Case Report

Intracranial ruptured dermoid cyst presenting as dysarthria: A case report

Sanjay Ballari[1], Gurubharath I[2*]

[1]Second-year Postgraduate, [2]Professor and Head
Department of Radio- Diagnosis, Shri Sathya Sai Medical College and Research Institute, Kancheepuram, Tamil Nadu, India
[*]Corresponding author email: **kavinilangovan@yahoo.co.in**

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Abstract

Intracranial dermoid cysts are tumors which are rare and are derived from ectopic epithelial cells. These dermoid cysts are slow-growing and are benign; they can cause morbidity by compressing the neurovascular structures. They also do rupture rarely into the subarachnoid space. Dermoid cystic tumors arise from the inclusion of ectodermal committed cells at the time of neural tube closure during the third to fifth week of embryogenesis. These lesions are slow growing due to the active production of hair and oils from the internal dermal elements. This is a case of a ruptured intracranial dermoid presenting as slurring of speech caused by the fat droplets.

Key words

Dermoid cyst, Intracranial ruptured dermoid cyst, Dermoid CT findings, Dermoid MRI findings.

Introduction

Intracranial dermoid cysts are tumors which are rare and are derived from ectopic epithelial cells. These dermoid cysts are slow-growing and are benign; they can cause morbidity by compressing the neurovascular structures. They also do rupture rarely into the subarachnoid space. Dermoid cystic tumors arise from the inclusion of ectodermal committed cells at the time of neural tube closure during the third to fifth week of embryogenesis.

Case report

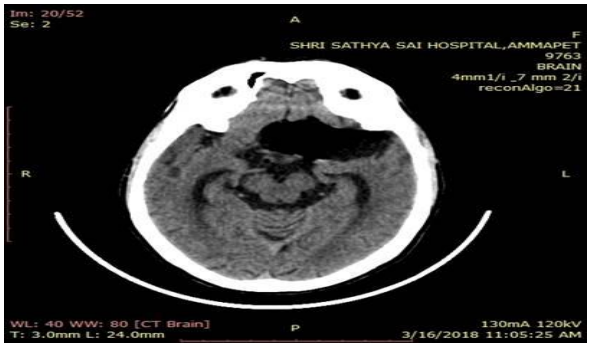
The study period was between 2017-2018 in the Department of Radiology and Imaging Sciences, Shri Sathya Sai Medical College and Research Institute. A 65-year-old female presented to the ER with complaints of difficulty in speech since the morning after waking up from the bed. On

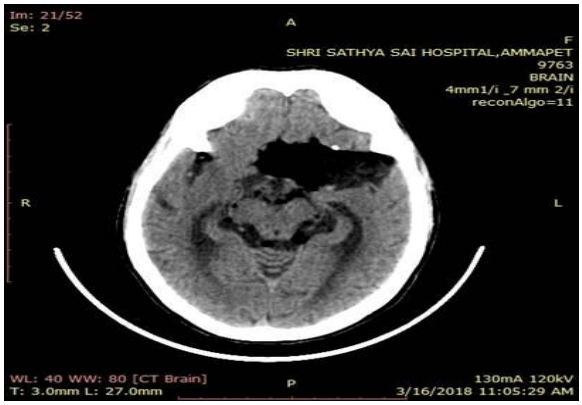
presentation, the patient on examination had left eye ptosis and shrugging of the shoulder on the right side which is of reduced power. The patient has no history of limb weakness, seizures, and urinary incontinence.

CT of the brain revealed a large ill-defined, irregular, extra-axial low-density (- 35 to -50 HU) fat containing extending from left Sylvian fissure to slightly right to the suprasellar region. Few low-density fat droplets are spread throughout the subarachnoid space to both Sylvian fissures and basal cisterns. Subsequent MRI of the brain revealed a non-enhancing suprasellar mass partially displacing the left MCA inferiorly. The mass was of high T1 and T2 signal with signal dropout on fat suppression imaging. Scattered droplets with similar signal characteristics were noted within the subarachnoid spaces. The suprasellar mass appears hyperintense on DWI.

The clinical history and MRI demonstration of fat droplets, an intracranial ruptured mass is the most likely diagnosis. The MRI signal characteristic of the mass on T1 and DWI, along with history given concludes the mass as an intracranial dermoid cyst. The patient was placed on speech therapy and on follow-up visits at 2 and 8 months, the patient was noted to be slowing down on speech. Follow-up imaging remained unchanged.

Figure - 1 and 2: Axial non-contrast CT images of the head an ill-defined irregular, extra-axial hypodense fat containing lesion (-35 to -60 HU) extending from the left Sylvian fissure to slightly right to the suprasellar region. Fat droplets are noted in the subarachnoid space.





CT and MRI images were as per **Figure – 1 to 10**. Differential diagnosis for dermoid cyst was as per **Table – 1**. Summary table for intracranial dermoid cyst was as per **Table – 2**.

Figure – 3: Axial CT non-contrast head shows fat droplets spread throughout the subarachnoid spaces into both basal cisterns and Sylvian fissures.

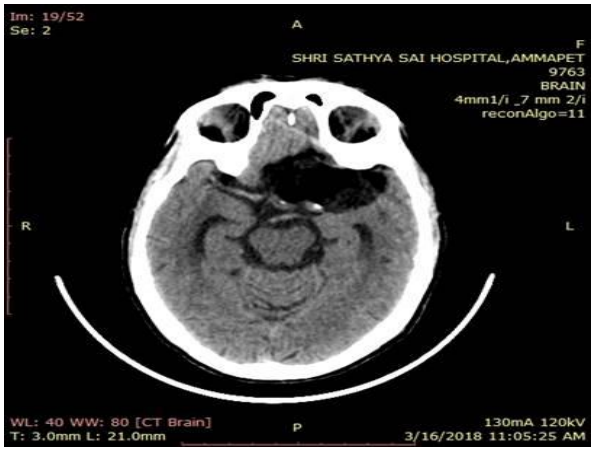
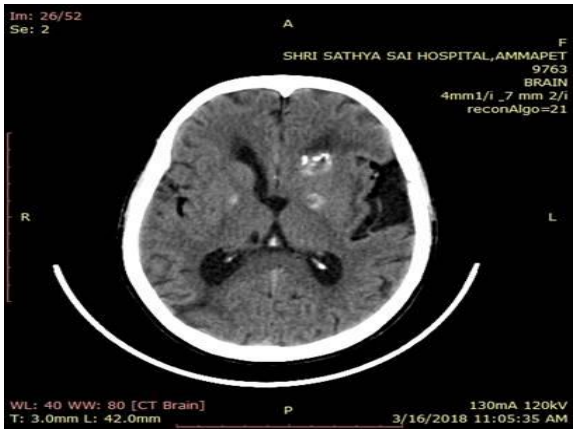


Figure - 4 and 5: Axial non-contrast CT images of the head calcification surrounding the lesion, also basal ganglia calcification is noted in this patient.



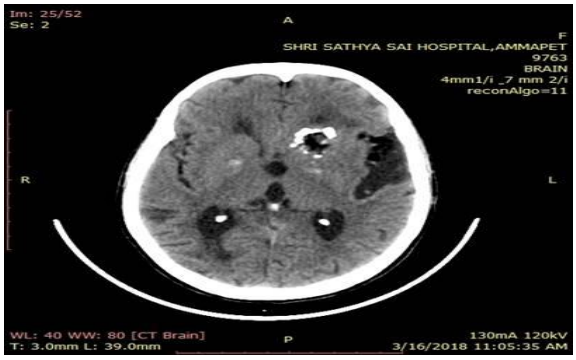


Figure - 6 and 7: Axial MRI (1.5 Tesla magnet) T1 weighted image demonstrates a lesion in the left frontal lobe Iso intense to CSF with high signal intensity around periphery Scattered droplets of similar signal characteristics were noted in the subarachnoid space.

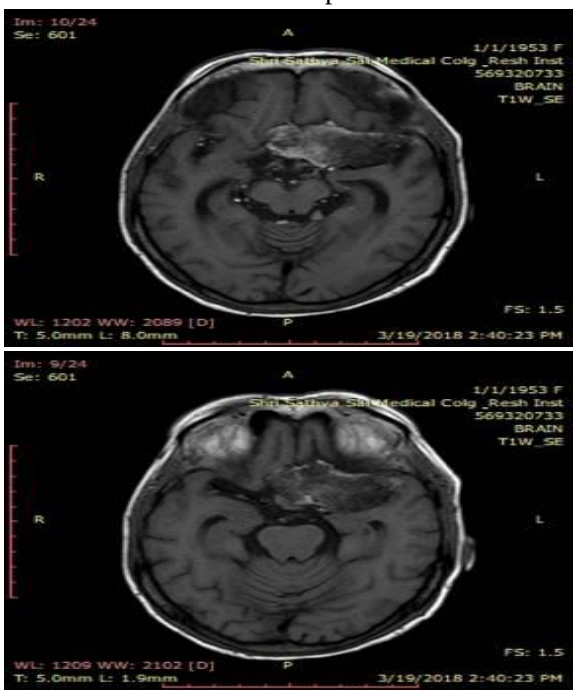


Figure – 8: Axial MRI (1.5 Tesla magnet) T2 weighted image demonstrates a mass in the left frontal lobe of high T2 signal intensity to CSF, which causes widening of the cistern.

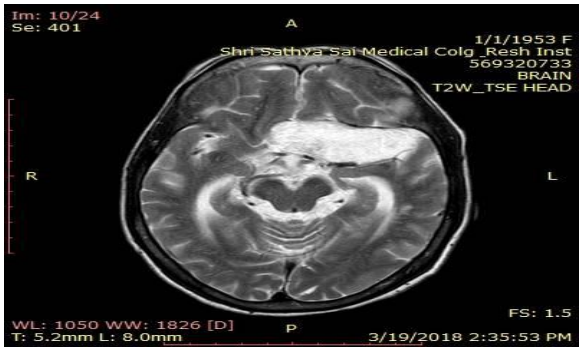


Figure – 9: MRI FLAIR sequence axial image 65-year-old female with the ruptured intracranial dermoid cyst. Axial MRI (1.5 Tesla magnet) fluid-attenuated inversion recovery a mass in the left frontal lobe with heterogeneous/dirty signal higher than the CSF signal imaging.

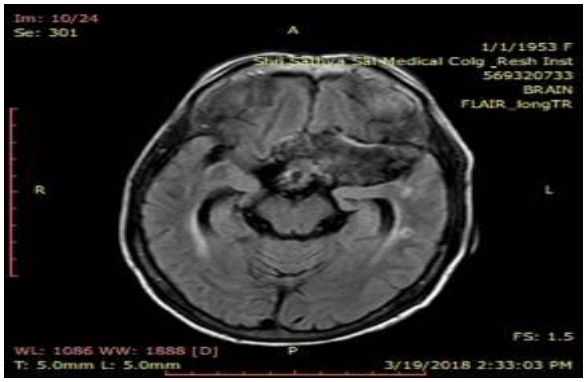
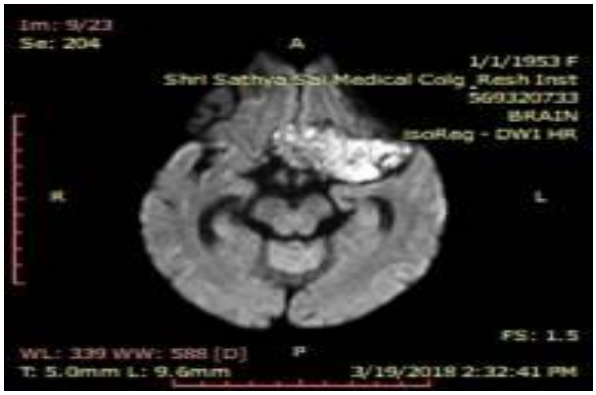


Figure – 10: MRI DWI image. The mass is noted in the left frontal lobe. A hyperintense signal is noted in the diffusion-weighted images (DWI), whereas the Apparent Diffusion Coefficient (ADC) of the mass is Iso intense with brain parenchyma.



Discussion

The dermoid cysts are rare that comprises of 0.04- 0.7% of all the intracranial tumors. They are derived from the neural tube from ectopic epithelial cells [1] that explains us the location of the mass nearby the midline. These masses are benign in condition and are slow growing which may even encroach the neurovascular structures and do rarely rupture [2]. These dermoid cysts contain lipid material which in the reports shows fatty tissue content in the periphery [3] and centrally with the fluid. The dermoid cysts can contain hair follicles, sebaceous and sweat

glands, and the presence of these structures helps distinguish [4, 5] a dermoid from the more common epidermoid cysts [6]. They are not neoplastic as they grow in size with an accumulation of desquamated products and sebaceous secretion within a cystic cavity rather than via cell division [7]. Rupture of intracranial dermoid cysts is a rare phenomenon (5 out of 2707, or 0.18% of all new CNS tumors) [8] although can occur secondary to closed head trauma. The pathology behind the rupture is not understood, [9] and hypotheses have shown secretions caused by age-dependent hormones [6], brain pulsations and head movements [10]. The rupture of the dermoid cyst causes dissemination of cholesterol breakdown and intracystic keratin products [11] can lead to a wide variety of symptoms ranging from a headache to hallucinations [12, 13, 14, 15]. Based on the cyst location the clinical manifestation varies, and in one analysis of available case reports by El-Bahy, et al. [16], the most common symptom is a headache, followed by seizures, cerebral ischemia with sensory and/or motor hemi syndrome, and aseptic meningitis. This case presented with spontaneous ruptured intracranial dermoid cyst causing difficulty in speech as the dissemination of fat droplets in the subarachnoid spaces causes' chemical irritation and leading to constriction of the vessels. On CT scans, intracranial dermoid cysts are heterogeneous [8], and usually do not enhance following contrast administration [17, 18, 19]. The fat in the cyst and disseminated fat droplets appear hypodense, but whereas the hyperdensity noted is the calcification of the wall. The fat-fluid level may be present following rupture of the cyst into the subarachnoid spaces. On MRI, these dermoid cysts are hyperintense on T1-weighted sequences and variable on T2- weighted sequences, the presence of cholesterol can make them appear hypointense on T2 as well [17, 20]. Dermoid and epidermoid cysts can be differentiated in that the dermoid represents fat signal on CT and MRI whereas the epidermoid cyst resembles CSF [21]. The epidermoid cyst may be hyperdense due to saponification or high protein content which are called as white epidermoids.Although Fluid Attenuated Inversion Recovery (FLAIR) sequences and Diffusion Weighted Imaging (DWI) are used to differentiate between dermoid and epidermoid where dermoid shows high signal intensity on DWI [22, 23]. MRI is sensitive than CT to detect dermoid cyst due to the high signal resolution, due to multiplanar imaging [24]. Orakcoiglu, et al. [25] in particular MRI sequence emphasizes MRI protocol involving T1-WI, T2-WI, T1 fat sat-WI, Magnetic Resonance Angiography (MRA) and Diffusion-weighted imaging (DWI). On DWI, however, the dermoids are hyperintense to brain parenchyma, but it represents ADC that shows similar signal intensity to that of brain parenchyma and Cerebrospinal fluid. In contrast, arachnoid cysts show low signal intensity on DWI and high signal intensity on ADC [26, 27]. A dermoid cyst can be differentiated from craniopharyngioma, as craniopharyngioma strongly enhances on CT [28, 29]. In addition to that, the craniopharyngioma cyst walls display high signal intensity on T1-weighted MRI sequences [30, 31]. Distinguishing dermoid cyst with teratoma via their calcifications, which are hyperdense on CT [32, 33]. Intracranial dermoid cysts are benign, and they do have a generally favorable prognosis. Surgery is indicated in cases where dermoid cysts cause mass effect and causing compression of surrounding neurovascular structures. The goal is complete surgical excision of the tumor capsule and dissection from adjacent neurovascular structures [7, 10]. Unfortunately, extensive for removal of the complete cyst. However, Liu, et al. [8] proves that repeat MRI scans of patients and clinical examination with extensive disseminated fat particles [35, 36] has not represented progression or movement of the fat. In those cases, medical management is indicated for symptom control [37, 38].

Conclusion

Intracranial dermoid cysts are benign and are slow-growing rare tumors when the tumors are intact; they are of mixed or predominantly low

density or fat density on CT and hyperintense on MRI T1. These dermoid cysts are hyperintense on DWI and Iso intense to brain parenchyma on ADC, which helps us to differentiate from other tumors. Following rupture, the presence of T1 hyperintense droplets may be noted which makes MRI the best modality of imaging for diagnosis.

Table – 1: Differential diagnosis for dermoid cyst. Craniopharyngioma [28-31], Teratoma [32-34], Epidermoid cyst [37-40].

Cause	During the closure of the neural tube including the ectodermal tissue
Epidemiology	It is rarer than epidermoid cysts.
Gender	Seen mostly in males
Age	Seen in 30-50 years of age
Risk factors	Sporadic
Symptoms	Most common symptoms: headache. Cerebral ischemia, seizure and, focal neurological symptoms because of the neurovascular encroachment. Rupture can cause chemical meningitis.
Treatment	Surgical excision
Prognosis	Benign in nature. Rupture of the mass can cause mortality due to vasospasm, coma, seizures, and infarction. may undergo malignancy into squamous cell carcinoma
Differentials	Craniopharyngioma, Teratoma, Epidermoid cyst.
Pathology	Squamous epithelium with surrounding collection of lipid and sebaceous contents.
Imaging features	CT: Well defined cystic mass with fat hypodensity. Fat-fluid levels within the ventricles when there is a rupture. MRI, T1 sequence: Hyperintense fat appearance. MRI, T2 sequence: Unruptured: variable, hypo to hyper intense. Ruptured: Hyperintense droplets. Curvilinear hypo intense represents hair. Enhancement: CT: no enhancement T1: Enhancement from chemical meningitis following rupture. DWI: hyperintensity on DWI. Demonstrate ADC that is similar to brain parenchyma.

Table - 2: Summary table for intracranial dermoid cyst.

Diagnosis	Origin	CT	MRI T1	MRI T2	Attenuation	Imaging
Dermoid cyst	Benign midline cysts from the ectodermal tissue.	Well defined cystic mass with fat density, but "dense" dermoids can be hyper attenuating. Few have capsular calcifications. Fat-fluid levels in the ventricles the following rupture.	Fat appears hyperintense. Dense dermoids and post-rupture fat droplets appear more hyperintense.	Hypo to hyperintense: Unruptured. Hyperintense droplets: Ruptured. Few curved and linear elements within appearing hypointense represent hair.	CT: No enhancement is seen. T1: post rupture extensive enhancement.	MRI best imaging following rupture. Fat suppression is used to confirm the diagnosis. To detect tiny droplets chemical shift selectively is useful.

Epidermoid cyst	Congenital inclusion cyst. Benign in nature.	Rounded mass resembling like CSF. Few can have calcifications.	Hyperintense slightly than CSF. If hypointense to CSF it is known black dermoids.	It is Iso to hyperintense to CSF.	CT and MRI: There is no enhancement or may show mild margin enhancement.	An MRI DWI sequence differentiates from the arachnoid cyst.
Craniopharyngioma	Tumor-derived from Rathke pouch. Benign in nature	Adamant nomatous type: 90% isodense to hypodense, and many have calcifications. Papillary type: they are so dense.	Classic type appears hyperintense with the heterogeneous nodule. Papillary type appears Iso intense and with the solid the component.	Solid component shows heterogeneous while cysts show hyperintense signal, calcification appears hypointense. In the brain parenchyma edema or gliosis appears hyperintense	CT: many show enhancing mass. MRI T1: cyst will enhance while solid material will show a heterogeneous signal.	In MRI: coronal and sagittal.
Teratoma	Midline supratentorial mass.	Soft tissue, fat and cyst attenuation. Mostly they have calcifications	The signal is variable in solid and increased in fat.	Iso to hyperintense in soft tissue. In FLAIR seq: signal increased from solid and decreased in the cyst.	CT and MRI: enhancement after contrast in soft tissues.	CT: shows calcification, fat and soft tissue. MRI helps to look for midline structures.

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