



Image Report

Parasellar T2 dark sign on magnetic resonance imaging to differentiate lymphocytic hypophysitis from pituitary adenoma

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ABSTRACT

Background: Pituitary adenomas are the most common sellar masses in adults with magnetic resonance imaging (MRI) being the imaging modality of choice. Inflammatory pituitary lesions such as lymphocytic hypophysitis (LH) can mimic pituitary macroadenoma on imaging and are often misdiagnosed as such. Although the imaging appearance on most of the sequences on MRI has similar findings, LH has a characteristic dark signal on T2 images (called dark T2 sign) which can be very helpful to reliably differentiate the two conditions.

Case Description: A 68-year-old woman diagnosed with a “pituitary mass” on the MR study done at an outside facility was referred to our neurosurgery department. The case was discussed at our multidisciplinary tumor board, where the possibility of an inflammatory condition mimicking tumor was considered, given the very dark signal on T2-weighted sequences. Transsphenoidal endoscopic biopsy revealed a firm rubbery mass, which histopathology demonstrated fibrous connective tissue with inflammatory cells consistent with LH.

Conclusion: Dark T2 signal on MR imaging can be very helpful in demarcating inflammatory pituitary conditions like LH from pituitary macroadenomas.

Keywords: Lymphocytic hypophysitis, Magnetic resonance imaging, Pituitary adenoma, Sella, T2 dark sign

INTRODUCTION

Pituitary adenomas are the most common sellar masses in adults with MR imaging being vital in diagnosis, pre-operative evaluation and post-operative follow-up. Inflammatory pituitary lesions such as lymphocytic hypophysitis (LH) can mimic pituitary macroadenomas on imaging and are often misdiagnosed as such. Although LH classically involves the infundibulum, involvement of the gland itself is not uncommon. However, glandular involvement in LH can appear very similar to pituitary adenoma on most of the MRI sequences. Inflammatory pseudotumors, like LH, however has a characteristic dark signal on T2 images (called dark T2 sign) due to the high lymphocytic and fibrotic contents. This sign is very helpful to differentiate the two conditions.

CASE REPORT

The patient is a 68-year-old woman who noted excessive thirst and dryness, along with progressive fatigue for 3–6 months. Endocrine laboratory evaluation revealed that her morning cortisol was

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low (3 ug/dl) with decreased ACTH. This prompted further evaluation with magnetic resonance imaging (MRI) of the pituitary gland, at an outside facility. The scan was interpreted with a final diagnosis of pituitary mass and presumably macroadenoma. She was referred to our University Hospital for further management. The patient's MRI scan was subsequently discussed at our multidisciplinary tumor board. MRI study revealed a large sellar-parasellar enhancing mass-like lesion with the involvement of bilateral cavernous sinuses and encasement of the cavernous carotid arteries, along with thickening of the infundibulum [Figure 1a and b]. Our team of neuroradiologists noted, whereas the lesion did look like a pituitary adenoma on the T1-weighted postcontrast sequences, it did not follow the expected T2 signal of pituitary macroadenoma [Figure 1c and d]. The lesion showed very low/dark signal on T2-weighted images, whereas pituitary macroadenomas show heterogeneously high/bright signal on T2 sequences with superimposed areas of cystic changes and necrosis often seen. The imaging findings, along with the diabetes insipidus like symptoms, prompted the discussion toward the lesion being inflammatory (likely lymphocytic

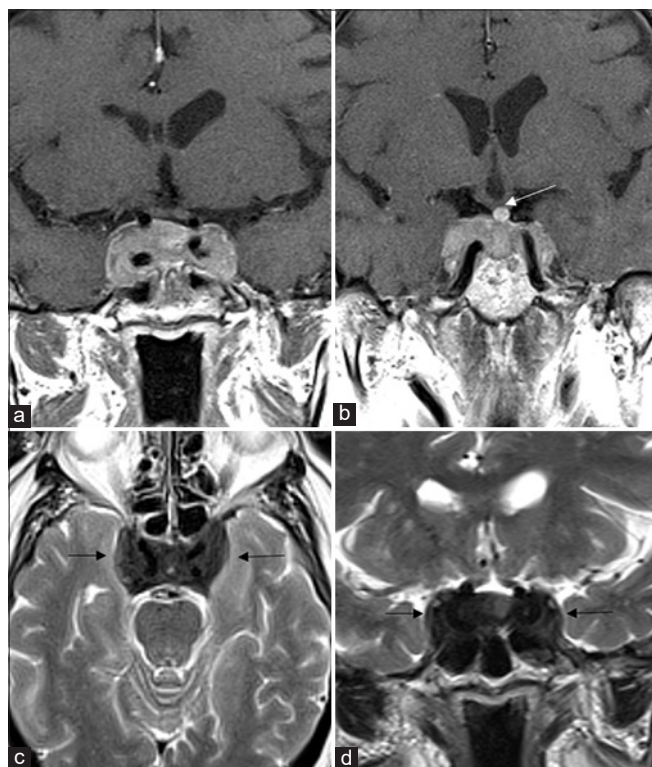


Figure 1: Lymphocytic hypophysitis: coronal T1 postcontrast MR images reveals an enhancing infiltrative sellar-parasellar lesion (a and b) involving bilateral cavernous sinuses with thickening of the infundibulum (b – white arrow). Corresponding T2 coronal images (c and d) show a very low/dark signal within the soft-tissue component (black arrows). There is marked enlargement of the cavernous sinuses with encasement of the cavernous carotid arteries. No significant vascular narrowing noted.

hypophysitis [LH]) in etiology rather than neoplastic. In the absence of any evidence of disease in her chest or abdomen, a transnasal biopsy was planned to establish a definitive diagnosis.

The sella was exposed through an endoscopic transsphenoidal approach, and the dura was then opened using an arachnoid knife in a cruciate fashion. A firm rubbery mass was noted and multiple specimens were taken for frozen and permanent pathology. Frozen section demonstrated fibrous connective tissue with inflammatory cells. The final pathology revealed fragments of dense, fibrous connective tissue containing T lymphocytes, and histiocytes [Figure 2a]. Immunoperoxidase stains demonstrate the expression of CD3 by lymphocytes and CD68 by histiocytes [Figure 2b]. The final clinical-radiological and pathological diagnosis of lymphocytic hypophysitis were made, and the patient was treated accordingly.

DISCUSSION

LH is an uncommon autoimmune inflammatory condition of the pituitary gland with lymphocytic infiltration, glandular tissue destruction, and varying degree of endocrine dysfunction. The inflammatory process can involve the entire pituitary gland, infundibulum, and the parasellar structures, including the cavernous sinus. The diagnosis of LH is made using clinical, imaging, and laboratory findings. MRI is the imaging modality of choice for suspected central nervous system involvement in LH. The MR imaging findings in LH are, however, variable ranging from subtle thickening of the pituitary infundibulum to large enhancing masses mimicking neoplastic conditions.^[1] LH is often misdiagnosed as pituitary macroadenoma due to the similar imaging findings and overlapping clinical and endocrinal parameters. Differentiating LH from macroadenoma is very important as the two conditions have vastly different management approaches. LH is usually treated conservatively, whereas pituitary macroadenomas

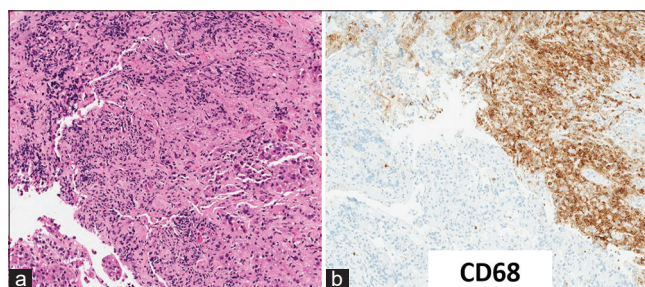


Figure 2: Histopathological examination: hematoxylin and eosin-stained permanent section (a) of the sellar lesion show fragments of fibrous connective tissue containing T lymphocytes and histiocytes. (b) Immunoperoxidase stains demonstrate the expression of CD68 by histiocytes.

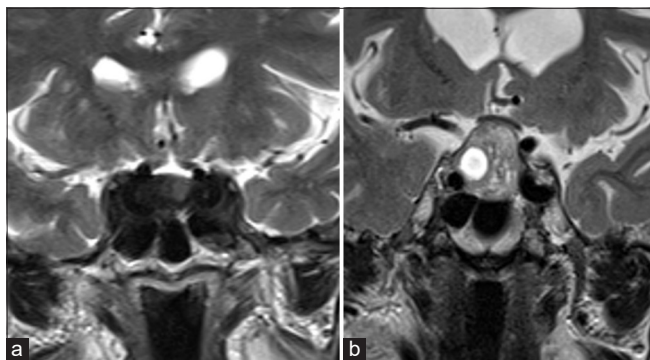


Figure 3: Lymphocytic hypophysitis versus pituitary macroadenoma: coronal T2 images in the patient with lymphocytic hypophysitis (a) show characteristic dark signal seen within the inflammatory soft tissue (“parasellar dark T2 sign”). This is in sharp contrast with the heterogeneously bright T2 signal of pituitary macroadenomas with cystic areas (b) in a different patient.

are treated surgically.^[4] The imaging overlap is so significant, that in one of the studies by Leung *et al.*, it was reported that approximately 40% of the cases of LH are misdiagnosed preoperatively as pituitary adenomas on MRI.^[2] Although many studies have described the imaging findings of LH, most of them relied on the involvement of the infundibulum to differentiate LH from macroadenoma. The first study to distinguish the two conditions based on the MR signal variability was performed by Nakata *et al.* in 2010.^[3] They observed that due to the fibrous nature of inflammatory conditions such as LH and IgG4 disease, a characteristic dark signal is seen within the inflammatory soft-tissue masses on the T2-weighted sequences (“parasellar dark T2 sign”). This is in sharp contrast with the heterogeneously bright T2 signal of pituitary macroadenomas [Figure 3a and b]. This finding, along with other imaging findings of LH, including loss of posterior pituitary bright spot and thickening of the infundibulum, can together be used to reliably distinguish between these two conditions.

CONCLUSION

Inflammatory intracranial lesions, like lymphocytic hypophysitis, can mimic neoplasms on imaging. However, these lesions generally tend to have low signal on T2 images given the high lymphocytic and fibrotic components, which can be helpful in differentiation of these lesions from tumors.

Declaration of patient consent

Patient’s consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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