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Review Article

Nasal haemangiopericytoma: report of two cases with literature review

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Abstract
Haemangiopericytoma (HPC) is a rare vascular tumour produced by proliferation of pericytes. One hundred and thirty-three cases of HPC have been reported in the nose and the paranasal sinuses. We present two more cases. Wide surgical excision via lateral rhinotomy, midfacial degloving, or endonasal removal is the treatment of choice. Radiotherapy has been used post-operatively in cases of incomplete removal. Life-long follow-up is required to evaluate local recurrence and late metastases.

Key words: Haemangiopericytoma; Nose; Paranasal sinuses

Introduction

Haemangiopericytomas are rare vascular tumours formed by the proliferation of pericytes. These cells with contractile properties are involved in the changing of the calibre of the capillary lumen. Immunohistochemical studies show that they express strong positive staining for vimentin.

These ultrastructural features are useful to determine a diagnosis, which is usually difficult. One hundred and thirty-three cases of haemangiopericytoma arising in the nose and paranasal sinuses have been reported so far in the literature (Osammor and Howat, 1991; Catalano *et al.*, 1996; Hekkenberg *et al.*, 1997). This report describes two new cases.

Case 1

A 53-year-old man presented in March 1995 with a three month history of unilateral nasal obstruction and anosmia. No epistaxis was noted. ENT examination showed a large purple mass in the left nasal fossa. The mass was smooth, soft and bled when touched. A previously taken biopsy was not contributive. Computerized tomodensitometry (CT) and arteriography showed a large tumour arising from the ethmoidal roof without any abnormal vessels. There was no bone destruction. The patient was operated on via a midfacial approach with degloving and the mass was completely removed. Histology showed a low grade haemangiopericytoma because there was no cell division nor necrosis. The tumour cells were positive for actin and vimentin. Post-operative recovery was uneventful. Chest X-rays and liver function tests showed no evidence of metastasis. The tumour has not recurred during a two year follow-up.

Case 2

A 53-year-old man was referred to the department in January 1992 for a second opinion. He had had a unilateral nasal obstruction on the left side for six months, which was associated with a squamous cell carcinoma of the posterior pillar of the left tonsil. Polychemotherapy had been started in another centre. ENT examination indicated that there were two different tumours. Biopsies confirmed the haemangiopericytoma in the left nasal fossa, and the squamous cell carcinoma in the oropharynx. A CT scan showed a tumour occupying the whole nasal fossa and spreading into the ipsilateral maxillary sinus, and confirmed the presence of a superficial and localized tumour of the tonsil. A lateral rhinotomy through a trans-facial approach was used to remove the haemangiopericytoma, associated to a surgical résection of the lateral and posterior wall of the oropharynx, through a trans-mandibular approach and bilateral neck dissection. Histological studies showed complete removal of both tumours with free margins and without invasion of the lymph nodes. The haemangiopericytoma showed no evidence of malignancy. The patient has

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been followed up for four years. He was seen in May 1996 for a recurrence of the pharyngeal carcinoma on the left lateral wall of the oropharynx. He was treated by radiotherapy and the result was complete regression of the tumour. The tumour was still in regression 10 months after the end of radiotherapy. ENT examination and CT showed no recurrence of the haemangiopericytoma.

Pathology

Histology showed spindle-cell tumours, containing ectatic vessels in both cases. There was no invasion of the overlying mucosa. The cells were fusiform with some mitotic figures in *Case 2*. Some cells showed vacuolation of the cytoplasm. Mucin stains were negative. Reticulin was present around individual cells. Immunohistochemistry was positive for vimentin and actin in the first case and for vimentin only in the second case (Figure 1). Epithelial, vascular, and neural markers were negative. Electron microscopy showed spindle-shaped or stellate cells lying outside the basal lamina of the vessels. Bundles of intermediate filaments were present in the cytoplasm with mitochondria, some rough endoplasmic reticulin and free ribosomes. The cells were arranged in an orderly fashion around blood vessels (Figure 2). The tumour cells were segregated from the vascular epithelium by a multilayer basal lamina.

Discussion

Haemangiopericytoma (HPC) was first described by Stout and Murray in 1942, while studying the glomus tumour. Stout reviewed all published reports in 1949 and added 25 new cases, establishing haemangiopericytoma as discrete entity. It differs from capillary haemangioma, in which fine vessels make up the mass of the tumour, from haemangioendothelioma, in which there is proliferation of endothelial cells in a tumour of small blood vessels, and from glomus tumour, which consists of nests of endothelial cells in a tumour of small blood vessels, epithelioid cells and vascular channels, and may be painful due to the presence of neural elements.

The English literature has been reviewed and a total of 133 cases were identified (Gudrun, 1979; Abdel-Fattah *et al.*, 1990; Catalano *et al.*, 1996). Seventy-two cases are summarized in Table I. The reported ages range from four months to 83 years, with a mean age of 55 years (52 years for men, 56 years for women). The ratio of men to women is 1:1. Nasal obstruction and epistaxis are the common presenting symptoms. Sinonasal HPC generally involved the nasal cavity along with one or more sinuses. The collected cases, not including our cases, revealed a recurrence rate of 18 per cent. Most of the recurrences were single and occurred within the first five years after surgery. However, first recurrences

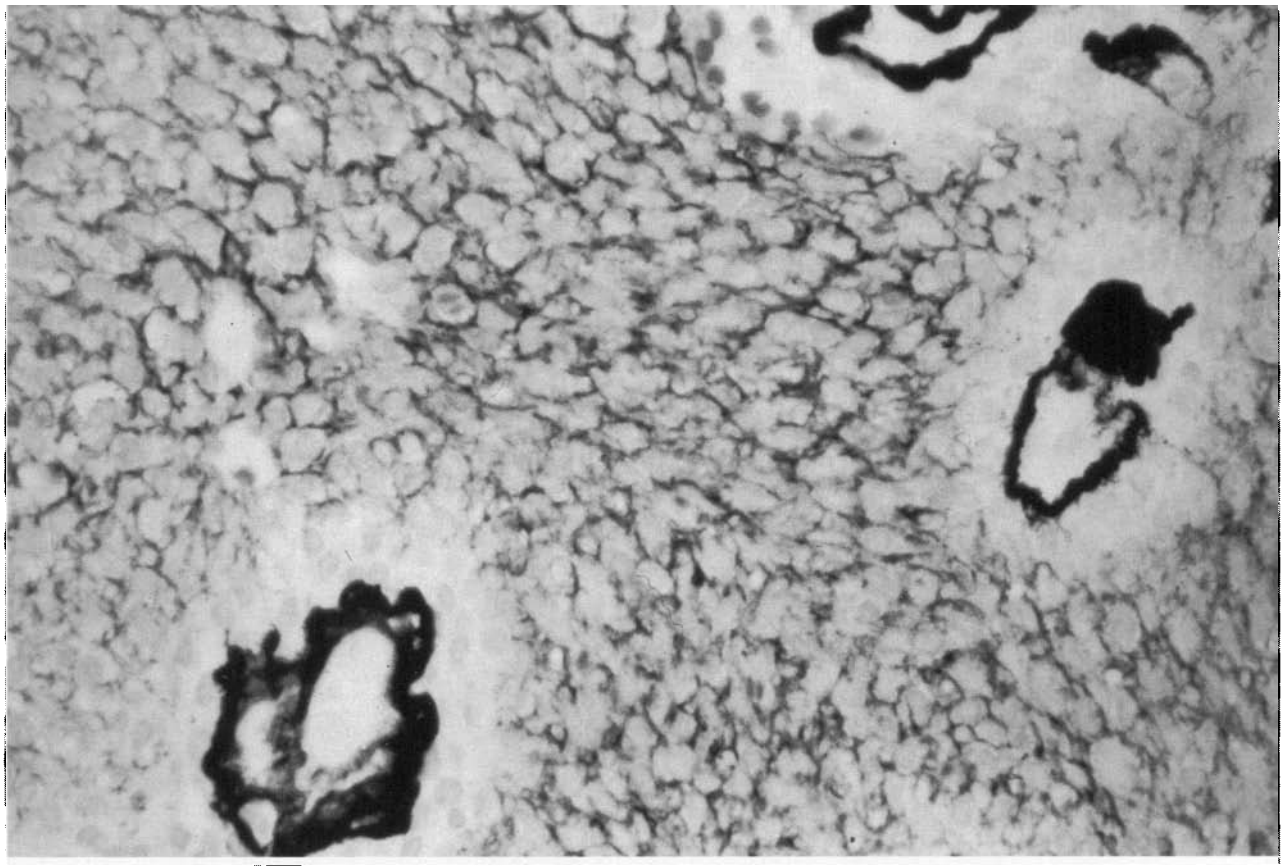

FIG. 1

Immunostaining for vimentin showing the dense network surrounding the vascular channels and the tumour cells. (Vimentin × 150)

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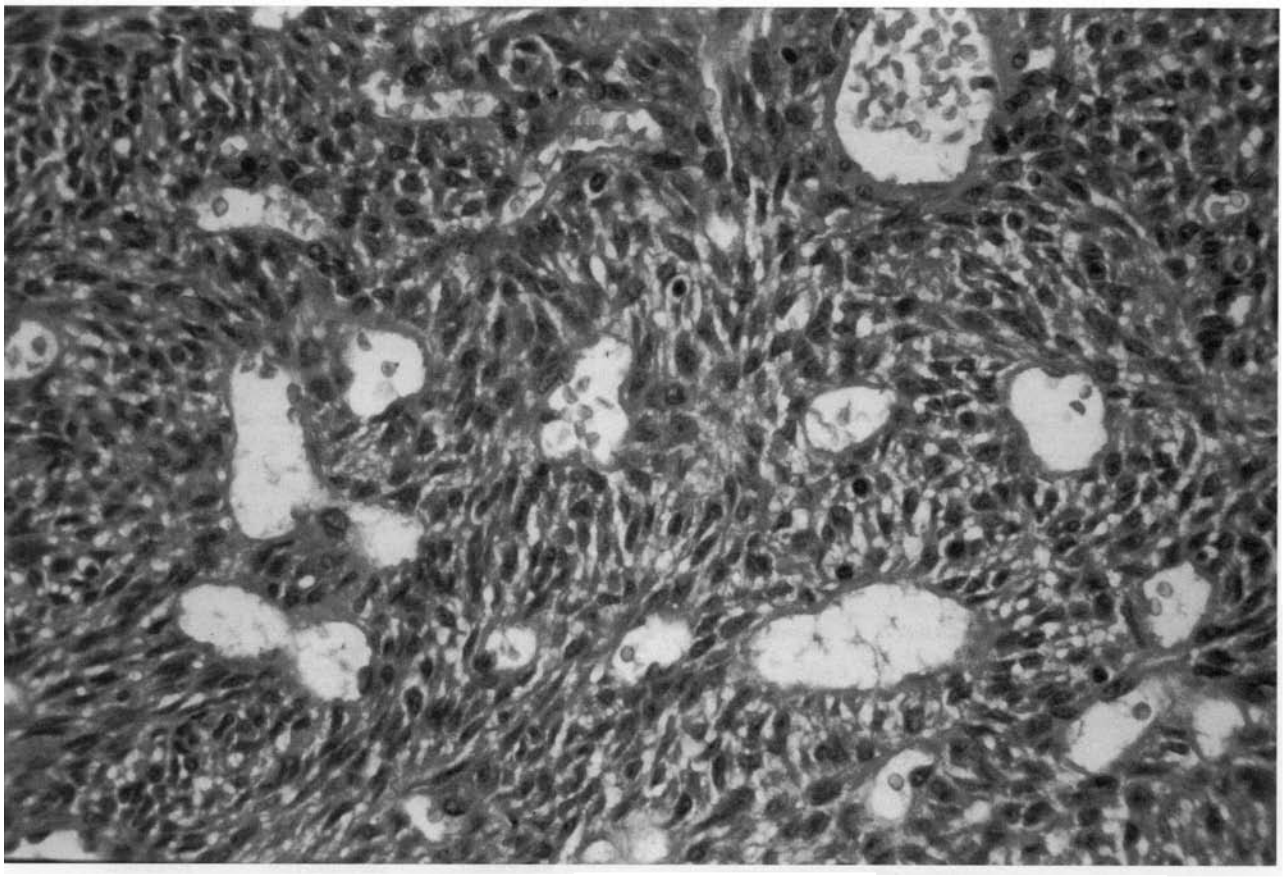

FIG. 2
Histological aspect of the tumour showing tightly packed cells surrounding the vascular channels lined by a single layer of endothelial cells. (H & E; × 100)

after the first 10 years have been noted in two cases, suggesting that patients should be carefully followed for at least 10 years before being considered 'cured'.

Zimmerman used the name pericytes in 1923. Pericytes are round or spindle-shaped cells with long branching cytoplasmic processes that cover the outer walls of capillaries. Pericytes are eventually transformed into mature smooth muscle cells. They are thought to regulate the size of the lumen of capillaries and synthesize their own basement membrane and adjacent collagen fibres (Rhodin, 1968). A fine sheath of reticulin can be seen around capillaries, separating them from the pericytes. The tumour is usually described as a soft slowly-growing, locally infiltrative and occasionally metastatic lesion that can reach a considerable size before clinical symptoms are detected. The submucosal location and intraluminal growth of these tumours, which are not specific in haemangiopericytomas at sites other than the head and neck, makes them likely to cause ulceration of the surface epithelium resulting in haemorrhage, inflammation and collagen deposition. These features have led to misdiagnosis (Eichhorn *et al.*, 1990).

The cells' characteristics and nuclear features that are useful for the diagnosis were described by Compagno and Hyams in 1976. They include absence of or minimal mitotic activity, a clear distinction of normal vessels from tumour cells, uniform spindle-shaped cells with little or no overlapping of cell borders, absence of necrosis and the presence of scattered mast cells.

McMaster *et al.* (1975) categorized HPC histologically as benign, borderline or malignant. Tumours having a slighter degree of cell anaplasia or one mitotic figure per 10 high-power fields, or those having a moderate degree of cell anaplasia and one mitotic figure per 20 high-power fields were predicted to have malignant properties. Enzinger and Smith (1976) emphasized that four or more mitotic figures per 10 high power fields indicated rapidly growing tumours capable of recurrence and metastasis. They also suggested that malignant HPC tend to have more cells, with cellular polymorphism, necrosis and haemorrhage. Although these categories exist, the natural history of the disease is not correlated with the histological grading and is rather unpredictable, even if the tumour is benign histologically. A large tumour size (>6.5 cm) has been correlated with poorer outcomes (McMaster *et al.*, 1975). Distant metastases occur in 20–50 per cent of HPC involving all body sites, and in about 10 per cent of cases involving the head and neck only (Walkie and Bailey, 1971).

Immunoperoxidase staining for vimentin showed that this protein was the only antigen strongly and reproducibly detected in all 10 cases studied by Eichhorn *et al.* (1990). This is in agreement with our

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TABLE I

(ADAPTED FROM GUNDRUN, 1979; CHAWLA AND OSWAL, 1987) REVIEW OF THE MAIN SERIES OF SINUSONASAL HAEMANGIOPERICYTOMA (1949–1998)

N	Year	Author	Age	Sex	Symptoms	Duration	Site	Spread	Treatment	Follow-up
1	1949	Stout	66	F	Epistaxis		Ethmoid sinus	Orbit	Excised 4 times in 7 years	Died one month after the last operation
2	1952	Wise (1)					Maxillary sinus			
3	1959	Woodson	52	F	Epistaxis		Left middle meatus	Nasopharynx	Excised by snare. Followed by radiotherapy 30 Gy	No recurrence for 3 years
4	1961	Murashima	4	F	Massive epistaxis		Right nasal cavity	Nasal septum, antrum and nasopharynx involved	Incomplete excision via lateral rhinotomy. Radium needles inserted 42 Gy	Died 3 weeks later due to general cachexia
5	1963	Powel and Suehs (1)					Maxillary sinus			
6	1964	Rhodes *et al.*	53	M	Nasal obstruction	3 years	Left spheno-ethmoid recess	Nasopharynx	Excised by nasal snare via post-nasal space	No recurrence for 3 years
7	1964	Rhodes *et al.*	57	F	Epistaxis	13 years	Nasal septum	Nasal septum eroded	Excised via lateral rhinotomy. 10 radons seeds implanted into nasal septum	No follow-up
8	1964	Rhodes *et al.*	51	M	Nasal obstruction	12 years	Right cribriformis plate	Nasal septum eroded	Benign tumour removed 8 years before. Excised *via* lateral rhinotomy	Post-operative CSF leak. No recurrence for 16 months
9	1965	O'Brien and Brasfield (1)					Maxillary sinus			
10	1968	Gill and Mehra	62	F	Nasal obstruction and epistaxis	6 years	Left ethmoid region	None	2 excisions in 3 years. Excised via external ethmoidectomy	No recurrence for 2 years
11	1968	Lenczyk	35	M	Recurrent Epistaxis	20 years	Roof of right nasal cavity	Erosion of cribriform plate	3 local excisions in 17 years. Removed via craniotomy-lateral rhinotomy approach	No recurrence for 2 years
12	1970	Eneroth *et al.*	50	M	Epistaxis	1 month	Left ethmoid region	Cribriform plate and left lateral wall excised	Excised via Denker's operation with block dissection. First diagnosis: anaplastic carcinoma. Radiotherapy 30 Gy	Neck lymph nodes 12 years later. Re-excised. Diagnosis: HPC
13	1970	Eneroth *et al.*	80	F	Nasal obstruction		Right nasal cavity	None	Polyp removed 2 years before, diagnosis: spindle cell sarcoma. Local excision followed by radiotherapy 27 Gy	No recurrence for 5 years
14	1970	Eneroth *et al.*	29	F	Nasal obstruction	6 months	Right posterior ethmoid	Nasopharynx	Excised via Denker's operation with ethmoidectomy	No recurrence for 18 months
15	1972	Alli and Singh	26	F	Nasal obstruction	10 months	Left ethmoid	None	Local excision	No recurrence for 5 years
16	1972	Shukla *et al.* (1)					Maxillary sinus			
17	1973	Anderson and DeSanto (1)					Right nasal cavity			
18	1973	Hahn *et al.*	12	M	Nasal obstruction		Left ethmoid	None	Excised with snare. Recurred 6 months later, re-excised.	No follow-up notes
19	1973	Benveniste and Harris	24	M	Epistaxis	8 years	Right ethmoid	None	Polypoid tumour removed with partial ethmoidectomy one year previously. Diagnosis: capillary haemangioma. Re-excised with cryoprobe	No recurrence for 2.5 years
20	1976	Caldarelli and Sperling (1)					Maxillary sinus			
21	1979	Gudrun	61	M	Nasal obstruction	6 months	Right ethmoid	Nasopharynx, Frontal sinus, Nasal cavity, anterior cranial fossa	Excision by lateral rhinotomy and post-operative radiotherapy 55 Gy	No recurrence for 18 months
22	1981	Aufdemorte (1)					Nasal cavity			
23	1981	Kimmelman	51	F	Nasal obstruction	6 months	Right posterior ethmoid and sphenoid sinus		Excision by right external ethmoidectomy approach. Subcutaneous nodule appeared in scar. Radiotherapy 50.4 Gy. Nodule disappeared	No recurrence for 6 months

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24	1983	Batsakis *et al.*	79	F	Nasal obstruction		Nasal septum	Left ethmoid	Nasal mass removed by snare avulsion. Recurrence 2 years later, forceps removal	No recurrence for 6 months
25	1983	De Campore *et al.*	56	M	Nasal obstruction	2 years	Right middle turbinate		Removed by endonasal approach and followed by radiotherapy	No follow-up notes
26	1984	Tadwalker *et al.*	57	F	Epistaxis	3 years	Left ethmoid	Maxillary antrum	Lateral rhinotomy	No recurrence for 1 year
27	1984	Atkinson *et al.*	8	M	Nasal obstruction		Right nasal fossa		Lateral rhinotomy Recurrence 3 months later. Re-excised	No recurrence for 4 years
28	1985	Gupta *et al.*	16	M	Nasal obstruction. Difficulty in speech Facial swelling	6 months	Both maxillae	Nasal cavity	Bilateral anterior subtotal maxillectomies. Post-operative radiotherapy 45 Gy	No recurrence for 4 years
29	1986	Rupa and Bhanu (1)					Ethmoid sinus			
30	1987	Chawla and Oswal	33	F	Nasal obstruction. Epistaxis	3 years	Septum	Nasopharynx	Mass excised through nose. Recurrence 14 months later. Lateral rhinotomy and tumour bearing area excised with CO2 laser. Recurrence after 11 months. Excised with CO2 laser via Denker's approach	No recurrence for 2 years
31	1987	Chawla and Oswal	56	F	Nasal obstruction. Epistaxis	1 year	Lateral wall	Nasopharynx	Lateral rhinotomy	No recurrence for 3 years
32	1987	Chawla and Oswal	56	M	Proptosis and epiphora left eye	6 months	Left ethmoid		Extended lateral rhinotomy. CSF leak during surgery	No recurrence for 8 months
33	1988	Al-Khalifa *et al.*	23	M	Epistaxis Nasal obstruction	2 weeks	Nasal septum on the left side		Intranasal resection	No recurrence for 3 years
34	1990	Abdel-Fattah *et al.*	42	M	Pain in the cheek		Right maxillary sinus	Middle cranial fossa and infratemporal fossa	Caldwell-Luc approach massive haemorrhage Pre-operative embolization temporal resection, radical maxillectomy, infratemporal resection through mandibulotomy approach	No recurrence for 3 years
35	1990	Abdel-Fattah *et al.*	54	M	Severe epistaxis		Left middle turbinate	Left ethmoid and sphenoid	Craniofacial resection	No recurrence for 18 months
36	1990	Eichhorn *et al.*	46	M	Epistaxis		Left middle turbinate		Polypectomy	3 recurrences during 13 years
37	1990	Eichhorn *et al.*	64	M	Nasal obstruction		Right middle turbinate	Ethmoid	Excision 1 recurrence after 1.6 year Re-excision	No recurrence for 2 years follow-up
38	1990	Eichhorn *et al.*	72	M	Epistaxis		Left nasal cavity		Polypectomy	No recurrence for 2 years
39	1990	Eichhorn *et al.*	77	F	Watery rhinorrhoea		Right posterior nasal septum		Right lateral rhinostomy	No follow-up
40	1990	Eichhorn *et al.*	70	F	Watery rhinorrhoea		Roof of right nasal cavity		Resection, post-operative irradiation	No recurrence for 10.3 years
41	1990	Eichhorn *et al.*	42	F	Nasal obstruction		Left maxillary sinus	Left nasal cavity, retrobulbar area, sphenoethmoid sinuses	Biopsy and irradiation recurrence after 6 years	9 years
42	1990	Eichhorn *et al.*	35	F	Watery rhinorrhoea		Left nasal cavity	Left maxillary, left ethmoid and bifrontal sinuses	Embolization, two-stage resection	No recurrence for 8 years
43	1990	Eichhorn *et al.*	50	F	Epistaxis		Left middle turbinate		Polypectomy recurrence after 17.5 years Re-excision	20 years
44	1990	Eichhorn *et al.*	52	M	Epistaxis		Left middle and inferior turbinate		Left lateral rhinotomy	No recurrence for 1.75 year
45	1990	Eichhorn *et al.*	59	M	Epistaxis		Left ethmoid sinus	Left nasal cavity and maxillary sinus	Resection	No recurrence for 6 years
46	1990	Eichhorn *et al.*	73	F	Not known		Left nasal cavity		Polypectomy	2 months follow-up
47	1990	Park *et al.*	68	M	Nasal obstruction. Epistaxis	3 years	Left nasal fossa		Endonasal removal	No follow-up notes
48	1990	Anand *et al.*	3 months	M	Epistaxis	1 week	Left inferior turbinate and maxillary antrum	Left maxillary sinus	Left lateral rhinotomy	No recurrence for 9 months

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49	1990	Reiner *et al.*	29	M	Nasal obstruction	9 months	Left nasal fossa	Left maxillary sinus and nasopharynx	Left lateral rhinotomy	No recurrence for 5 years
50	1991	Osammor and Howat	54	F	Nasal obstruction	10 months	Left middle turbinate		Endonasal removal Recurrence after 3 months Re-excision through a left lateral rhinotomy	No recurrence for 9 months
51	1992	Delsupehe *et al.*	77	M	Epistaxis	1 year	Right nasal fossa	Right ethmoid sinus	Right lateral rhinotomy with sphenoethmoidectomy	No recurrence for 3.5 years
52	1992	Delsupehe *et al.*	39	M	Nasal obstruction	6 months	Left lower turbinate	Left maxillary, ethmoid and frontal sinuses	Left lateral rhinotomy with sphenoethmoidectomy	No recurrence for 3.5 years
53	1992	Delsupehe *et al.*	30	M	Nasal obstruction Epistaxis	6 months	Left lower turbinate	Right maxillary, ethmoid and frontal sinuses	Endonasal and Caldwell Luc approach	No recurrence for 1.5 year
54	1994	Millman *et al.*	61	M	Nasal obstruction Epistaxis	2 months	Right nasal fossa	Right maxillary, ethmoid and frontal sinuses	Right lateral rhinotomy	No recurrence for 1.5 year
55	1994	Millman *et al.*	54	M	Nasal obstruction Epistaxis	2 years	Left nasal fossa	Left ethmoid and sphenoid sinuses	Left lateral rhinotomy	No recurrence for 22 years
56	1994	Millman *et al.*	67	F	Epistaxis	4 years	Right nasal fossa	Right sphenoid and ethmoid sinuses	Right lateral rhinotomy	No recurrence for 7 years
57	1996	Mangwana *et al.*	28	F	Epistaxis	6 years	Left nasal fossa	Left ethmoid and maxillary sinuses	Left lateral rhinotomy	No recurrence for 1 year
58	1996	Catalano *et al.*	66	F	Nasal obstruction Headache		Sphenoid, ethmoid, maxillary sinuses		Lefort 1 maxillotomy	No recurrence for 5 months
59	1996	Catalano *et al.*	50	F	Nasal obstruction Epistaxis		Nasal cavity	Frontal sinus	Craniofacial resection Recurrence after 12 years resection of infratemporal fossa, mandible. Metastasis	Persistent disease after 14 years
60	1996	Catalano *et al.*	79	F	Epistaxis		Nasal cavity	Lateral nasal wall, ethmoid, cribiform plate	Polypectomy Recurrence after 3 years Craniofacial resection	No recurrence for 5 years
61	1996	Catalano *et al.*	83	F	Pain		Ethmoid Nasal cavity	Nasopharynx, cribriform plate	Medial maxillectomy	No recurrence for 13 months
62	1996	Catalano *et al.*	74	M	Epistaxis		Nasal cavity	Maxillary, ethmoid sinuses	Polypectomy recurrence after 5 years Medial maxillectomy external ethmoidectomy	No recurrence for 8 years
63	1996	Catalano *et al.*	20	F	Nasal obstruction		Nasal cavity	Sphenoid, ethmoid cribriform plate	Craniofacial resection	No recurrence for 16 months
64	1996	Catalano *et al.*	33	F	Epistaxis		Nasal cavity		Lateral rhinotomy	No recurrence for 3 months
65	1997	Hekkenberg *et al.*	27	F	Nasal obstruction		Ethmoid Nasal cavity	Nasal septum cribriform plate	Medial maxillectomy ethmoidectomy, sphenoidotomy	No recurrence for 3 months
66	1997	Hekkenberg *et al.*	55	F	Right proptosis		Ethmoid sinus	Frontal sinus, medial orbital wall	Lateral rhinotomy and craniofacial resection	No recurrence for 3 months
67	1997	Hekkenberg *et al.*	64	F	Epistaxis	7 years	Left nasal cavity	Maxillary, ethmoid sinus up to the cribriform plate	Medial maxillectomy through lateral rhinotomy approach	No recurrence for 11 months
68	1997	Hekkenberg *et al.*	64	M	Nasal obstruction Epistaxis	3 years	Right nasal cavity	Ethmoid, maxillary sinus	Polypectomy recurrence after 1 year Medial maxillectomy through lateral rhinotomy approach	No recurrence for 16 months
69	1997	Hekkenberg *et al*	59	F	Epistaxis	5 years	Right nasal cavity	Ipsilateral ethmoid sinus	Medial maxillectomy, ethmoidectomy, sphenoidotomy via lateral rhinotomy	No recurrence for 19 months
70	1997	Hekkenberg *et al.*	69	F	Nasal obstruction	5 years	Ipsilateral maxillary, ethmoid sinus		Medial maxillectomy, ethmoidectomy, sphenoidotomy via lateral rhinotomy	No recurrence for 26 months
71	1997	Hekkenberg *et al*	66	M	Nasal obstruction	4 months	Left nasal cavity		Medial maxillectomy via lateral rhinotomy	No recurrence for 31 months
72	1997	BhattaCharyy *et al.*	67		Left epistaxis	3 months	Left nasal cavity	Left posterior ethmoid and sphenoid sinus	Resection through transpalatal approach recurrence after 3 years Endoscopic intranasal resection	No recurrence for 2 years

(1): cited by Abdel-Fattah *et al.*

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finding that immunohistochemistry for vimentin showed focal sites only. Epithelial, neural, and vascular markers were negative. Muscle markers are usually negative but in one case, we found a weak immunoreactivity for actin, which might be consistent with the role of pericytes as regulators of the vascular lumen. Electron microscopy has been described by many authors (Hahn *et al*, 1973; Nunnery *et al*., 1981; Batsakis *et al*., 1983; Mittal *et al*., 1986; Eichhorn *et al*., 1990).

The treatment of choice is wide surgical excision. Pre-operative embolization has been reported to provide better surgical result (Birzgalis *et al*., 1990). The use of the endoscope for resection may be limited by several factors including a large tumour or septal deviation. In addition tumours with intracranial extension, orbital involvement or invasion of the pterygopalatine fossa would not be amenable for endoscopic resection (Bhattacharyya *et al*., 1997). The endoscopic approach must be tempered with the malignant nature of this lesion and the tendency for delayed recurrence. The use of radiotherapy and chemotherapy as adjuvent treatments is still controversial. Radiotherapy alone is reported to have a cure rate of only 13.3 per cent (Batsakis, 1979).

HPC metastasize via lymphatics and the blood stream to the lungs, bone, liver and local lymph nodes (Gudrun, 1979). However, regional lymph node involvement is very unusual. Lungs and skeleton are the most frequent sites for distant metastases (Batsakis, 1979). Distant metastases of haemangiopericytoma are difficult to differentiate from sarcomatous secondary lesions. The local recurrence rate for HPC of the nasal cavity range from eight to 53 per cent (Batsakis *et al*., 1983; Reiner *et al*., 1990). Recurrences seem to occur because of incomplete excision and may not appear for many years. In view of the common local recurrence and the very late appearance of metastases, life-long follow-up is required (Walkie and Bailey, 1971).

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