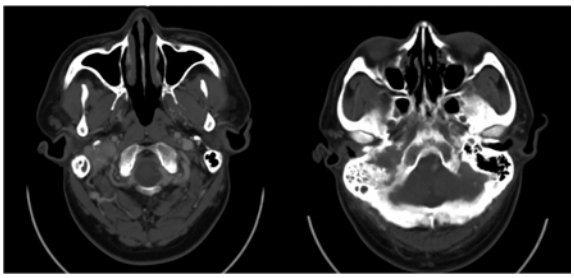

Fig. 1 CT Temporal bone with contrast showed enhancing mass at the right jugular foramen with extension to right mastoid cavity and right upper neck.

had progressive unilateral facial palsy one month before he decided to go to the hospital, at which point he was referred to our centre for further investigation and treatment.

Physical examination showed multiple pulsatile neck masses on both sides of the neck at the carotid bifurcation area. The mass on the right was 5 centimeters in diameter and the one on the left was 2 centimeters. We also detected another pulsatile mass at the left supraclavicular area, which had an ill-defined border and was 3 centimeters in diameter. On otological examination, we found a pinkish, totally occluded mass in the right external ear canal. Neurological examination showed complete right facial paralysis of lower motor neuron type, sixth grade House-Brackmann classification, and there was decreased gag reflex on the right side. There was no other cranial nerve deficit. The pure tone audiogram showed profound hearing loss in the right ear.

Computerized tomography (CT) of the neck showed vividly enhancing soft tissue masses with splaying of the internal carotid artery (ICA) and external carotid artery (ECA) of the right and left neck, vividly enhancing soft tissue mass at the left superior mediastinum, and enhancing soft tissue mass at the right jugular foramen. Magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) were obtained to evaluate the tumor's characteristics, and we found four heterogenous enhancing iso-hyposignal T1W/Hypersignal T2W soft tissue masses, one at the right jugular fossa, two at the right and left carotid bulb, and another at the angle between the left subclavian artery and the common carotid artery.

In accordance with surgical planning, we performed a cerebral angiogram with balloon occlusion test of the right internal carotid artery (ICA), and discovered five hypervascular masses at the bilateral cervical regions, bilateral jugular foramen and left-sided superior mediastinum.

The first one was located at the right carotid bifurcation, causing splaying of right ICA & right ECA,

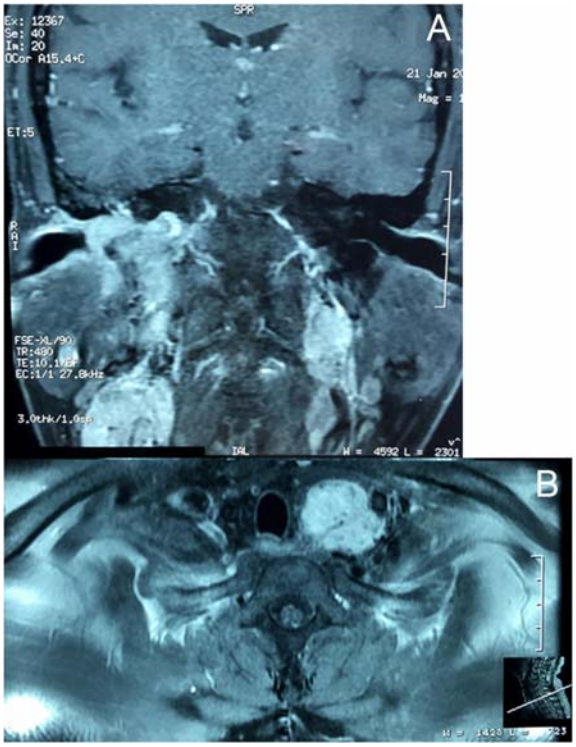

Fig. 2 T1W MRI with Gadolinium showed enhancing iso-hyposignal mass at the right jugular fossa (A), right and left carotid bulb, and at the left superior mediastinum (B).

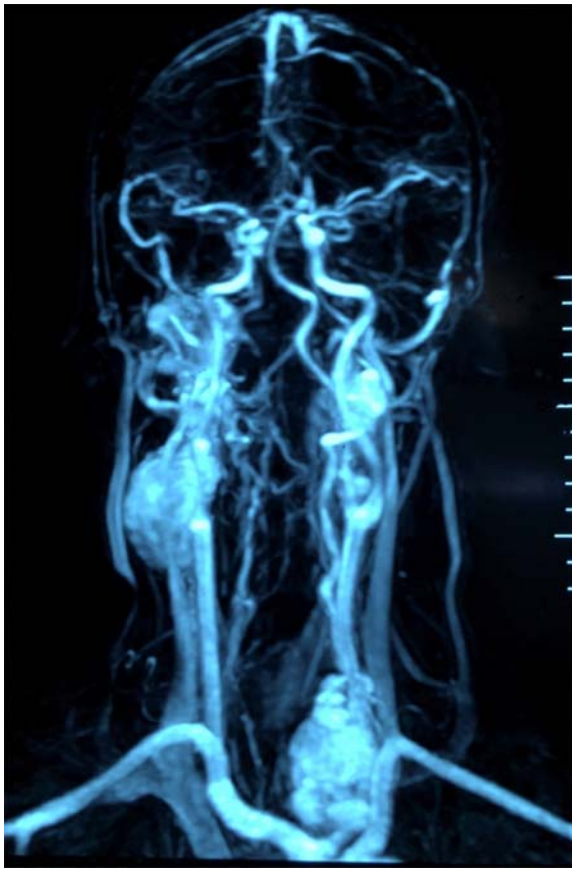

Fig. 3 MRA showed five tumors from bilateral jugulotympanic, bilateral carotid body and left subclavian paraganglioma.

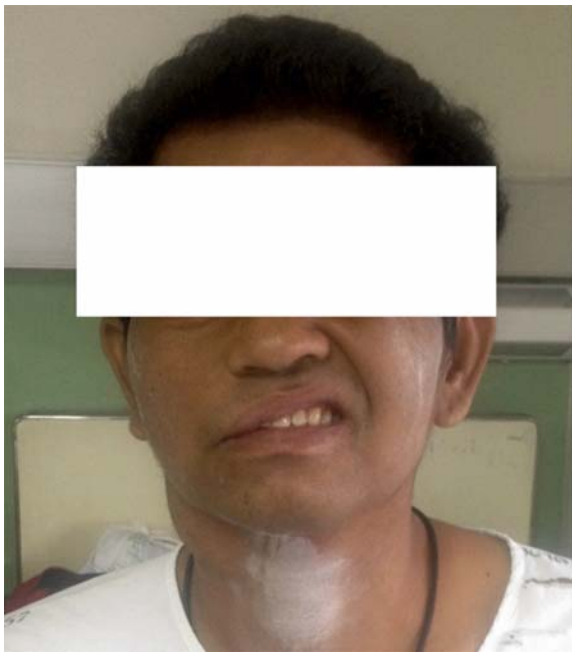

Fig. 4 The patient with right facial paralysis.

3.2x2.9x5.0 cm in size, which was fed by the vasa vasorum of the right ECA & right ICA, and the ascending pharyngeal artery (ASPA). The second one was located at the left carotid bifurcation, causing splaying of the left ICA and left ECA, 1.2x1.5x1.9 cm in size, and fed by the vasa vasorum of the left ICA & left ECA. The third one was located at the right jugular fossa, 3.3x3.5x3.9 cm in size, fed by branches of the right posterior auricular artery, stylomastoid artery and right ASPA. The venous drainage of the tumor was to the right transverse and sigmoid sinuses. The fourth one was located at the left-sided superior mediastinum, 2.1x3.7x5.1 cm in size, fed by branches of the thyrocervical trunk. Surprisingly, the angiogram displayed the fifth tumor, which was located at the posterior aspect of the left distal cervical ICA, 1.2x1.5x1.9 cm in size, and was fed by the left ASPA. All of the intracranial arteries were normal, with patent circle of Willis, and normal cerebral venous drainage was noted. A balloon occlusion test of the right ICA demonstrated angiographically and clinically passed.

In order to evaluate tumor-related catecholamine release and concomitant pheochromocytoma, abdominal CT scan and 24-hour urine metanephrine and vanillylmandelic acid tests were performed, all with negative results.

All treatment options, surgical risks and prognoses were discussed with the patient before we started the treatment planning. Radiation therapy and observation were selected in this case because of the significant postoperative morbidity and mortality rates from the surgical operation.

Discussion

Paraganglionic cells derive from the neural crest cells and form the paraganglion system, which is a source of catecholamines in fetal development prior to the formation of the adrenal medulla.

In adults, these cells function as chemoreceptors by modulating the respiratory and cardiovascular systems in response to fluctuations in arterial pH, oxygen, and carbon dioxide tension, such as those caused by carotid body. They can still function as sources of catecholamines but in very small quantities[2].

The neoplasms derived from these paraganglion cells are called paragangliomas, and they are usually benign. The incidence of malignant paraganglioma is reported to be about 6%[3].

Approximately 90% of tumors that arise from the paraganglion system are in the adrenal gland and are termed pheochromocytomas. The remaining 10% arise from extraadrenal sites, and 85% of these arise in the abdomen, 12% in the thorax, and the remaining 3% in the head and neck area[4].

In the case of carotid body tumor, patients usually present with a painless slow-growing pulsatile neck mass at the area of the upper lateral neck, which is at the carotid bifurcation area.

Progressive symptoms of dysphagia, odynophagia, hoarseness, and other cranial nerve deficits (CN9-11) can be found if the tumor is large enough. Carotid sinus syndrome syncope has been described in association with carotid body tumors[5].

Because 1% to 3% of carotid body paragangliomas can be functional as catecholamine secretors[2], patients should be asked about signs and symptoms indicating elevated catecholamines. In these patients, a 24-hour urine collection is examined for norepinephrine and its metabolites, including vanillylmandelic acid and normetanephrine.

In the case of jugulotympanic paraganglioma, patients can present with pulsatile tinnitus and conductive hearing loss. If the tumor size is big enough, it can cause dysfunction of the cranial nerves that pass through the jugular foramen (CN9-11), and it can also cause facial nerve paralysis by tumor extension into the mastoid, or sensorineural hearing loss caused by bony erosion of the labyrinth.

Most paragangliomas present with a solitary

tumor. However, multicentricity of these tumors has been reported. The most common form of multiple tumor occurs with bilateral carotid body tumor[6].

The etiology of paraganglioma appears to be multifactorial. It is found to be associated with people living in high-altitude areas with low oxygen levels[7,8]. The other cause is from genetic mutation of a sporadic or familial pattern.

Familial paraganglioma syndrome has been described and accounts for at least 10% of cases. Patients with hereditary paraganglioma syndrome have early onset of tumors and a higher frequency of bilateral and/or multiple tumors than those with sporadic disease.

Genetic mutations responsible for the hereditary form of paraganglioma have been identified in genes that code for succinate dehydrogenase subunit D (SDHD), B (SDHB), and C (SDHC) genes, which map to chromosomes 11, 1, and 1, respectively[9-11].

Surgery is the mainstay of treatment. Controversy persists in certain cases, particularly in relation to multicentric tumors and patients with advanced disease or significant co-morbidities. Radiation therapy will arrest growth but will not reduce the tumor size and is reserved for patients who are poor surgical candidates. Observation can be selected in cases with poor medical condition or locally advanced tumors when both surgery and radiation therapy are contraindicated.

What this study adds ?

Paragamglioma is benign tumor usually present with unilateral mass multiple paraganalioma has been reported with overall incidence of cases, usually bilateral carotid body paraganglioma. The presence of synchronous paragangliomas is extremely rare. In this literature, we present a case with five syndironous paragangliomas without any family history.

Potential conflicts of interest

None.

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เนื้องอกพาราแกงกลิโอมาที่เกิดขึ้นพร้อมกัน 5 ตำแหน่งที่บริเวณศีรษะและคอ

ดาวิน เยาวพลกุล, ทัศนชาติ จิตรีธาตุ

นำเสนอเกี่ยวกับโรคเนื้องอกพาราแกงกลิโอมาที่พบในผู้ป่วยชายอายุ 38 ปี ซึ่งตรวจพบเนื้องอกในเวลาเดียวกันถึง 5 ตำแหน่ง โดยผู้ป่วยมาพบแพทย์ด้วยอาการพบก้อนโตที่บริเวณคอทั้งสองข้างอย่างช้าๆ นาน 4 ปี มีใบหน้าซีกขวาอ่อนแรง 1 เดือน เสียงอื้อในหู และสูญเสียการได้ยินในหูข้างขวา ซึ่งในบทความนี้ผู้เขียนได้อภิปราย และทบทวนวรรณกรรมที่เกี่ยวข้องกับโรคเนื้องอกพาราแกงกลิโอมาที่เกิดพร้อมกันหลายตำแหน่ง ซึ่งเป็นโรคที่พบเจอได้น้อยมาก