Imaging Spectrum of Idiopathic Intracranial Hypertension: A Four-Case Series

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ABSTRACT

Idiopathic intracranial hypertension (IIH) is characterized by increased intracranial pressure without a structural lesion, hydrocephalus, or infection. The diagnosis is radiologically supported: exclusion of secondary causes and demonstration of characteristic imaging features that corroborate raised intracranial pressure. This case series reports four patients with clinical symptoms of headache and visual disturbances who showed typical neuroimaging features of IIH on MRI or CT. For all four cases, shared findings included partial empty sella, optic nerve sheath distension, posterior globe flattening, dilated perioptic CSF spaces, tortuous optic nerves, and transverse sinus narrowing. MRI and MR venography were especially useful in demonstrating optic nerve sheath enlargement and venous sinus stenosis. CT demonstrated posterior scleral flattening and empty sella well in the emergency setting. These cases serve to remind one of the importance of recognizing the imaging spectrum of IIH because early identification enables appropriate therapy and prevents irreversible optic nerve damage and visual loss. Imaging remains central in both diagnosis and follow-up, especially in atypical or elderly presentations where clinical signs may not be overt.

Keywords: Idiopathic intracranial hypertension, empty sella, papilloedema, MR venography, optic nerve sheath distension, raised intracranial pressure.

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INTRODUCTION

Idiopathic intracranial hypertension (IIH), also known as pseudotumour cerebri, is characterized by increased intracranial pressure with normal CSF composition without recognizable intracranial lesion, hydrocephalus, or venous thrombosis. [1], [2] It affects primarily women of childbearing age and is closely associated with obesity, but can be seen across all age groups and both sexes. [3]

Clinical presentation generally includes headache, transient visual obscurations, pulsatile tinnitus and papilloedema. Radiological imaging plays an important role in the exclusion of secondary causes and in finding supportive signs of raised intracranial pressure. MRI, along with MR venography, is the modality of choice because it can show optic nerve, sella and venous sinus features.[4] CT is still useful in acute presentations or where MRI cannot be performed.[5]

Neuroimaging findings also characteristically include empty or partially empty sella, posterior globe flattening, distension of the optic nerve sheath, tortuous optic nerves, enlarged Meckel's caves, and transverse sinus stenosis.[6],[8] Early identification of these findings is important in making a diagnosis and starting treatment that may potentially avoid permanent visual impairment.

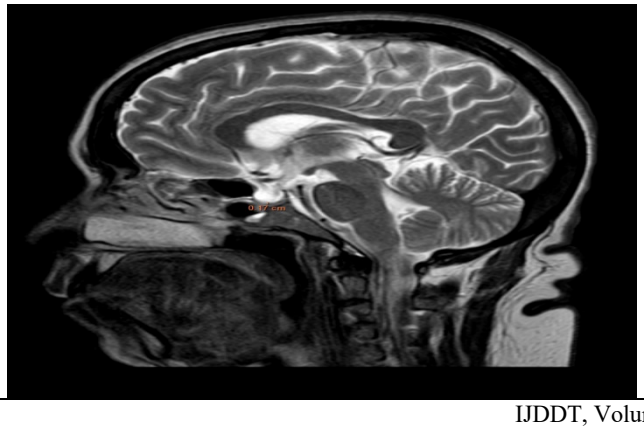
This article presents a series of four patients with a clinical suspicion of IIH who had characteristic imaging findings on either CT or MRI. The aim is to illustrate the radiological spectrum of IIH in various clinical settings that include atypical and elderly patients.

Case Presentations

Case 1

A 51-year-old woman presented with a 3-year history of recurrent dull headaches accompanied by occasional scalp paraesthesia. She did not complain of visual loss, tinnitus or vomiting. Neurological examination was normal and fundus evaluation revealed mild bilateral optic disc margin blurring. CSF opening pressure was 28 cm H_2O with normal biochemical composition.

MRI brain with MRA/MRV showed partial empty sella with pituitary gland height of about 1.7 mm. There was bilateral optic nerve sheath distension with prominence of the perioptic CSF spaces, with associated papilloedema. The bilateral Meckel's caves were dilated. MR venography demonstrated focal narrowing of the right transverse sinus with complete stenosis of the left transverse sinus. These findings were in keeping with raised intracranial pressure. The patient was commenced on acetazolamide and reported symptomatic improvement at follow-up.



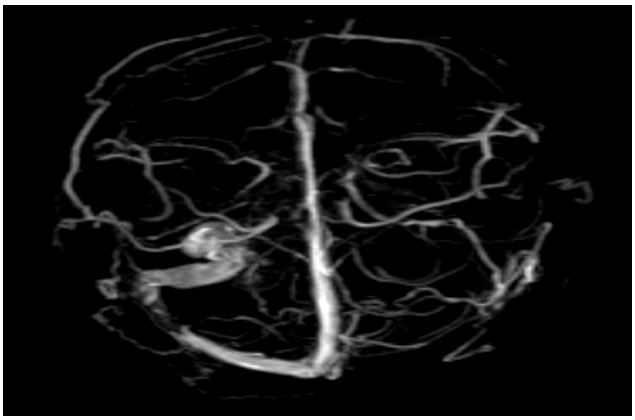


Figure 1a: Sagittal T2-weighted MRI showing partial empty sella with flattened pituitary gland (~1.7 mm).*Figure 1b:* Axial T2 MRI demonstrating perioptic-CSF distension and optic-nerve prominence. *Figure 1c:* MR venography showing focal right and complete left transverse-sinus stenosis. *Figure 1d:* Axial T2 MRI depicting bilateral Meckel's-cave dilatation (arrows).

Case 2

A 55-year-old man with known hypertension presented with a 4-month history of frontal headaches and intermittent episodes of visual blurring. Blood pressure on arrival was 160/100 mmHg. Fundus examination showed bilateral papilloedema. A lumbar puncture, which was performed after blood pressure had stabilised, showed an elevated CSF opening pressure of 30 cm H_2O with normal CSF analysis.

MRI brain with MRV revealed bilateral optic nerve sheath enlargement measuring approximately 7.0 mm on both sides with anterior optic nerve protrusion. The pituitary fossa appeared enlarged with a partially empty sella and pituitary height of approximately 1.6 mm. MR venography demonstrated reduced calibre and partial loss of signal within the left transverse sinus, sigmoid sinus, and jugular bulb, suggesting venous outflow reduction. These findings were supportive of IIH. The patient was managed with acetazolamide and optimisation of antihypertensive therapy, with improving symptoms on review.

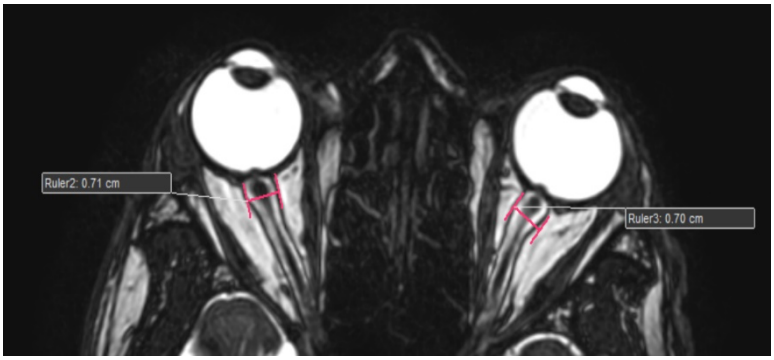
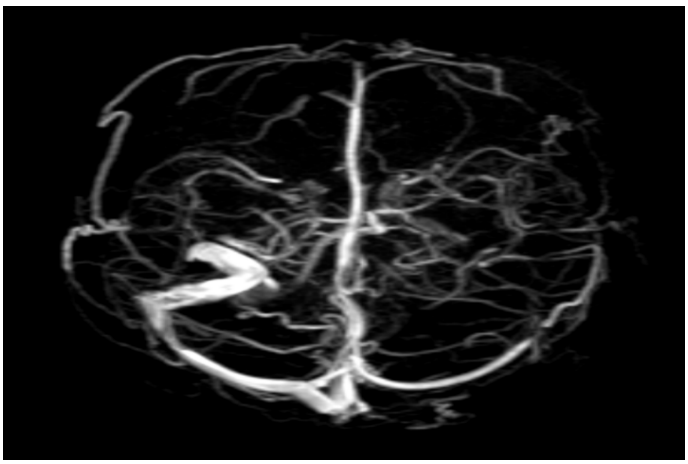


Figure 2a: Axial T2-weighted MRI showing bilateral optic-nerve-sheath prominence (~7 mm) with papilledema.



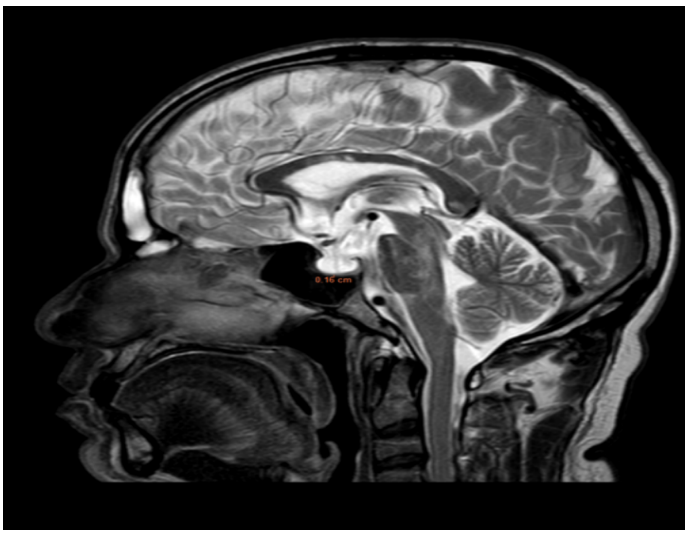


Figure 2b: MR venography (TOF) demonstrating reduced calibre of the left transverse and sigmoid sinuses. *Figure 2c:* Sagittal T1 MRI showing partial empty sella with reduced pituitary height (~1.6 mm).

Case 3

The 95-year-old female patient, with a history of long-standing hypertension, presented for sudden reduced responsiveness. At the time of presentation, her Glasgow Coma Scale score was 9/15. No trauma, seizure, or recent infection was reported. A non-contrast CT brain was therefore performed immediately due to her acute condition.

CT of the brain showed a partially empty sella, with bilateral optic nerve sheath prominence (right 6.5 mm, left 6.8 mm) and mild posterior scleral flattening adjacent to the optic nerve insertions. There was no evidence of acute haemorrhage, infarction or hydrocephalus. Although lumbar puncture was deferred due to her clinical status, the CT features were supportive of raised intracranial pressure. She was treated with supportive management and stabilised over the following days.

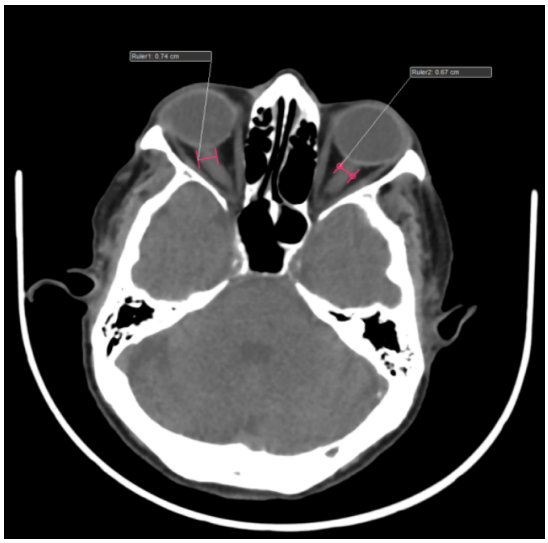
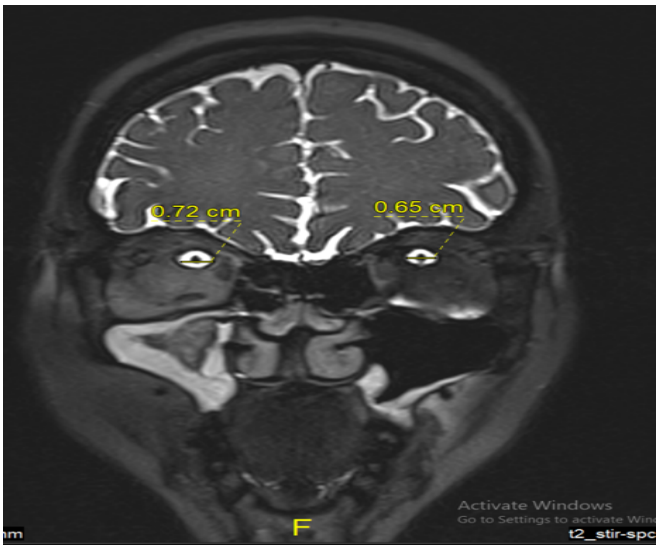


Figure 3a: Axial non-contrast CT showing optic-nerve-sheath prominence with posterior-globe flattening (papilledema). *Figure 3b:* Sagittal non-contrast CT demonstrating partial empty sella with CSF-filled sella and pituitary thinning.

Case 4

A 48-year-old female with a history of scrub meningitis in January 2024 presents with chronic headaches over the past month, which have been worsening, with intermittent blurring

of vision. There was disc blurring bilaterally on fundus examination. The lumbar puncture showed an opening pressure of 31 cm H_2O with normal CSF composition.
MRI brain with MRV showed bilateral perioptic CSF sheath distension (right 7.2 mm, left 6.5 mm), tortuous optic nerves, posterior globe flattening, and a partially empty sella with pituitary thinning. Mild left transverse sinus narrowing was also present. These were consistent with IIH findings. The patient showed improvement with adjustment of the acetazolamide dose.



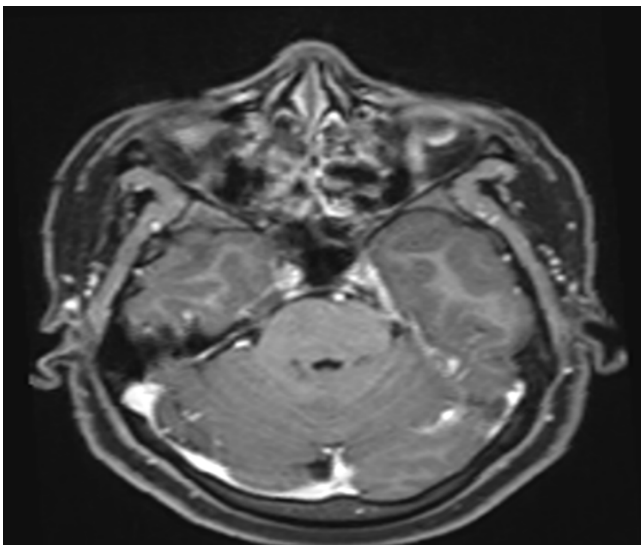
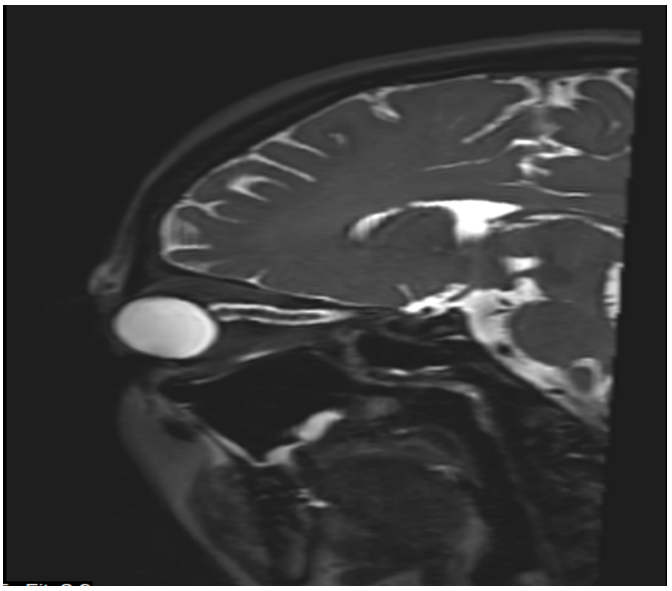


Figure 4A: Coronal T2 MRI showing T2-weighted MRI showing bilateral optic-nerve-sheath prominence (~7 mm)in Case 4.
Figure 4B: Axial post-contrast T1-weighted MR image demonstrating reduced calibre and diminished flow-related enhancement of the left transverse–sigmoid sinus, consistent with venous sinus stenosis in Case 4.
Figure 4C: Axial T2 MRI showing tortuous optic nerves and posterior globe flattening in Case 4.

Table 1. Clinical and Imaging Findings of Four Patients with IIH



Case	Age/ Sex	Presenting Symptoms	CSF Opening Pressure	Key Imaging Findings	Diagnosis Support	Outcome
1	51/F	Chronic headache	28 cm H_2O	Empty sella, optic nerve sheath distension, Meckel's cave dilatation, sinus stenosis	MRI/ MRV	Improved
2	55/ M	Headache, papilloedema	30 cm H_2O	Optic sheath enlargement, empty sella, venous narrowing	MRI/ MRV	Improving
3	95/F	Reduced responsiveness	–	Empty sella, globe flattening, optic sheath prominence	CT	Stabilised

4	48/F	Chronic headache	31 cm H_2O	Optic sheath distension, tortuous nerves, globe flattening	MRI/ MRV	Improved

Discussion

Idiopathic intracranial hypertension is the condition of raised intracranial pressure without evidence of a mass lesion, hydrocephalus, or infection.[10] Clinical diagnosis is based on symptoms including headache and visual disturbances, while the hallmark physical finding is papilloedema. Neuroimaging has become critical in confirming increased intracranial pressure and excluding secondary causes.[11]

MRI and MRV provide great anatomic detail and enable assessment of the optic nerves, pituitary fossa, and dural venous sinuses. The presence of a partially empty sella, which was present in all four of our patients, is one of the commonest imaging findings of IIH. Findings that have also commonly been reported include posterior globe flattening, optic nerve sheath distension, and tortuous optic nerves; these findings are related to increased CSF pressure.[12]

Transverse sinus stenosis in Cases 1, 2, and 4 may play a role in the pathophysiology of IIH. Narrowing of the venous sinus increases the venous pressure, impairs CSF absorption and further elevates intracranial pressure. It is important to recognize the relationship, particularly in patients with symptoms that may be refractory to interventions, in whom venous sinus stenting may be considered.

Case 3 illustrates that changes due to IIH can be appreciated even on CT, which has remained a modality of value in aged or unstable patients. Globe flattening posteriorly and an empty sella on CT are signs that reliably indicate raised ICP. These illustrate that IIH may present rather atypically and cannot be excluded based solely on age or comorbidities.

The cases also illustrate the role of imaging in follow-up. Improvement in optic nerve sheath distension and decrease in prominence of papilloedema often parallels symptomatic improvement after medical treatment. Acetazolamide remains the cornerstone of management and was effective in all patients who received it.

Conclusion

Idiopathic intracranial hypertension is a significant and potentially reversible cause of chronic headache and visual symptoms. MRI with MRV is very sensitive to structural changes associated with raised intracranial pressure; CT can identify a number of supportive features in an acute setting. The recognition of a combination of empty sella, optic nerve sheath distension, posterior globe flattening, and venous sinus narrowing is crucial for an early diagnosis. Timely intervention can prevent permanent visual loss, underlining the very important role of radiology in patient management.

Patient Consent

Written informed consent was obtained from all patients or legal guardians for the use of anonymised clinical and imaging data for publication.

Ethical Approval

This report followed institutional guidelines. Because of the retrospective and anonymised nature of the case series, there was no requirement for approval by an ethics committee.

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