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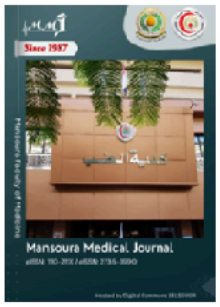

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CAROTID BODY TUMORS : CHALLENGING COMPLEXITY OF DIAGNOSIS AND SURGICAL MANAGEMENT

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CAROTID BODY TUMORS : CHALLENGING COMPLEXITY OF DIAGNOSIS AND SURGICAL MANAGEMENT

By

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ABSTRACT

The tumor of the carotid body tumor (CBT), is a rare tumor, only about 1000 cases had been reported in the literature. It's of obscure origin and misdiagnosed if it is suspected. CBT is usually benign and commonly presented as a non-painful cervical mass.

The aim of this study was to analyze diagnostic and therapeutic aspects and complications of surgery of CBT in Mansoura University Hospitals.

We present eight patients had 10 carotid body tumor. Male to female ratio was (1: 2), age ranged between 13-72 years in the period between May 2000 to December 2003. The aim of this study was to analyze diagnostic and therapeutic aspect and complications of surgery of CBT in Mansoura University Hospitals.

All patients were identified and complete radiological study was done including CT, MRI, Doppler Ultrasound and Angiography. Clinically, there were no secreting tumors in these patients. Preoperative immobilization was done in seven cases 24 hours before surgery. All patients were operated on for tumor resection. Result the blood loss for these patients was fewer than those without immobilization. Only one case needed resection of the carotid and interposition graft. One patient had preoperative nerve deficit. Neurological

deficits were noted in three patients out of nine patients (33%) immediately after surgery and two patients out of seven had permanent deficit (29%). One patient deceased in the postoperative period from pulmonary embolism (12.5%). Our conclusion is: the diagnosis of CBT is depending on suspicious, radiology is essential. Emboilization decreases blood loss and facilitates tumor removal. Observation is not recommended because of the progressive behavior of the tumor associated with increased risk of neurological deficit. Surgery is the treatment of choice with minimal morbidity and mortality,

INTRODUCTION

Carotid body tumors are rather uncommon. Even though there is a great amount of literature on the subject, its biological behavior, therapeutics and surgical management still remains a subject of debate. Tasar and Yetiser, 2004.

Carotid body tumors are rare neoplasm arising from the small chemoreceptor organ in the adventitia of the common carotid bifurcation. Patients with carotid body tumors usually present with a gradually enlarging non-tender anterolateral neck mass. Differential diagnosis includes metastatic lymph nodes, carotid artery aneurysm, salivary gland tumor, branchial cleft cyst, and neurogenic or thyroid tumors. It is a slowly growing tumor which is scantily active and rarely metastasizes. Pellitteri et al, 2004.

For suspected carotid body tumor patients, ultrasound and angiography reconstruction of carotid artery should be applied routinely before operation. Maxwell et al, 2004.

Doppler color flow ultrasonography enables the clinician to arrive at a definite diagnosis. Stoeckli et al, 2002. All paragangliomas presented in B-mode sonography as solid, well-defined, and hypoechoic tumors Stoeckli et al, 2002.

Subsequent arteriography is mandatory, because the finding of an intensely blushing hypervascular mass spreading into the carotid bifurcation further supports the diagnosis and provides accurate preoperative information concerning arterial blood supply. Computed tomography scanning is appropriate to delineate the relation of the tumor to adherent structures, while magnetic resonance tomography demonstrates the relation of the

tumor to the adjacent internal jugular vein and the carotid artery. Stoeckli et al, 2002.

Definitive management for these lesions should be carefully considered in relation to both tumor and patient-oriented factors, especially in regard to the potential morbidity of treatment. Pellitteri et al, 2004.

Surgery is the preferred treatment. Early surgery is the treatment of choice and is recommended in order to minimize major risks, but individual surgeons or an institution cannot accumulate sufficient expertise to evaluate their outcomes with confidence. Maxwell et al 2004. Resection of carotid body tumors carries inherent risks of injury to the cranial nerves and other structures as well excessive blood loss. Kafie and Freischlag 2001. Persky et al 2002. Patetsios 2002.

The primary goals of preoperative embolization of CBT are to reduce the blood loss in the surgical field, minimize the risk of operative complications, and prevent recurrence by contributing to complete resection. Obliteration of a vascular channel may provide additional help in symptomatic relief by decreasing the tumor volume. Tasar and Yetiser, 2004.

These tumors frequently extend to the skull base. There has been controversy concerning the role of preoperative angiography and embolization of these tumors and the benefits that these procedures offer in the evaluation and management of paragangliomas. Persky et al 2002. Patetsios 2002.

AIM OF THE WORK

The aim of this study was to analyze diagnostic and therapeutic aspects and complications of surgery of CBT in Mansoura University Hospitals.

PATIENTS AND METHODS

Eight patients had ten CBT. Male to female ratio was (1: 2), age ranged between 13-72 years in the period between May 2000 to December 2003. All patients were identified depending on complete radiological studies. CT, MRI, Doppler Ultrasound and Angiography were done. Initial evaluation usually included CT and/or MRI. (Fig.1). All patients underwent bilateral carotid angiography, embolization of the tumor nidus, and cerebral angiography to define the patency of the

circle of Willis. None of these cases were considered secreting tumor clinically.

Preoperative embolization was done in seven cases 24 hours before surgery. Feeding arteries of the tumor were embolized with gelfoam. Successful embolization could be accomplished with gelfoam, judged by diminution of the angiographic blush. (Fig. 2)

All patients operated on for tumor resection. We used a transcervical approach with a Y shaped incision from the symphysis menti to the mastoid tip and the longitudinal limb from the middle to the clavicle along the anterior border of sternomastoid muscle. In three cases we extended the incision to include midline mandibulotomy when the tumor was high.

Identification of the carotid arteries and jugular veins was done at first. The key of our work was to push the patient away from the tumor and not the tumor from the patient.

After identification of all vessels and use the vessel loop around the common carotid and internal jugular and identifying the external and internal carotid. (Fig. 3: A, B&C). All structures around were visible then find the feeding vessel of the tumor without manipulation. Ligation of all vessels in and out of the mass then resected extra adventaial. Operative technique involved good exposure, vascular control, identification and preservation of neurovascular structures and sub adventitial tumor dissection. (Fig. 4: A, B, &C).

One case needed carotid resection and shunt then reconstructed using vein graft. (Fig 5 : A& B).

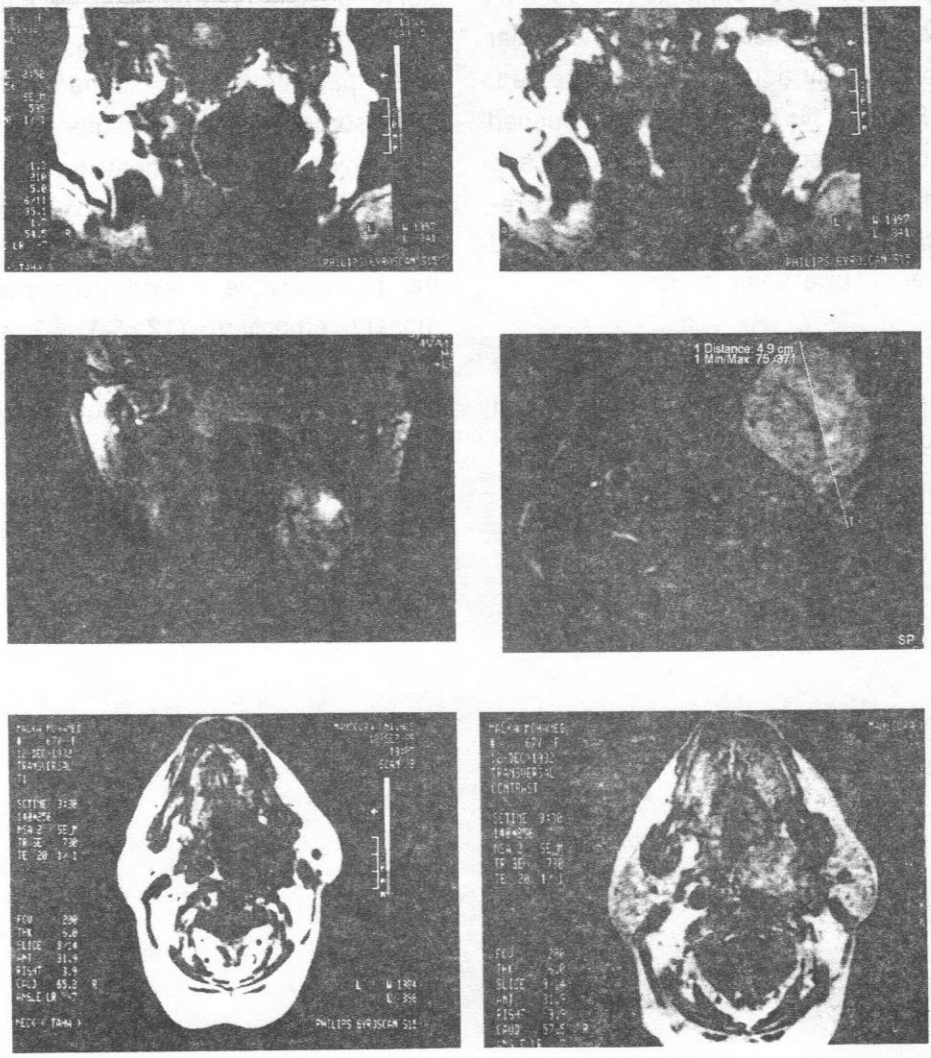
RESULTS

Color Doppler imaging revealed hypervascularity was in 8 (80%) tumors. No flow signal was detected in 3 carotid body tumors at standard velocity encoding (30 cm/s). Only carotid body tumors could be assessed in their full extent. Carotid body tumors showed a splaying of the carotid bifurcation with displacement of the external carotid anteriorly and both the internal carotid and the internal jugular vein posteriorly. According to the direction of tumor growth and vascular supply, the intraluminal flow signal was predominantly directed upward in carotid body tumors.

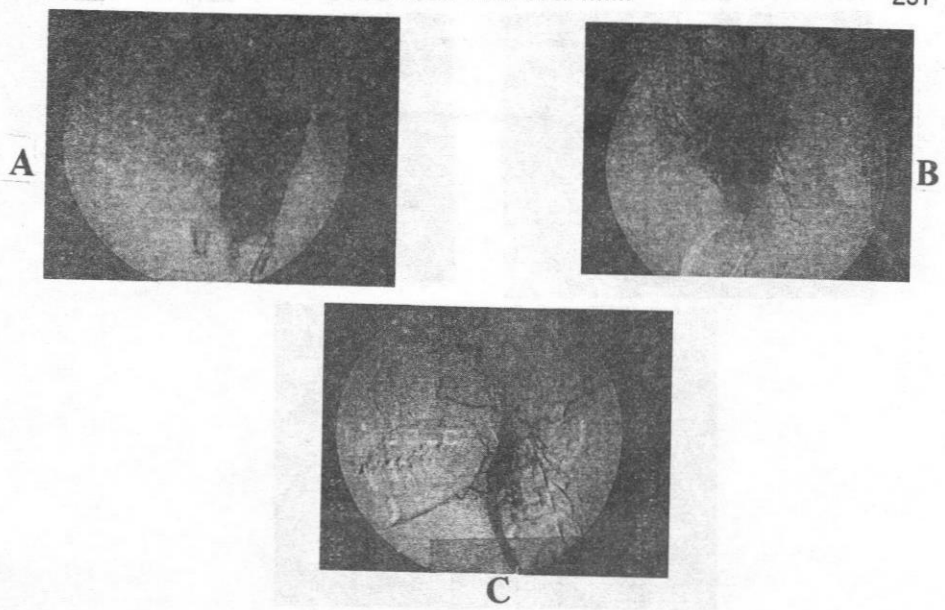
The blood loss for these patients was fewer than those without immobilization. In embolized patients it was 200-300 ml comparing to 700-1000 ml in non embolized patients. Vascular patency intraoperative is preserved. (Fig. 5C). No complications happened from preoperative embolization. Case needed resection of carotid and reconstructed with vein graft had no neurological complications.

Patients discharged 10 days after surgery. All patients stayed in the ICU for two days.

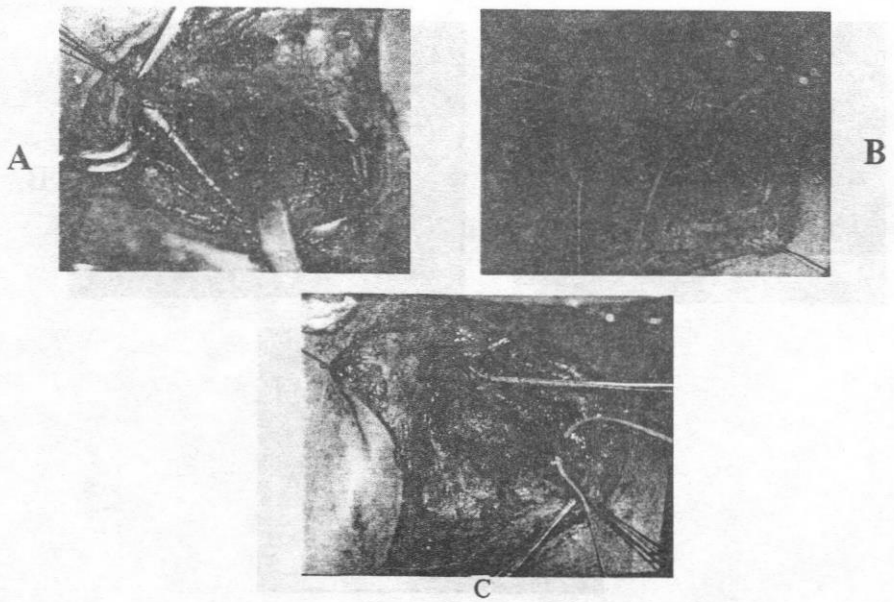
Only one case needs resection of the carotid and interposition graft. One patient had preoperative nerve deficit. Neurological deficits were noted in three patients out of nine patients (33%) immediately after surgery and two patients out of seven had permanent deficit in the form of injury of hypoglossal nerve (29%). One patient died in the postoperative period from pulmonary embolism (12.5%). Post operative MRI and MRA for the patients showed complete resection. (Fig. 6).



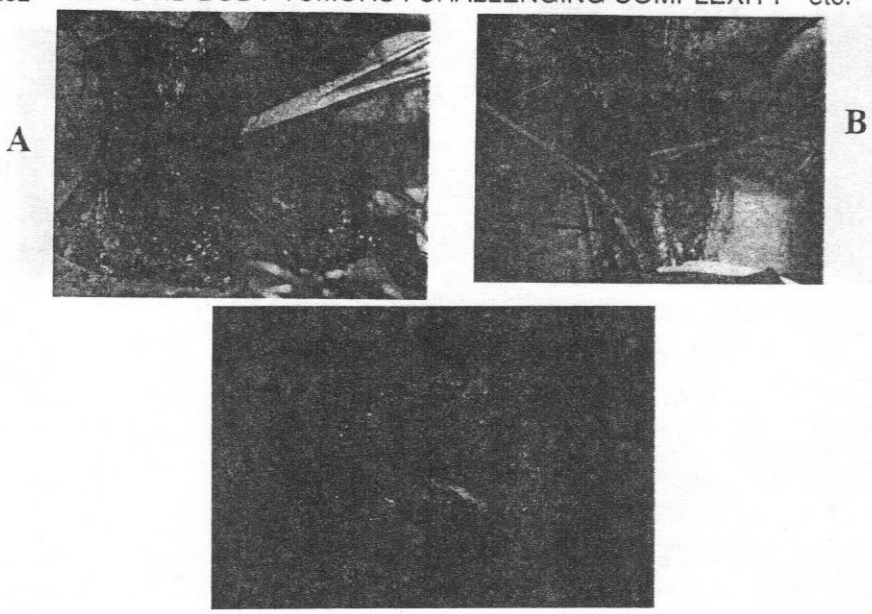
(Fig. 1) : CT & MRI of CBT showed widening of carotid bifurcation wiith displacement of internal and external carotid arteries.



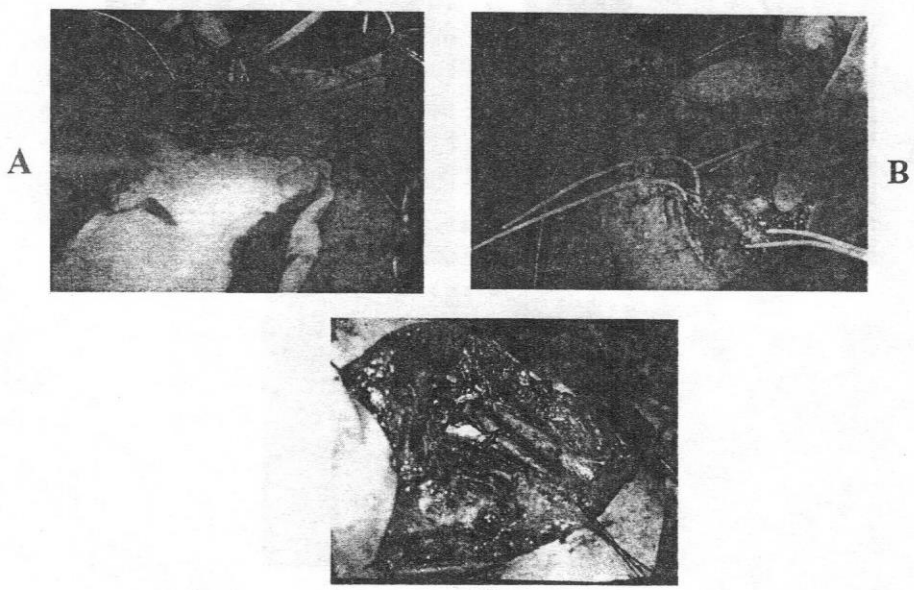
(Fig. 2) : Left carotid artery anngiography A&B are pre embolization, C post embolization.



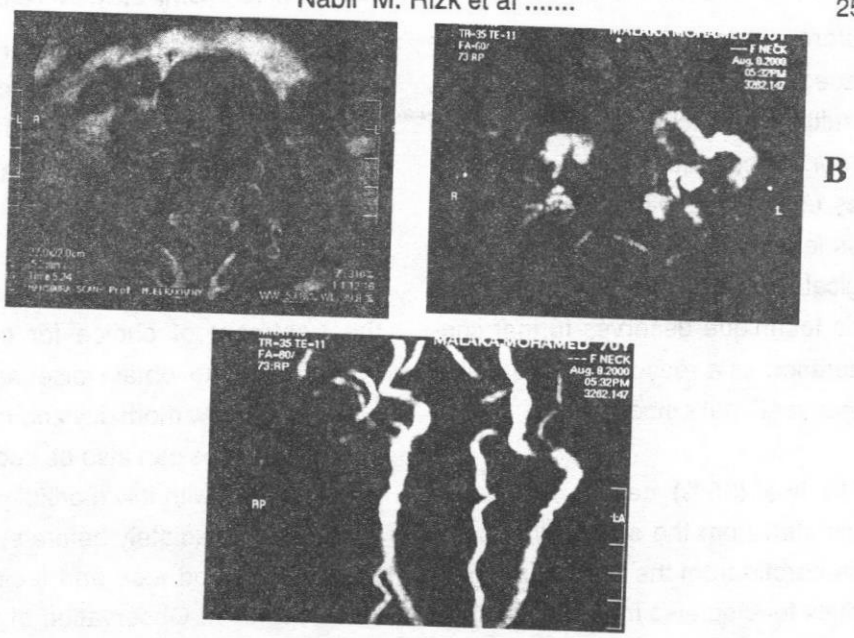
(Fig. 3) : Trans-cervical approach, A showed the tumor with displacig the common carotid artery, B&C starting dissection plane between the CCA and tumor and vessel loop in between.



(Fig. 4) : Delivery of the tumor A&B. C the mass.



(Fig. 5) : A, Resection of the CAA and shunt with Shunt, B vein graft. Complete tumor resection with intact CCA, ECT, ICA & IJV .



(Fig. 6) : MRI & MRA post operative of complete resection of LT CBT .

DISCUSSION

Carotid body tumors are rare neoplasm, which typically present as a slow growing, painless neck mass found along the anterior border of the sternocleidomastoid muscle. These tumors are generally benign but possess aggressive local growth potential. Therefore, definitive treatment requires surgical resection. Ling et al. 2004.

Koischwitz and Gritzmann 2000, demonstrated that Color flow doppler ultrasound (CFD-US) was found to be a good non-invasive method for diagnosis of vascular neck swellings. It enabled the diagnosis of CP with 100 per cent accuracy, but it was not sufficient for diagnosis of high vegal paraganglioma.

Embolization decrease the blood loss and helps in good dissection and identify all the carotid triangle. In our series the blood loss ranged from 200-300 mL in embolized patients. This agreed with Stoeckli et al, 2002.

Tripp et al, 2003, reported a new approach to preoperative vascular exclusion of a carotid body tumor.

Before surgery, covered stent were placed in the external carotid artery, resulting in vascular exclusion of the tumor. Subsequent surgical excision was uneventful, with operative blood loss less than 200 mL and no neurological complications postoperatively. This technique deserves further consideration as a reasonable alternative to conventional embolization.

In two (20%) cases, the tumor originated from the side wall of common carotid from the posterior aspect with its feeding also from the common carotid. One case was extra-advential and the other was adherent to the wall that needed resection of the carotid with vein graft reconstruction. The direction of these two cases was anterior displacement of the carotid and posterior displacement of internal jugular vein. Other cases originated from the bulb 80% and widening the bifurcation.

Thabet and Kotob 2001, addressed that in 80% of their patients the tumot involved the carotid bifurcation. This widening occurred whenever the CBT was large enough to grow in between the external carotid artery and internal carotid artery. Large CBT may displace the vessels either anterolaterally or anteromedially. Knowledge of the direction of the carotid displacement is essential to avoid intra - operative vascular injuries.

Aggressive surgical resection is the treatment of choice for carotid body tumors to obtain disease free survival with low morbidity and mortality. Recurrences can also be successfully operated with low morbidity. Embolization immediately before surgery decreases blood loss and facilitates tumor removal. Observation of these tumors is not recommended because progressive growth is associated with increased risk of neurologic deficits. In our series, the risk of new post surgical cranial nerve deficits was small. Somasundar et al, 2000. Wang et al, 2000. Plukker et al, 2001. Van der Mey et at, 2001.Konstantntinov et al, 2002.

Permanent neurological deficit occurred as hypoglossal nerve injury in 2 cases out of ten lesions 20% and one superior laryngeal nerve in one patient 10%. No vascular injury had occurred. Postoperative death in one out of 8 patients, in comparison to the study by Thabet and Kotob 2001, who addressed that mor-

tality was one patient out of 16 patients.

CONCLUSION

Our conclusion is: the diagnosis of CBT is depending on suspicious, radiology is essential. Immobilization decreases blood loss and facilitate tumor removal. Surgery is the treatment of choice with minimal morbidity and mortality, as observation is not recommended because progressive grow associated with increased risk of neurological deficit.

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