

Remarkable Diagnostic Magnetic Resonance Imaging Findings in Sellar Xanthogranuloma: Report of Three First Cases in Latin America

Mario Tapia Céspedes¹ Jaime Pinto Vargas² Fernando Andrade Yañez³ Loreto Spencer León⁴
Pablo Álvarez Arancibia⁵ Thomas Schmidt Putz⁶

¹ Department of Otorhinolaryngology – Head and Neck Surgery, Regional Hospital of Concepción, Concepción, Chile

² Department of Neurosurgery, Regional Hospital of Concepción, Concepción, Chile

³ Department of Radiology, Regional Hospital of Concepción, Concepción, Chile

⁴ Department of Pathology, Regional Hospital of Concepción, Concepción, Chile

⁵ Faculty of Medicine, University of Concepción, Concepción, Chile

⁶ Department of Otorhinolaryngology - Head and Neck Surgery, University of Concepción, Chile

Address for correspondence Thomas W. Schmidt Putz, MD, Department of Otorhinolaryngology - Head and Neck Surgery, Specialty Department, University of Concepción, Chacabuco Avenue, No. 1401, Concepción, Chile (e-mail: Schmidtp@udec.cl).

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Abstract

Keywords

- ▶ xanthogranuloma
- ▶ craniopharyngioma
- ▶ sellar region
- ▶ MRI

The sellar xanthogranuloma is a rare lesion of the sellar–parasellar region difficult to differentiate from other tumors such as craniopharyngiomas or Rathke's cleft cyst in the preoperative evaluation. As they are recently recognized as a separate entity and the few number of reports in the literature, its etiology is unknown and its impact remains uncertain. This article will describe the first three cases reported in Latin America, identified in one of them an imaging feature that may be helpful to elucidate an imaging growth pattern. Current evidence will be described regarding to the clinicopathological features, imaging diagnosis, and etiology origin theories.

Introduction

The World Health Organization (WHO) appointed xanthogranuloma of the sellar region as a specific type of brain tumor in 2000, differentiating it from adamantinomatous craniopharyngioma (CP). They are a rare entity, with two cases reported in the Western Hemisphere.^{1,2} Histologically, xanthogranulomas correspond to a granulomatous reaction characterized by the presence of cholesterol crystals, foamy macrophages, giant cells, hemosiderin deposits, necrotic detritus, lymphocytic infiltrate, and fibrous proliferation.³ Since the 37 cases were reported by Paulus et al,³ 21 reports have been documented since 2000, without previous reports in Latin America.^{2,4–23}

The etiology of xanthogranulomas of the sellar region is controversial, and there are currently two hypotheses under

greater discussion. The first states that xanthogranulomas originate from an inflammatory reaction, hemorrhage or rupture of a Rathke's cleft cyst (RCC). The second hypothesis postulates that xanthogranulomas arise from a secondary inflammatory progression of a CP.^{19,21,24} Until now, there is no preoperative diagnostic method, imaging and immunohistochemical studies have not been sufficient by themselves to achieve accurate preoperative diagnosis.^{1,9,20,21} We report three cases of sellar xanthogranuloma, highlighting an imaging finding in one of the cases that might be helpful to elucidate a characteristic pattern of these lesions.

Case 1

A 10-year-old patient, obese, with no other relevant medical history, presented with a 1-year history of recurrent

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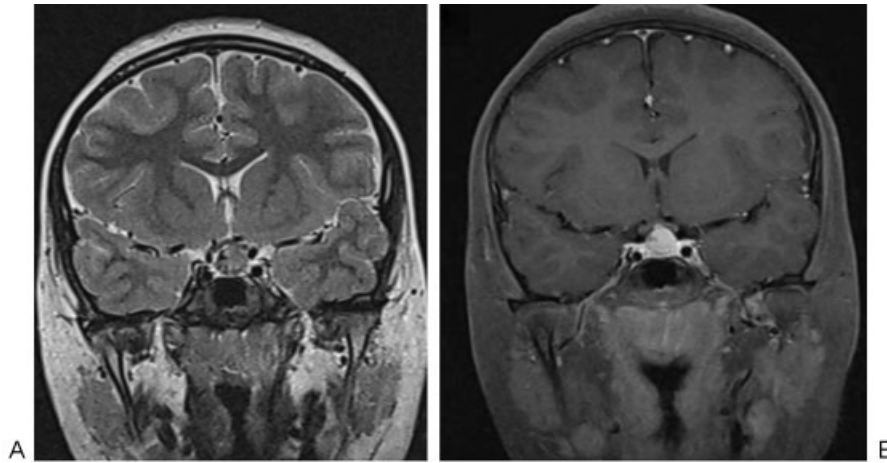


Fig. 1 Case 1. (A) Coronal T2 and (B) coronal T1 postcontrast. Intrasuprasellar cystic hyperintense tumor with small solid hypointense peripheric nodule.

episodes of headache associated with blurred vision, polyuria, and polydipsia. Magnetic resonance imaging (MRI) of the brain showed a cystic solid heterogeneous sellar mass with suprasellar extension, suggestive of CP or pituitary adenoma (►Figs. 1 and 2). Goldmann perimetry showed a tubular visual field unrelated to the pituitary lesion.

An extended endoscopic transsphenoidal, transplanum, transsellar, transtuberculum approach was performed. Macroscopically, the mass was described as similar to a CP with an old hematoma at its center. The patient had no postoperative complications. Histological examination revealed findings consistent with xanthogranuloma. At 38 months' follow-up after surgery, the patient had a significant improvement in visual disturbances, with no more headache episodes, polyuria, and polydipsia. The postoperative MRI confirmed the total tumor resection without recurrence or residual disease.

Case 2

A 35-year-old male patient, with a history of dyslipidemia, presented a 2-year history of recurrent headache, progressive visual loss, blurred vision, decreased libido and erectile dysfunction. The visual field test showed a superior temporal

quadrantanopsia in the left eye and a temporal hemianopsia in the right eye. Endocrinological evaluation showed hypogonadism associated with secondary adrenal insufficiency. The MRI showed an expansive process of the sellar-suprasellar region, partially cystic, slightly heterogeneous, hyperintense on T1-weighted and heterogeneous in T2-weighted image with calcifications, mass effect on the optic chiasm, and a retroclival dural tail with contrast enhancement (►Fig. 3).

An extended endoscopic transsphenoidal, transsellar, transtuberculum, transplanum approach was made without complications. Histopathological examination showed the presence of cholesterol crystals, sclerosis and fibrosis of the connective tissue, cholesterol granulomas, lymphocytic infiltrate, hemosiderin deposits, and multinucleated giant cells without epithelial component, findings consistent with a xanthogranuloma (►Fig. 4). No complications developed in the postoperative period, except transient diabetes insipidus. At 8 months' follow-up after surgery, the patient had no more headache episodes; however, hypogonadism and visual field remain unimproved. Postoperative MRI showed a heterogeneous residual tumor appearance with a remnant of the retroclival dural tail before mentioned (►Fig. 5).

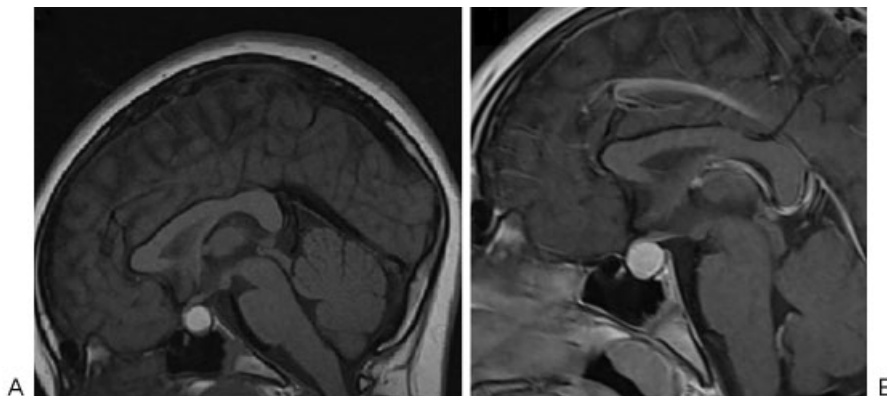


Fig. 2 Case 1. (A) Sagittal T1 precontrast and (B) sagittal T1 postcontrast. Sellar-suprasellar hyperintense cystic tumor with a thin peripheric solid component (A). Solid peripheric component slightly enhanced, cystic component remains hyperintense (B).

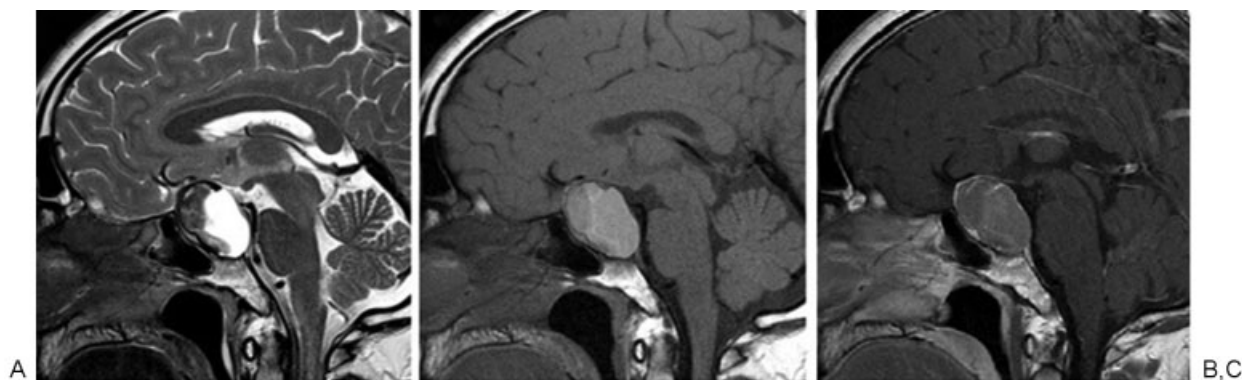


Fig. 3 Case 2. (A) Sagittal T2, (B) sagittal T1 precontrast, and (C) sagittal T1 postcontrast. Sellar–suprasellar solid cystic expansion process with predominance of cystic component hyperintense in T2, and a hypointense peripheral solid component (A). Cystic hyperintense in T1 (B). Solid peripheral component and retroclival dural tail slightly enhanced (C). Mass effect on optic chiasm.

Case 3

A 31-year-old male patient, without morbid or surgical history, presented with a 2-year history of progressive decrease libido and erectile dysfunction associated with loss of muscle mass and progressive visual loss in the right eye. Endocrinological evaluation showed panhypopituitarism and brain MRI showed a sellar mass contacting the optic chiasm (→ Fig. 6).

An extended endonasal endoscopic approach similar to previous cases was performed without complications. Histopathological findings were consistent with xanthogranuloma like the other cases. At 6 months' postoperative follow-up, the patient persisted with panhypopituitarism and visual deficit without improvement. Postoperative MRI showed complete tumor resection without residual lesion.

Discussion

The xanthogranulomatous masses in the sellar–parasellar region were considered as a variation of adamantinomatous CP.²⁵ Paulus et al³ proposed this pathological pattern as a distinct clinicopathological entity and compared these

lesions with CPs. They found several statistically significant differences highlighting the presentation at a younger age, intrasellar location, more severe endocrinological dysfunction, longer preoperative history, lower frequency of visual disturbances, and better surgical resectability with more favorable outcomes. Therefore, this entity was added to the WHO brain tumor classification in 2000, found mentioned in the third and fourth edition of the WHO classification of tumors of the central nervous system.^{26,27}

Most cases of xanthogranulomas of the sellar region have been reported in Asia with few reports in Western Hemisphere and none in Latin America. Therefore, the incidence of xanthogranulomas in the Western Hemisphere remains unknown. There is controversy regarding the origin of these rare lesions, and there are two main hypotheses under greater discussion. The first theory postulates that xanthogranulomas originate from an inflammatory reaction, hemorrhage, or rupture of a RCC. The second theory proposes their origin from a secondary inflammatory progression of a CP.^{3,13,19,21,24} However, there is also reports related to systemic diseases such as sarcoidosis⁷ and Erdheim–Chester's disease.^{5,16} The actual evidence is not yet conclusive regarding its etiology. The presence of squamous epithelium

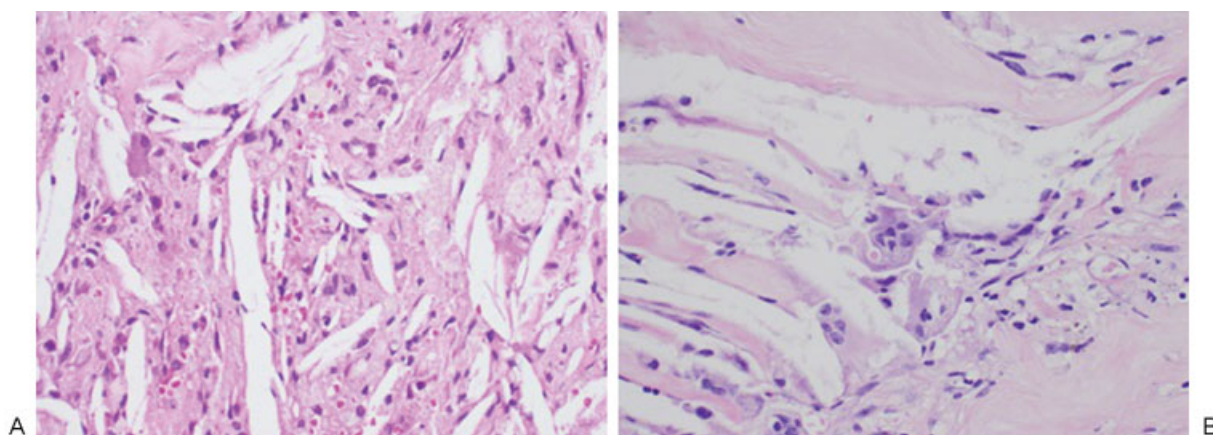


Fig. 4 (A) Hematoxylin–eosin technique, fibrous tissue is observed with xanthogranulomatous chronic inflammation. (B) Crystals of cholesterol, inflammatory cells, and macrophages.

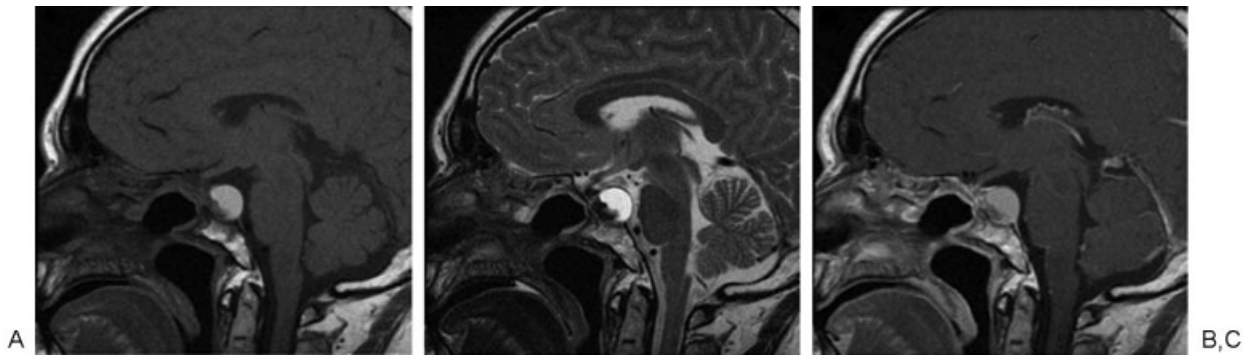


Fig. 5 Case 2. Postoperative (A) sagittal T1 precontrast, (B) sagittal T2, and (C) sagittal T1 postcontrast. Lesion suggestive of residual tumor, smaller than preoperative. Solid cystic sellar expansive process. The anterior thin solid peripheral component shows slightly enhancement postcontrast and remaining retroclival dural tail.

and calcifications reinforce the theory that relate xanthogranulomas to adamantinomatous CPs,³ but the evidence gathered last year has been accumulating, favoring their origin related to RCC.^{1,2}

Clinically, they are characterized by the presence of cephalgia, weight loss, anorexia, nausea, fatigue, visual disturbances, and endocrine disorders ranging from mild deficiencies of one or more hormone to panhypopituitarism. They have also been reported as a cause of diabetes insipidus of central origin (5–10.19) and obstructive hydrocephalus.¹⁵ All our cases were nonfunctioning tumors. In our series of cases, headache was the predominant symptom in one case, while in the other two cases were secondary to hypogonadism. Due to the rarity of this entity and considering its definitive diagnosis is by biopsy of the surgical specimen, the natural history of presentation of xanthogranuloma remains unknown, and there is no diagnostic method developed to achieve an accurate preoperative diagnosis to date. There are no typical radiological characteristics or patterns for xanthogranuloma.^{9,20} They have variable levels of intensity secondary to unpredictable bleeding patterns and calcified lesions associated; therefore, it has not been possible to describe a typical imaging pattern presented consistently.

We have conducted a literature review of previously reported cases of xanthogranulomas of the sellar–suprasellar region and elaborated a table focusing on the imaging characteristics with the intention of achieving an imaging pattern that contributes to the preoperative diagnosis (–**Table 1**), without finding patterns or consistency in its MR signal characteristics. Recently, Madan Mohan et al²³ reported a case with residual tumor followed up with MR assessment revealing the development of new lesions that may illustrate a growth pattern, one of these lesions described was the development of a dural tail, also developed in our case 2, supporting it as an interesting feature that may elucidate a new imaging pattern that could be helpful in preoperative diagnosis.

The increased risk of pituitary dysfunction compared with CP and RCC is probably due to bleeding, inflammation, or degeneration of a primary lesion. Regardless of tumor size, it appears that there is a better outcome when there is less intrasellar commitment and time between the onset of symptoms and the surgical resolution.¹⁹ Surgical resection is the treatment of choice. The management has been almost universally treated by craniotomy or transsphenoidal microscopic surgery.^{17,19,20} Our three cases were treated by endoscopic endonasal transsphenoidal

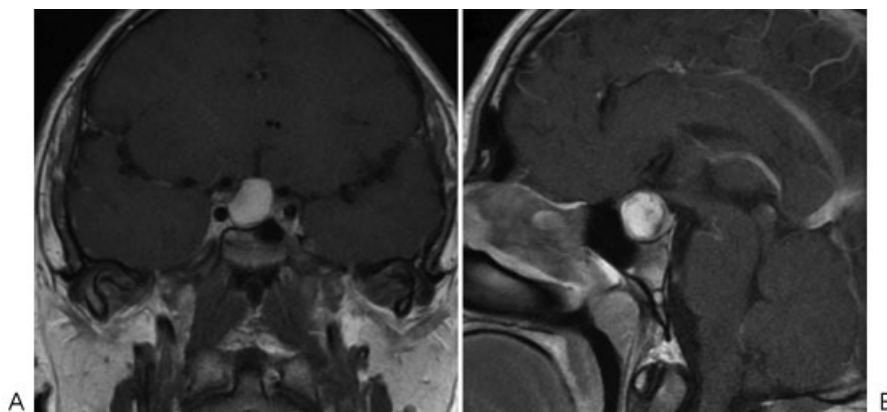


Fig. 6 Case 3. (A) Coronal T1 postcontrast and (B) sagittal T1 postcontrast. Intra- and suprasellar cystic tumor with small solid excentric extension, with predominance of T1 hyperintense cystic component, and a thin peripheral solid component which slightly enhanced postcontrast. Optic chiasm compression.

Table 1 Sellar xanthogranuloma reported cases' features summary

Author (year)	Age/ gender	Clinical manifestation	Clinical findings (Preop.)	Location /size	MRI findings			Tumor resection/ approach	Clinical findings (Postop.) and follow-up
					T1	T2	Gd enhancement		
Reithmeier et al (2002)	51/M	Pallor, libido decrease	Panhypopituitarism, visual disturbances	Intrasellar-suprasellar/NA	Hyperintense	NA	Heterogeneous	NA/transcranial	NA
Yonezawa et al (2003)	67/M	Fatigue, loss of appetite, weight loss	Pituitary dysfunction and hyponatremia	Intrasellar/NA	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	Asymptomatic 3 mo
Burt et al (2003)	29/M	Cephalaea, nausea	Panhypopituitarism and bitemporal hemianopsia	Intrasellar-suprasellar/1.8 × 1.5 cm	Heterogeneous	NA	Periphery, heterogeneous	Subtotal/transsphenoidal	Favorable outcome 18 mo
	26/M	Decrease libido, fatigue, weight loss	Panhypopituitarism and hyperprolactinemia	Intrasellar-suprasellar/NA	Hyperintense	Hyperintense	No enhancement	NA/transcranial	HRT, no recidiva at 8 mo
Murao et al (2005)	47/M	NA	NA	NA	Hyperintense	Hyperintense	Periphery	NA	NA
Jung et al (2006)	57/F	Cephalaea	Bitemporal hemianopsia	Intrasellar-suprasellar/2.0 × 2.0 × 2.5 cm	Heterogeneous	Heterogeneous	Heterogeneous	NA/transsphenoidal	NA
	5/M	Weakness, loss of appetite, cephalaea	Diabetes insipidus, secondary adrenal insufficiency, hypothyroidism	Intrasellar-suprasellar/2.6 cm	Hyperintense	Hypointense	NA	Partial/transcranial	NA
Tajima et al (2006)	9/M	Polyuria, polydipsia	Pituitary dysfunction and hypothyroidism	Intrasellar/NA	Hyperintense	Hyperintense	No enhancement	Total/transsphenoidal	Diabetes insipidus, without recidiva 12 mo
	6/M	Polyuria, polydipsia	Diabetes insipidus	Intrasellar/NA	Hyperintense	Hypointense	No enhancement	Total/transsphenoidal	Diabetes insipidus, HRT, without recidiva at 12 mo
Liu et al (2008)	32/M	Impairment of consciousness	Blurred vision	Suprasellar/3.4 × 3.8 × 4.2 cm	Hyperintense	Hyperintense	No enhancement	NA/transcranial	Favorable outcome 6 mo
Pavón de Paz et al (2008)	16/F	Cephalaea	Pituitary apoplexy and impairment of consciousness	Intrasellar/NA	Hyperintense	Hyperintense	NA	NA/transsphenoidal	Without recidiva at 24 mo
Moriya et al (2008)	54/M	NA	NA	NA	Hyperintense	Heterogeneous	No enhancement	NA	NA
Sugata et al (2009)	26/M	Polyuria, fatigue	Visual disturbances and pituitary dysfunction	Intrasellar-suprasellar/3.0 cm	Isointense	Hypointense	Heterogeneous	Subtotal/transcranial	HRT, without recidiva at 12 mo
Arai et al (2010)	55/F	Cephalaea and visual disturbances	Bitemporal hemianopsia, secondary adrenal insufficiency, and hypothyroidism	Intrasellar-suprasellar/NA	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	HRT, without recidiva at 18 mo
Sulentić et al (2010)	40/M		Panhypopituitarism	Intrasellar-suprasellar/2.5 × 2.0 cm	NA	NA	NA	Total/transsphenoidal	HRT, sellar process at 6 mo

Table 1 (Continued)

Author (year)	Age/gender	Clinical manifestation	Clinical findings (Preop.)	Location /size	MRI findings			Tumor resection/ approach	Clinical findings (Postop.) and follow-up
					T1	T2	Gd enhancement		
Kamoshima et al (2011)	8/F	Cephalaea, photophobia, and decreased libido	Diabetes insipidus and bitemporal hemianopsia	Intrasellar-suprasellar/1.1 × 1.1 cm	Hyperintense	Hypointense	No enhancement	Total/transsphenoidal	NA
	11/M	Cephalaea	Diabetes insipidus and bitemporal hemianopsia	Intrasellar-suprasellar/2.0 × 1.2 cm	Hyperintense	Isointense	No enhancement	Total/transsphenoidal	NA
	12/F	Growth delay	Panhypopituitarism and bitemporal hemianopsia	Suprasellar/3.0 × 1.7 cm	Heterogeneous	Heterogeneous	Heterogeneous	Total/transcranial	NA
	10/F	Cephalaea	Bitemporal hemianopsia	Intrasellar-suprasellar/2.0 × 1.1 cm	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	NA
	5/M	Polydipsia	Diabetes insipidus	Intrasellar/0.8 × 0.6 cm	Hyperintense	Hypointense	No enhancement	Total/transsphenoidal	NA
Agarwal et al (2012)	41/M	Cephalaea	Panhypopituitarism	Intrasellar-suprasellar/NA	Hyperintense	Hypointense	Heterogeneous	Total/transsphenoidal	Without recidiva at 6 mo
Nishituchi et al. (2012)	47/M	Cephalaea, fatigue, and loss of appetite	Visual disturbances, hypothyroidism, and hypogonadism	Intrasellar-suprasellar/1.2 × 1.8 × 1.5 cm	Heterogeneous	Heterogeneous	Heterogeneous	Total/transsphenoidal	HRT
Tsai et al (2012)	49/F	Cephalaea and blurred vision	Visual disturbances, secondary adrenal insufficiency, and hypothyroidism	Intrasellar-suprasellar/4.0 × 4.0 × 5.0 cm	Hyperintense	Heterogeneous	No enhancement	Subtotal/transcranial	Panhypopituitarism, visual disturbances unimproved, diabetes insipidus
Amano et al (2013)	20/M	Cephalaea	Diabetes insipidus and panhypopituitarism	Intrasellar-suprasellar/1.2 cm	Hyperintense	Heterogeneous	Periphery	Partial/transsphenoidal	HRT, diabetes insipidus, without recidiva at 84 mo
	64/M	Cephalaea and diplopia	Hypogonadism and hypothyroidism	Intrasellar-suprasellar/1.8 cm	Heterogeneous	Heterogeneous	Periphery	Partial/transsphenoidal	HRT, without recidiva at 63 mo
	12/M	Cephalaea	Visual disturbances, panhypopituitarism, and diabetes insipidus	Intrasellar-suprasellar/2.0 cm	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	HRT, without recidiva at 45 mo
	40/F	Cephalaea	Panhypopituitarism and visual disturbances	Intrasellar-suprasellar/3.2 cm	Hyperintense	Heterogeneous	Periphery	Subtotal/transsphenoidal	HRT, without recidiva at 31 mo
	59/F	Diplopia	Visual disturbances	Suprasellar/1.1 cm	Hyperintense	Heterogeneous	Periphery	Total/transsphenoidal	Asymptomatic and without recurrence at 25 mo
	63/F	Cephalaea and diplopia	Visual disturbances, hypogonadism, and hyperprolactinemia	Suprasellar/1.8 cm	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	HRT, without recurrence at 22 mo

(Continued)

Table 1 (Continued)

Author (year)	Age/gender	Clinical manifestation	Clinical findings (Preop.)	Location /size	MRI findings			Tumor resection/ approach	Clinical findings (Postop.) and follow-up
					T1	T2	Gd enhancement		
	68/M	Cephalaea	Visual disturbances, panhypopituitarism, and diabetes insipidus	Intrasellar-suprasellar/2.3 cm	Heterogeneous	Heterogeneous	Periphery	Subtotal/transsphenoidal	HRT, diabetes insipidus without recurrence at 12 mo
Case 1	10/M	Cephalaea, polydipsia, polyuria, and blurred vision	Diabetes insipidus	Intrasellar-suprasellar/0.7 cm	Hyperintense	Heterogeneous	No enhancement	Total/transsphenoidal	Asymptomatic 35 mo follow-up
Case 2	35/M	Cephalaea, decreased libido, erectile dysfunction, and visual disturbances	Left upper lateral quadrantanopsia, right hemianopsia, and hypogonadism	Intrasellar-suprasellar/3.5 × 2.5 × 2.6 cm	Hyperintense	Heterogeneous	Periphery and dural tail	Subtotal/transsphenoidal	HRT, hypogonadism, residual mass with retroclival dural tail at 6 mo follow-up
Case 3	31/M	Decreased libido, erectile dysfunction, muscle mass loss, and visual disturbances	Panhypopituitarism	Intrasellar-suprasellar/1.5 × 1.5 × 1.6 cm	Hyperintense	Heterogeneous	Periphery	Total/transsphenoidal	HRT, without recurrence at 3 mo follow-up

Abbreviations: F, female; HRT, hormone replacement therapy; M, male; MRI, magnetic resonance imaging; NA, not available; Postop., postoperative; Preop., preoperative; T1, T1-weighted image; T2, T2-weighted image.

approach achieving a satisfactory exposure with no morbidity related to the surgical procedure, being less invasive than craniotomy. Recurrences after complete resection are rare.¹⁶ Radiotherapy has also been described as an effective treatment in a case of partial resection.²⁰

Conclusion

Otolaryngologists and neurosurgeons must be cognizant of the existence of sellar xanthogranulomas as a differential diagnosis. We report the first three cases in Latin America, all of them operated by an endonasal endoscopic extended approach which allows a satisfactory exposure and gross tumor resection being a less invasive and effective approach to cure this pathology. The existence of a retroclival dural tail sign in a context of a sellar solid cystic lesions suspicious for a CP or RCC might be a specific feature that could raise the suspicion of a xanthogranuloma. Further studies with MRI assessment are needed to prove the reliability of this imaging characteristic.

Conflict of Interest

The authors declare no conflict of interest of any kind related to this article.

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Ethical Approval

This article does not contain any studies with animals performed by any of the authors. It corresponds to a retrospective study, according to the instructions for the authors for this type of study, formal consent is not required.

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