

# Metastasis of Meningioma: A Rare Differential Diagnosis in Subcutaneous Masses of the Scalp

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## Abstract

**Background:** Subcutaneous masses of the scalp have a wide range of differential diagnosis. After removal of a meningioma in the patient's history, scalp metastasis from the previously resected meningioma should be considered.

**Methods:** A 86 year old patient presented with a local swelling on the left temporal forehead and no other clinical symptoms. Eleven years earlier an extra-axial meningioma was resected. The patient was receiving immunosuppressive therapy subsequent to kidney transplantation. After clinical examination and MRI, a lipoma was suspected. The mass was resected under local anesthesia.

**Results:** Histopathology revealed a metastasis of the previously removed meningioma (WHO grade II). No further treatment was recommended. Clinical follow-up was without pathological findings so far.

**Conclusion:** Scalp metastases of meningiomas are a rare finding. However, if patient history reveals removal of a meningioma, scalp metastasis must be a differential diagnosis for subcutaneous masses even years after the initial surgery.

**Keywords:** Meningioma metastasis; Skin lesion; Subcutaneous mass

## Introduction

Meningiomas are neoplasms of the meningoendothelial cells of the arachnoidal layer covering the brain. Metastasis has been reported in less than 1 per 1000 patients [1] and only 15 cases of scalp metastases have been described in literature [2]. Usually, the scalp metastasis is located near the craniotomy site. The suggested most common mechanism is intraoperative seeding. However, up to 20% of all intracranial meningiomas develop a synchronous extracranial extension [3]. Therefore, expansion of the primary tumor to the subcutaneous tissue or skin (invasive tumor growth) is also a possible pathomechanism [1]. Risk factors for scalp metastases include multiple surgeries, piecemeal resection of the primary tumor, immunosuppression, cerebrospinal fluid fistulae, radiation therapy and delayed wound healing [1]. There is a broad spectrum of clinical differential diagnoses for subcutaneous masses of the scalp including nevus sebaceous, epidermoid cyst, fibroma, hemangioma, lipoma, verrucous hamartoma and alopecia areata. From a histopathological point of view, metastases of meningiomas have to be differentiated from squamous cell carcinoma, hemangioma, giant cell fibroblastoma, perineuroma, myoepithelioma, angiosarcoma and cellular fibrous histiocytoma [1].

## Materials and Methods

An 86 year old patient was referred to our outpatient clinic with a progressively enlarging local swelling on the left temporal forehead first identified 18 months before (Figure 1). Although the patient had never reported pain or other neurological symptoms related to the lesion, the patient requested its removal for aesthetic reasons.

The medical history of the patient revealed renal transplantation at the age of 69 and therefore continuing immunosuppressive therapy. At the age of 73, an atypical, left frontal located, extra-axial meningioma WHO grade II was diagnosed (Figure 2). This was completely removed through coronar incision craniotomy. In the same year, a bronchial adenocarcinoma (pT1a pN0) of the right inferior lobe was treated with



**Figure 1:** Clinical aspect of the subcutaneous mass at presentation.

right inferior lobectomy, lymph node dissection and partial pleurectomy. At the age of 74, the patient received radiation therapy with a total of 50 Gy over 5 fractions for a second mass in the superior lobe of his left lung.

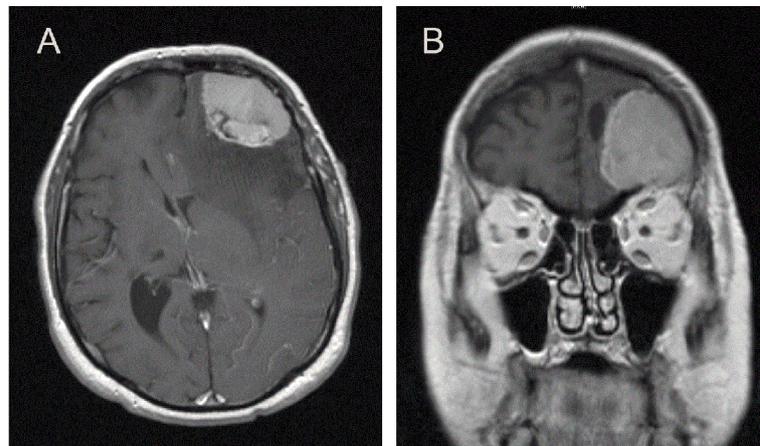
Clinical examination of the forehead showed a subcutaneous,

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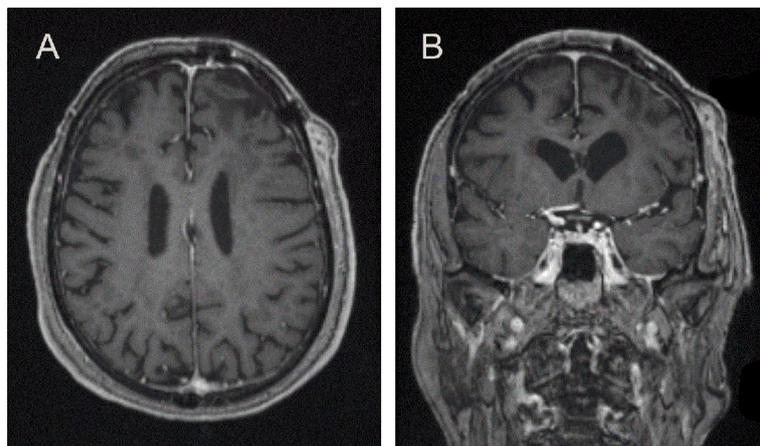
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**Figure 2:** (A) Axial post contrast T1-weighted image depicting the intra-axial meningioma, (B) Coronal post contrast T1-weighted image of the meningioma (courtesy of Kantonsspital Baselland, Liestal).



**Figure 3:** (A) Axial post contrast T1-weighted image depicting the metachronous skin metastasis 12 years after resection of the meningioma in proximity to the craniotomy site, (B) Coronal post contrast T1-weighted image of the skin metastasis (courtesy of University Hospital Basel).

painless mass with a diameter of  $1.5 \times 2$  cm close to the left lateral craniotomy site. The mass was covered by unsuspecting skin and movable on the fascia.

Because of the patient's history of a meningioma, a MRI scan was carried out. The scan revealed a subcutaneous, contrast enhancing mass with a size of  $22 \times 8$  mm (Figure 3). Radiographical findings revealed no suspicion for a recurrence of the resected meningioma.

## Results

The patient underwent surgical resection of the mass under local anesthesia. Intraoperatively, the mass was located subcutaneously, did not infiltrate the surrounding muscle tissue or bone and had a lipoma-like aspect. No postoperative complications occurred.

Histological analysis revealed a metastasis of the initial meningioma (WHO grade II). Hematoxylin and eosin stained paraffin sections revealed a typical meningothelial meningioma with lobules of meningothelial cells. These cells were positive for epithelial membrane antigen (EMA) and progesterone receptor by immunohistochemistry and a maximum of 5% of tumor cells were positive for Ki-67 (Figure 4).

The findings were discussed at the multidisciplinary meeting. Recommendations were limited to clinical follow-up. At present, there is no sign for local recurrences.

The patient consented to publication.

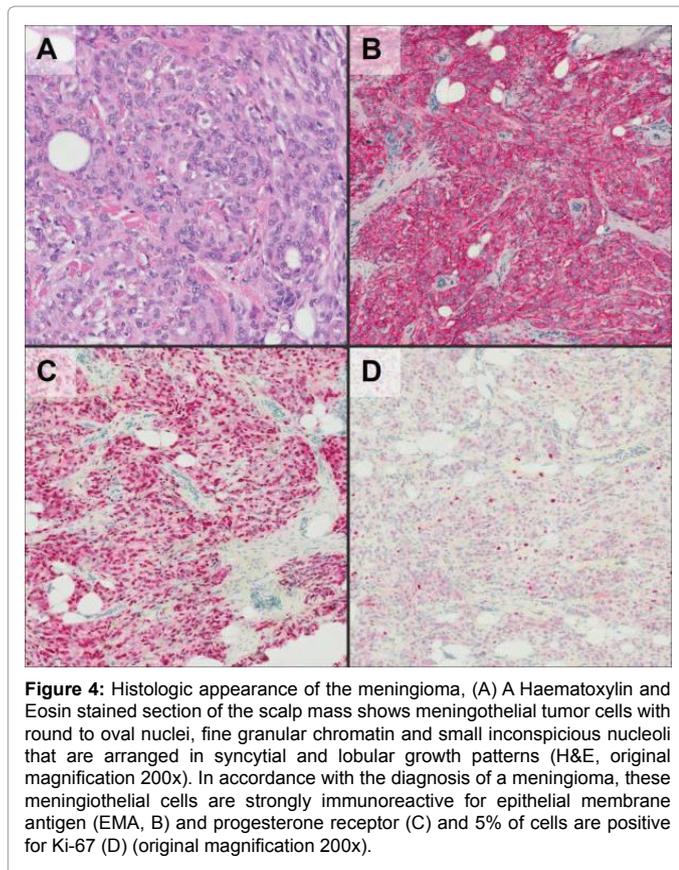
## Discussion

Including our case, 16 cases of scalp metastases of meningiomas have been described in literature [1] (Table 1). In the presented case, there was one risk factor (the immunosuppressive therapy). Other risk factors, as multiple surgeries, radiation therapy, cerebrospinal fluid fistula or wound breakdown after initial resection, could not be identified. The time range between primary resection of the meningioma and clinical manifestation of the metastasis was 11 years, corresponding to the described time range in literature (between 1 year and 6 months and 16 years). Histopathologically, the metastasis was classified a WHO grade II meningioma which seems to be a common finding (10 out of 16 cases according to the literature). A manifestation of the adenocarcinoma of the lung was ruled out by immunohistochemistry.

Subcutaneous masses have a plethora of differential diagnosis

Patient	Age, years/ Sex	Extent of Resection	Tumor Topography	WHO Grade	Radiotherapy*	Surgical Wound Problems/ CSF Fistula	No. Operations	Location of the Scalp Recurrence	Time Interval	No. Scalp Recurrences	WHO Grade at Scalp Metastasis	Follow Up
1	86/M	Total	frontal, extra axial left	II	No	No	1	Proximity of Craniotomy	12 years	1	II	4 years
Avecillas-Chasin et al. [2]	61/M	Simpson I	Convexity	I	No	No	3	Craniotomy site	12 years	2	II	24 years
Avecillas-Chasin et al. [2]	64/M	Simpson II	Anterior cranial base	I	No	No	5	Surgical scar	13 years	3	I	19 years
Avecillas-Chasin et al. [2]	67/M	Simpson III	Parasagittal	II	Yes	Yes	3	Surgical scar	5 months	1	III	1 year, 6 months
Avecillas-Chasin et al. [2]	72/M	Simpson II	Parasagittal	I	Yes	Yes	4	Craniotomy site	7 years	4	III	13 years
Waterson et al. [4]	36/M	Partial	Anterior cranial base	NR	NR		2	Craniotomy site	16 years	1	NR	
Singh et al. [5]	42/F	Total	Anterior cranial base	I	No		1 reported	Surgical scar	1 year 9 months	2	I	
Lüdemann et al. [6]	11/M	Total	Convexity	III	NR		1	Surgical scar	6 months	1	III	
Spagnuolo et al. [7]	76/F	Total	Convexity	I	NR		3	Craniotomy site	4 years	2	II	
Spagnuolo et al. [7]	52/M	Subtotal	Parasagittal	I	NR		2	Craniotomy site	3 years	1	II	
Akai et al. [8]	70/F	Total	Parasagittal	I	Yes		3	Surgical scar	3 years 6 months	1	II	
Darwish et al. [9]	53/F	Total	Intraventricular	II	NR		2	Craniotomy site	7 months	1	II	
Gunes et al. [10]	19/F	Total	Convexity	I	No		1	Surgical scar	3 years	1	I	
Ozer et al. [11]	42/F	Total	Parasagittal	II	Yes		3	Mayfield pin site	2 years	1	II	
Velnar et al. [12]	37/F	Total	Parasagittal	II	NR		1	Craniotomy site	10 years	1	II	
Tahir et al. [13]	48/F	Total	Convexity	II	NR		2	Surgical scar	1 year 6 months	NR	II	

**Table 1:** Cases of metachronous scalp metastases reported in the literature (1970-2017), modified and updated according to Avecillas-Chasin et al. [2]. Patient 1 represents hallmarks of our case, WHO: World Health Organization, M: Male; F: Female, NR: Not reported, CSF: Cerebrospinal Fluid, \*Prior to scalp metastasis t Prior to scalp metastasis t Time interval between first surgery for meningioma and scalp metastasis



including atheromas, epidermoidal cysts and lipomas. In patients with a history of meningioma, scalp metastasis should be ruled out, even years after primary treatment. Metastases of meningioma origin are especially important to consider in the case of multiple surgeries, radiation therapy, immunosuppression, cerebrospinal fluid fistula

or wound breakdown after initial resection. In these cases, the mass should be resected and histopathologically evaluated even if presenting with a clinical and radiologic benign aspect.

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