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## Case Report

# Xanthomatous Meningioma: A Case Report

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## ABSTRACT

Meningioma is a neoplasm derived from meningotheial cells. Grade1 meningiomas consist of 9 different subtypes. One of the rare subtypes is metaplastic meningioma. Metaplastic meningioma could be defined as "xanthomatous meningioma" in the presence of prevalent xanthomatous changes. A 32-year-old male patient presented to the outpatient clinic with complaints of vertigo and tinnitus. Magnetic resonance imaging revealed a large mass lesion of 7.4 cm in the right frontal region with an extra-axial localization. Resection material demonstrated a neoplasm composed of classical meningotheial meningioma areas accompanied with areas of xanthomatous changes, containing cells with clear, vacuolated cytoplasm. Epithelial membrane antigen (EMA), vimentin, and progesterone expression were evident in both xanthomatous and meningotheial meningioma areas. Additionally, CD68 positivity was also observed in xanthomatous areas. EMA positivity is a neoplastic marker for xanthomatous cells and is a critical marker to differentiate these cells from macrophages, which is crucial for pathologists in the differential diagnosis. Xanthomatous meningiomas are quite rare and our case presentation is the 7<sup>th</sup> one in the current literature.

**KEYWORDS:** Meningioma, Xanthomatous, Metaplastic

## ■ INTRODUCTION

Meningioma is a neoplasm derived from meningotheial cells. It makes up 24% of primary central nervous system tumors (12). Grade 1 meningiomas are divided into 9 subtypes according to World Health Organization (WHO) classification as follows: Meningotheial, fibrous, transitional, psammomatous, angiomatic, microcystic, secretory, lymphoplasmacyte rich, and metaplastic types (7). The classification and grading of meningiomas have not undergone revision in the WHO 2016 classification. Metaplastic meningioma is one of the rare subtypes and contains different mesenchymal components solely or in combination. Osseous, cartilaginous, lipomatous, myxoid, or xanthomatous tissues can be present in focal or diffuse patterns (7,10). Metaplastic meningioma demonstrating prevalent xanthomatous changes is defined as "xanthomatous meningioma" (7). Up to now only 6 cases have been reported in the literature. The differentiation of this very rare neoplasm from Grade 2 clear cell meningioma is crucial (1).

## ■ CASE REPORT

A 32-year-old male patient presented to our neurosurgery outpatient clinic with a complaint of vertigo and tinnitus being evident for 3-4 months and tending to increase in the meantime. After a complete physical examination and laboratory evaluation, a magnetic resonance image was obtained which revealed a large mass lesion of 7.4 cm in the right frontal region with an extra-axial localization, heterogenous weak contrast enhancement, lobulated contours, and well defined margins (Figure 1A-C). This neoplasm was restraining the cerebral parenchyma. The patient underwent right frontoparietal craniotomy and frontoparietal extra-axial total excision of the mass was successfully performed. Gross macroscopic evaluation revealed cream-brown colored and ragged tissue samples with a total dimension of 10x7x3 cm. Microscopic evaluation demonstrated neoplastic cells with rounded-oval shaped nuclei and eosinophilic cytoplasm accompanied by xanthomatous areas (Figure 2). Neoplastic cells in the xanthomatous areas had clear and vacuolated cytoplasm.

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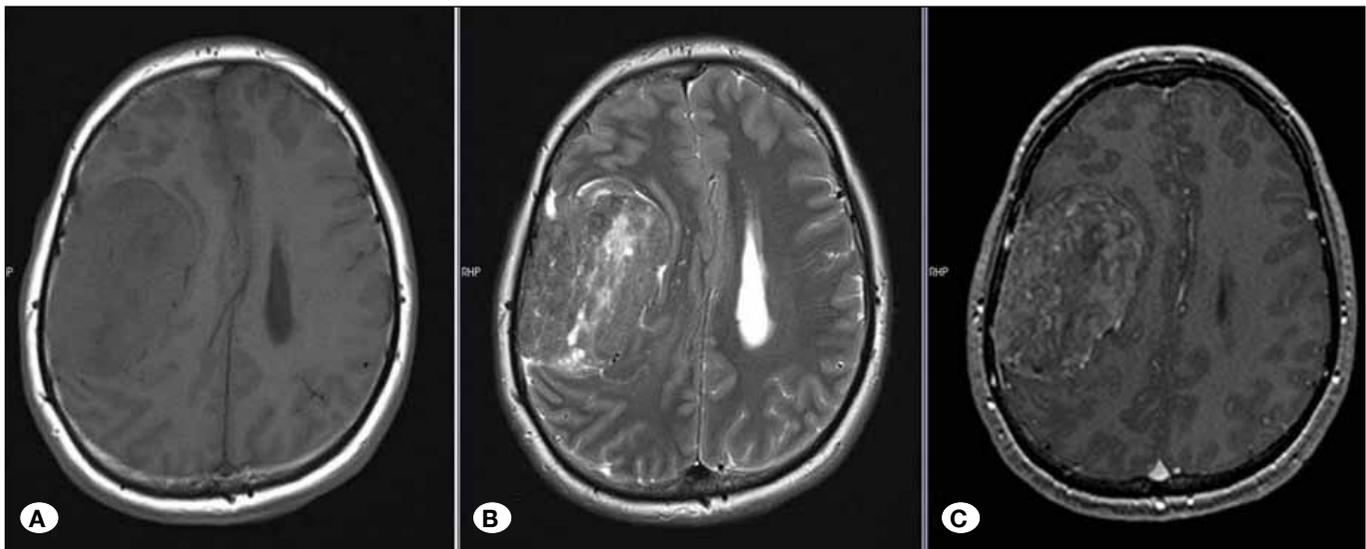
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These areas showed positive epithelial membrane antigen (EMA) and adipophilin staining (Figure 3). Some of the cells in these areas were also positive for CD68 (Figure 4). EMA, vimentin, and progesterone staining was positive in classical meningothelial meningioma areas. Ki-67 index was 3% in the most cellular area. Neoplastic cells were not stained with carcinoembryonic antigen (CEA), S-100 protein, or glial fibrillary acidic protein (GFAP). Immunohistochemical studies were performed with the Ventana automated system. The final histopathological diagnosis was “Xanthomatous meningioma” in light of the morphological and immunohistochemical findings. The patient is alive and healthy 8 months after the surgery without any sign of tumor recurrence.

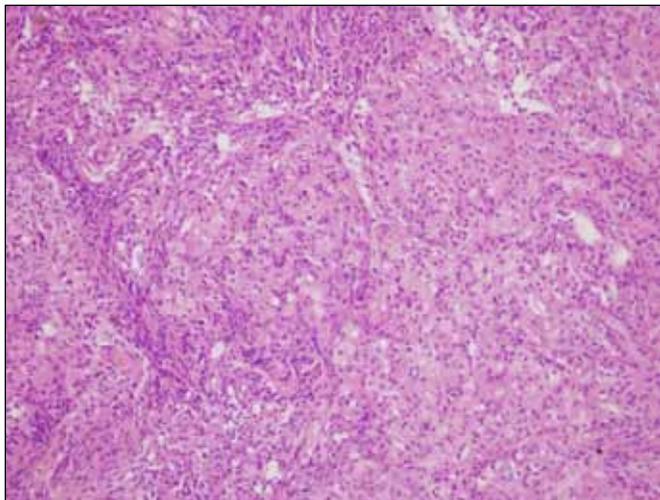
## DISCUSSION

Xanthomatous meningioma was first described in 1994 by Kepes (8). Up to now only 6 cases have been reported with a quite wide age range between 2 and 76 years (1,4-8). Xanthomatous meningiomas are quite rare and our case presentation is the 7<sup>th</sup> one in the current literature. All of the previously reported cases including the present case are summarized in Table I.

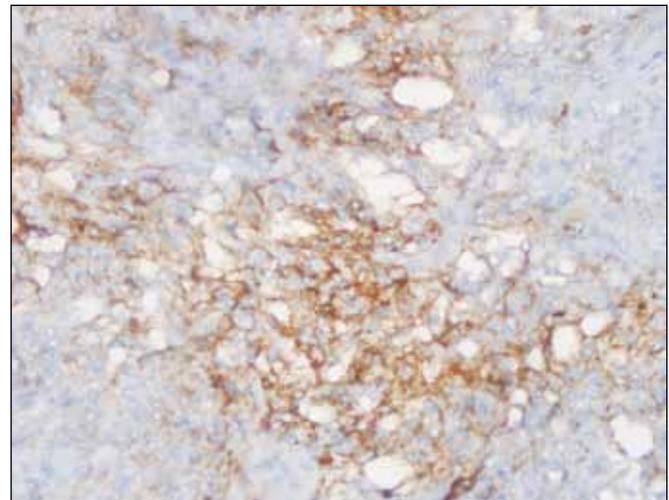
Liu et al.(9), have defined a histiocytic meningioma case in which both meningothelial and histiocytic cells had been stained with EMA. Histiocytic cells had also been stained with CD68 and CD4 in this case and thus they proposed



**Figure 1:** Magnetic resonance imaging of the patient demonstrating a mass lesion in right frontal region. The tumor was isointense with cerebral cortex in T1W images (A), had a heterogenous appearance in T2W series (B), and had a weak enhancement in T1W series after contrast administration (C).



**Figure 2:** Microscopic examination demonstrating neoplastic cells with rounded-oval shaped nuclei and eosinophilic-clear cytoplasm accompanied by xanthomatous areas (Hematoxylin and eosin, x200).



**Figure 3:** Areas positive for EMA staining (EMA, x200).

this case as another subtype. This case of Liu et al. had a history of head trauma. Trauma may be a causative factor for the xanthomatous changes in the pathogenesis of the neoplasm (9). The similarities between the case of Liu et al. and xanthomatous meningioma cases may address the presence of more cases reported in the literature with different name tags.

The most important histopathological finding of xanthomatous meningioma is the presence of xanthomatous tumor cells (2,6). These cells possess clear vacuolized cytoplasm and a round-oval shaped nucleus located centrally (2). Xanthomatous cells have foam-like appearance because of their lipid ingredient. Although they resemble macrophages morphologically, EMA staining supports meningeothelial origin of these cells (6,7). Ikota et al. have described a case demonstrating EMA (+) stained neoplastic cells accompanied with EMA (-) foamy macrophages. These foamy macrophages had probably

immigrated to this area due to tumor degeneration (6). In our current case, xanthomatous cells were stained with EMA, which indicated their meningeothelial origin.

Previous reports indicate that xanthomatous neoplastic cells were also stained with histiocyte markers, like CD68 and lysozyme. CD68 positivity does not always address histiocytes but may also indicate the presence of abundant lysosomes in the cytoplasm of the inspected cell type and thus EMA positivity is the most important finding supporting the meningeothelial origin of the tumor (6,7). In our case, xanthomatous neoplastic cells were positive for CD68, but did not stain with lysozyme.

Adipophilin expression in xanthomatous meningioma was first shown by Ishida et al. in both xanthomatous and conventional areas. Adipophilin is an antibody demonstrating lipid droplets in cytoplasm (7). However, we only observed adipophilin positivity in xanthomatous areas.

Differential diagnosis of xanthomatous meningioma mainly comprises lipomatous meningioma and clear cell meningioma. Lipomatous meningioma is characterized by the presence of adipose tissue and it is a very rare meningioma subtype. Classical meningioma areas are accompanied with adipocyte-like cells (13). Lipid accumulation is a common finding for both xanthomatous and lipomatous meningioma. In a series of 18 patients with lipomatous meningioma, Roncaroli et al. reported the presence of xanthomatous and lipomatous cells together in some cases. The reason of lipid accumulation in these cells could not be defined yet, but the most logical explanation remains to be a metabolic abnormality of tumor cells (11). These adipocyte-like cells observed in lipomatous meningiomas were reported to be stained with S-100 (3). In our case, we did not observe adipocyte-like cells, but we noticed xanthomatous changes indicated by the infiltration of foamy cells accompanying meningeothelial neoplastic cells.

Another rare subtype of meningioma is clear cell meningioma, which is mostly diagnosed during childhood. Lumbar

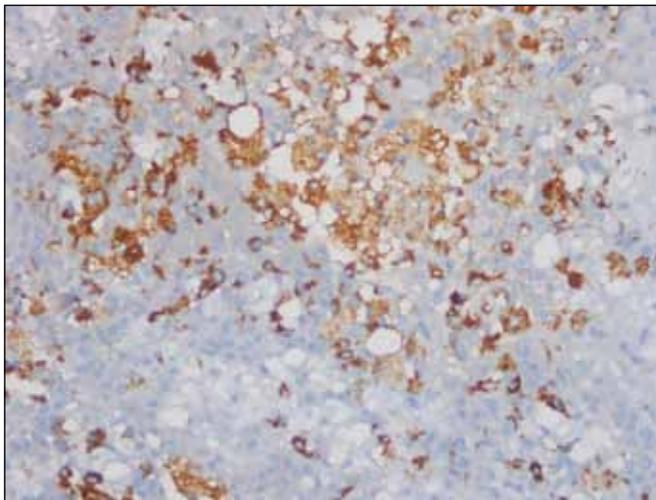


Figure 4: Areas positive for CD68 (CD68, x200).

Table 1: Clinicopathologic Features of Reported Cases of Xanthomatous Meningiomas

Case No	Age (years)/ Gender	Location	Transition Between Conventional Meningioma and Xanthomatous Area	Immunohistochemistry	Reference No
1	24/Male	Right parietal	+	CD68 (+)	(8)
2	2/Female	Posterior pyramid	Not available	EMA (+)	(4)
3	10/Male	Right frontal	+	CD68 (+)	(5)
4	61/Female	Right occipital to parietal	+	EMA (+), CD68 (+), Ki-67 LI 2.2%	(6)
5	76/Male	Left parasagittal to frontal	+	EMA (+), CD68 (+), Adipophilin (+), Ki-67 LI 2.1%	(7)
6	24/Female	Temporo-parietal-occipital	+	EMA (+), MIB-1 (Ki-67 LI 3.2%	(1)
<b>Present case</b>	32/Male	Right frontal to parietal	+	EMA (+), CD68 (+) Adipophilin (+) (Xanthomatous area), Ki-67 LI 3%	

EMA: Epithelial membrane antigen, Ki-67 LI: Ki-67 Labeling index.

vertebrae are the most prominent involvement area. The benign histological appearance is generally deceptive (2). This subtype does not contain classical meningioma areas unlike xanthomatous meningioma. Although quite rare, xanthomatous changes might also be observed in atypical and anaplastic meningiomas (7,13).

Another reported case by Ijiri et al. is a 10-year-old child who developed xanthomatous meningioma following radiotherapy for ependymoma (5).

## ■ CONCLUSION

Xanthomatous meningioma is a quite rare variant of meningioma. There are only a few case reports in the current literature. Every new case will widen our horizon. Neoplastic meningothelial cells exhibit xanthomatous changes as result of undetermined metabolic abnormalities. Diagnosis depends on the recognition of xanthomatous changes in the neoplasm and differentiation from normal macrophages.

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