ANGIOFIBROMA: A REVIEW

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SUMMARY

Angiofibroma is the most common benign tumor of the nasopharynx which has unique clinical behaviour. In this article, most aspects of this neoplasm and controversies about its management is reviewed in light of recent literature.

Key word: *Angiofibroma.*

ÖZET

Anjiofibrom, nazofarenksin en sık görülen bening tümörü olup kendine has klinik davranışlara sahiptir. Bu makalede, yeni literatür ışığında söz konusu neoplazinin bir çok yönü ve tedavisi hakkındaki tartışmalar gözden geçirilmiştir.

Anahtar sözcük: *Anjiofibrom*

INTRODUCTION

Angiofibroma is a benign neoplasm of the nasopharynx which is generally encountered in adolescent males. The terms '' juvenile '' and '' nasopharyngeal '' are considered not only incaccurate but also misleading because the tumor rarely occurs in younger (1) or older patients and it is not restricted to the nasopharynx. More rarely, angiofibroma may be encountered in females (2,3).

Macroscopically, angiofibroma appears as a pink to pale blue lobulated mass. Histologically, it is composed of a vascular network (angio-) and a fibrous stromal (-fibroma) component. Vascular network contains vessels of various sizes lying against the stroma. Fibrous stroma, varying from dense areas to more myxoid connective tissue is made up of spindle and satellate fibrocytes that have hyperchromatic nuclei (4). The endothelium of the irregular vascular channels contact the stromal cells with no intervening smooth muscle cells between them (2,5,6); also the tumor vessels lack elastic laminae and elastic stromal fibers (4). These features make the tumor well known as one of the most bleeeding neoplasms.

An interesting feature of angiofibroma is, its tendency towards involution with the growth of the patient. It is not uncommon to encounter radiologically stable residual tumors and rarely spontaneous regression may be observed (7,8).

Multiple steroid hormone receptors and more recently growth factors were reported to exist in the tumor tissue (9-14). Among sex hormones; progesterone, estradiol, testosterone and dehydrotestosterone were reported to exist or not exist in different studies (2,11,15). These findings suggest that hormonal treatment may influence the growth rate of angiofibroma.

Various theories were proposed regarding the origin and development of angiofibroma; such as

the fibroblastic theory (16,17), hormonal theory (16) and hamartamatous theory (18). Perhaps the most unifiying is the hormonal target theory which suggests that the neoplasm arises as a desmoplastic response of the nasopharyngeal periosteum to an ectopic nidus of hormonally controlled hamartomatous tissue lying dormant until the unset of puberty (19).

CLINICAL FEATURES

In general, angiofibromas account for less than 0.5% of all head and neck tumors (6) although they were noted to be the most common benign tumors originating in the nasopharyx (20).

The tumor most commonly originates from the sphenopalatine foramen region, but may rarely arise from different sites (21). The area of tumor origin is considered to be the junctional zone between the posterolateral wall of the nasal cavity, sphenoidal process of the palatine bone, horizontal lamina of the vomer and the roof of the pterygoid laminae (22).

This region is close to the attachment of the posterior end of the middle turbinate. It is the approximate location of the attachment of the buccopharyngeal membrane in the embryo which is the boundary between the stomodael ectoderm and the foregut endoderm (23).

Although benign histologically, angiofibroma behaves aggressive clinically. It compresses surrounding structures and erodes bone causing significant structural alterations and may attain a considerable size before symptoms occur(23, 24).

Tumor spread is accomplished mainly in two ways; direct extension via bone erosion and growth along relatively less resistant planes and natural openings towards various regions producing symptoms relevant to its invasion. Nasopharyngeal mass effect causes serous otitis media due to eustachian tube disfunction and bulging posterior to the soft palate. The tumor grows into the nasal cavity anteriorly, producing recurrent epistaxis and nasal obstruction. The orbit is invaded anterolaterally through the inferior orbital fissure producing proptosis. Lateral spread into the pterygomaxillary fossa is important in the growth and invasion of angiofibroma (22). It spreads through the pterygopalatine fissure into the infratemporal and temporal fossae bringing out fullness in the buccal and temporal regions as well as pain and other pressure symptoms radiating to the ipsilateral face and neck.

Intracranial extension may occur from the infratemporal fossa reaching the middle cranial fossa through the base of the pterygoid process, foramina ovale, rotundum or lacerum; from the pterygomaxillary fissure along the superior orbital fissure; from the sphenoid sinus via the superior wall into the cavernous sinus and/or pituitary fossa; and rarely through the cribriform plate into the anterior cranial fossa. In these

ways, the tumor surrounds important structures such as the optic chiasm, cavernous sinus and internal carotid artery.

The most common symptoms and signs are nasal obstruction, recurrent epistaxis, facial deformity, proptosis, nasal drainage, eustachian tube disfunction, palatal bulging and snoring (23).

Various surgical staging schemes were constituded based on the growth characteristics in order to designate the best treatment approach and prognosis. The following are the most regarded staging systems:

a) Chandler's modification of the AJC system (25):

Stage I: Early tumor confined to the nasopharynx.

Stage II: Additional extension into the nasal cavity and sphenoid.

Stage III: Additional extension into the ethmoid and maxillary sinuses, pterygomaxillary space, infratemporal fossa, orbit and cheek.

Stage IV: Additional intracranial extension.

b) Mishra (26):

Stage I: Tumor confined to the original site.

Stage II: Extension to the adjoining regions.

Stage IIa: Extension to the nose and nasopharynx.

Stage IIb: Extension to the ethmoids, pterygopalatine fossa and contralateral nasal cavity.

Stage IIc: Extension to the antrum, ethmoids and cheek.

Stage III: Skull base extension.

Stage IIIa: Orbit, sphenoid, infratemporal fossa, vertebra invasion.

Stage IIIb: Anterior or middle cranial fossa invasion.

Stage IIIc: Dural involvement.

c) Andrews (5):

Type I: Tumor limited to the nasopharynx and nasal cavity, no bone destruction.

Type II: Pterygopalatjne fossa or maxillary, ethmoid sphenoid sinus invasion with bone destruction.

Type IIIa: Infratemporal fossa or orbital invasion, no intracranial involvement.

Type IIIb: Infratemporal fossa or orbital invasion, with extradural intracranial involvement.

Type IVa: Intracranial intradural tumor; no cavernous sinus, pituitary fossa or optic chiasm involvement.

Type IVb: Intracranial intradural tumor with cavernous sinus, pituitary fossa or optic chiasm involvement.

d) Bremer (23):

Ia: Tumor limited to posterior nares or nasopharynx.

Ib: Extension into one or more paranasal sinuses.

IIa: Minimal involvement of the pterygomaxillar fossa.

IIb: Complete pterygomaxillary fossa or orbital involvement.

IIc: Infratemporal fossa invasion.

III: Intracranial extension.

e) Antonelli (2):

Stage I: Tumor confined to the nasopharynx and/or nasal fossa.

Stage II: Sphenoid sinus and/or pterygomaxillary fossa extension.

Stage III: Maxillary sinus, ethmoid, orbit, infratemporal fossa, cheek or palate invasion.

Stage IV: Intracranial extension.

DIAGNOSIS

A history of nasal obstruction and recurrent epistaxis in a young male patient should be considered suspicious for angiofibroma. Patients may not infrequently be erroneously followed up with diagnoses such as rhinitis, sinusitis, antrochonal polyps or traumatic epistaxis. The next step is a thorough physical examination, indirect and fiberoptic nasopharyngoscopy often revals the typical appearence of the neoplasm. Inattentive examination and biopsy attempts should be avoided in order not to cause massive bleeding.

A nasopharyngeal soft tissue density is generally seen in plain XRay with bone erosion involving the surrounding sphenoid, palatine and maxillary bones. Paranasal sinus opacifications may also be observed secondary to osteomeatal obstruction or due to direct tumoral invasion. Contrast enhanced CT in both axial and coronal planes is the key to the radiological diagnosis of angiofibroma. Generally, tumor mass and bone erosion can be evaluated sufficiently. Anterior bowing of the posterior wall of the maxillary antrum due to gradual widening of the pterygopalatine fissure (Holman-Miller sign), is considered as the typical radiodiagnostical sign of angiofibroma and other rare infratemporal fossa tumors (23), and it is best detected on axial CT scans. MRI is indicated when additional information is necessary for treatment planning, such as in the case of intracranial extension, or previous treatment obscuring the soft tissue planes.

Angiography is generally unnecessary except for cases with substantial intracranial involvement in which combined extracranial-intracranial surgical procedures ere considered. It may also be indicated when preoperative angiography and selective embolization of the feeding vessel is preferred. Ipsilateral internal maxillary artery is the major arterial supply with contributions from branches of the ipsilateral internal carotid and contralateral external carotid arterial systems (22). The characteristic radiologic appearence generally obviates biopsy (27).

TREATMENT

Surgery is the principal treatment modality (2, 5, 22, 23, 27, 28). The surgical techniques may vary from the simplest transnasal to complex

skull base procedures depending on the extension of the tumor. Since the clinical presentation of angiofibroma encompasses a wide variety of lesions in various locations, many different and imaginative surgical approaches were determined for the surgical treatment. These are; endoscopic transnasal, transpalatal, suprahyoid pharyngotomy, midfacial degloving, lateral rhinotomy, medial maxillectomy, facial translocation, infratemporal fossa and other skull base procedures and combined extracranial intracranial approaches.

Transnasal endoscopic excision may be feasible for tumors limited to the nasopharynx, nasal cavity and paranasal sinuses with minimal extension into the pterygopalatine fossa (29, 30). However, the trend towards performing more skull base surgical procedures with increasing skills decreased the morbidity and recurrence rate of previous surgery (31).

Hormonal therapy was advocated as an adjunctive treatment in cases of intracranial residual or recurrent tumors which can not be surgically removed. Testosterone receptor blockers may reduce the growth rate of angiofibroma, suggesting their use in the preoperative period offering the possibility of reduced blood loss (9, 32).

Radiotherapy is generally accepted as a treatment modality in cases with extensive skull base and intracranial involvement (33, 34). Some centers report high control rates following a low dose primary radiotherapy course over 3 weeks (35). The radiotherapy effect is on the tumor vasculature inducing fibrosis and volume reduction producing alleviation of symptomatology. However, only subtotal tumor regression could be obtained (36,37,38). Radiotherapy may adversely affect facial skeletal growth and even induce malignant transformation, most commonly to fibrosarcoma (22, 39, 40).

The value of embolization in treatment the of angiofibroma is controversial. Preoperative superselective embolization with various substances may be utilized in order to shrink the tumor mass to reduce the intraoperative blood loss. Surgery should be performed within a few days, otherwise recanalization of the occluded vessels and neovascularization of the tumor may remove the effectivity of embolization (41). Ligating the branches of the internal maxillary artery early during the surgical procedure or temporary ligation of the ipsilateral external carotid artery may decrease bleeding comparable to that obtained by embolization. Some reports emphasize the significant benefit in terms of blood loss during surgery while others have found no differences betweeen the embolized and nonembolized groups (2, 42, 43, 44). It has not received widespread acceptance due to the relatively low benefits in contrast to significant risks (45, 46, 47).

Chemotherapy was advocated for residual or recurrent tumors with intracranial extension involving vital structures (47). Other treatment modalities such as electrocoagulation, cryo-surgery, sclerotherapy and intersitial irradiation have, for the most part been discarded (23).

Angiofibroma has a marked tendency to recur if not completely removed (2,23,27). The reported recurrence rates vary between 17-37.5 % (23, 30, 45,49). Recurrences most commonly occur during the first year after treatment and are unusual after 2 or more years (23). The stage of the tumor is the primary factor affecting tumor recurrence (49), it is more common in patients with intracranial involvement. Failure to remove extensions of the tumor because of inadequate surgical exposure and failure to recognize intracranial extension are the most common reasons of recurrence.

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