**INTRODUCTION:**

The Sylvian cistern is the subarachnoid space extending into the Sylvian fissure. It is bounded by the insular cortex (island of Reil) and the opercular cortex (fronto-orbital, frontoparietal and temporal). Within the Sylvian cistern lies the middle cerebral artery (MCA) and its branches. The opercula (lobes) cover and encase the insular cortex (Fig 1). The Sylvian fissure, insular cortex and operculum are anatomically intimately related to each other.

Sylvian fissure anatomy is variable and extends on the lateral surface of the brain from the anterior perforated substance to the supramarginal gyrus. It separates the frontal and parietal lobes from the temporal lobe and the insular cortex from its floor.¹ (Fig 1, 2)

The Sylvian fissure is divided into anterior (stem) and posterior (insulaopercular) compartments.² (Fig 5, 4) The lumen insulae forms the junction point or knot between the anterior and posterior stem.³ (Fig 2, 3, 4) This is the most lateral limit of the anterior perforated substance and is the starting point of the triangular shaped insular cortex. Anterior, superior and inferior periinsular sulci demarcate the limits of the insular cortex and the sulci demarcate the insular cortex from the adjacent operculum. (Fig 2, 3, 5)

The fronto-orbital, frontoparietal and temporal operculum enclose the insula. (Fig 1, 2) The operculum encloses areas which are vital to perception and motor aspects of speech, auditory function and secondary somatic sensory and motor functions.¹

**ANATOMY:**

The Sylvian cistern is well understood and various examples of pathology occurring in this area.

The insula is classified as part of the paralimbic system and a variety of functions have been attributed to it including memory, drive, affect, gustation, and olfaction.¹

The central insular sulcus, the main and the deepest sulcus of the insula, courses obliquely across the insula, and extends uninterrupted from the limen insula to the superior perinsular sulcus. It divides the insula into two unequal zones: the larger anterior insula, and the smaller posterior insula. (Fig 2, 3)

The anterior insula is composed of the triangular and three principal short insular gyri (anterior, middle and posterior). The anterior, middle and posterior short insular gyri are separated by the short insular sulcus and the pre-central insular sulcus. The gyri of the anterior insula fuse to form the insular apex (Fig 2, 3), which is its most superficial area. The posterior insula is composed of an anterior long insular gyrus which are separated by the post-central insular sulcus. The cortical grey matter of the insular cortex is continuous with that of the different opercula.² (Fig 2, 3, 5) The extreme capsule, consisting of the subcortical white matter of the insular cortex is continuous with the white matter of the operculum. (Fig 4, 5)

**Fig 1. Normal Anatomy. A. Sagittal T1-weighted MR image through insular cortex. B. lateral to the insular cortex. C. through opercula.**

**Fig 2. Normal Sagittal Anatomy. A. Sagittal T1-weighted MR image through insular cortex.**

**Fig 3. Normal Sagittal Anatomy. A. Sagittal T1-weighted STIR image through insular cortex. B. lateral to the insular cortex. C. through opercula.**

**Fig 4. Normal Arterial Anatomy. A. Axial T1-weighted STIR images of level anterior insula.**

**Fig 5. Normal Coronal Anatomy. A. Coronal T1-weighted STIR image at the anterior insula.**

**SAGITTAL ANATOMY OF THE SYLVIAN CISTERN**


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**INSULAR LESIONS:**

A. Sagittal noncontrast T1-weighted image through the right insular cortex demonstrates isointense mass (*) occupying the anterior insular cortex. B. Sagittal FLAIR image shows entire mass to be uniformly hypointense (*) and adjacent extreme capsule.

Fig. 7. Insular Glioma. A. Sagittal postgadolinium T1-weighted MR image through the right insular cortex demonstrates an isointense nonenhancing mass (*) occupying the insular cortex. B. Sagittal FLAIR image shows mass (**) to have hypointense signal. Note normal signal intensity of the surrounding opercular cortex (**). C. Axial FLAIR image shows hypointense mass involving the right insular cortex. Note sharply margined medial border of the mass (*) abutting the adjacent extreme capsule.

B. Sagittal postgadolinium study demonstrates ring enhancement. C. Axial postgadolinium T1-weighted image shows mass (*), adjacent to the posterior insular cortex. D. Coronal postgadolinium study shows homogenous enhancement of mass. E. Axial FLAIR image shows mass (**) in subinsular area sparing the posterior insular cortex (***). F. Coronal postgadolinium study shows mass within the subinsular cortex with rounded medial border of the mass. G. Sagittal contrast T1-weighted image shows restricted diffusion involving the opercular cortex.

**OPERCULAR LESIONS:**

A. Sagittal noncontrast T1-weighted image through the right insular cortex shows mass (**) occupying the anterior insular cortex. B. Sagittal FLAIR image shows entire mass to be uniformly hypointense (*) and adjacent extreme capsule.

Fig. 8. Recurrent Low grade astrocytoma. A. Sagittal noncontrast T1-weighted image through the right insular cortex demonstrates hypointense expansile mass (**) occupying the insular cortex. Note involvement of the adjacent superior frontoparietal cortex (**) and temporoparietal cortex (**). C. Axial FLAIR image shows entire mass to be expansile hypointense (***) and adjacent extreme capsule. D. Coronal T2-weighted image demonstrates expansive mass (**) taking the right insular cortex with sharply defined medial extension. There is adjacent superior spread of the mass along the frontoparietal cortex (**), inferiory along the temporoinsular cortex (***) and medially along the subarchnoid space (**). Note previous surgery with enlarged subarchnoid space of the right Sylvian fissure (****)

Fig. 9. Recurrent pilocytic astrocytoma. A. Sagittal noncontrast T1-weighted image through the right insular cortex demonstrates hypointense expansile mass (**) occupying the anterior insular cortex. B. Sagittal postgadolinium study demonstrates ring enhancement. C. Axial postgadolinium T1-weighted image shows exact location of mass and note sharp linear border abutting the extreme capsule.

Fig. 10. Posterior insular cortex (*). A. Sagittal noncontrast T1-weighted image through the left insular cortex demonstrates isointense mass (*) occupying the insular cortex. B. Sagittal FLAIR image shows entire mass to be expansile hypointense (**) and adjacent extreme capsule. D. Coronal T2-weighted image demonstrates expansive mass (**) taking the right insular cortex with sharply defined medial extension. There is adjacent superior spread of the mass along the frontoparietal cortex (**), inferiory along the temporoinsular cortex (***) and medially along the subarchnoid space (**). Note previous surgery with enlarged subarchnoid space of the right Sylvian fissure (****).

**CONCLUSIONS:**

Sagittal imaging although included in routine protocols in MR studies of the brain, is underutilized in interpreting lesions around the Sylvian cistern. While axial and coronal images demonstrate the insula as a rim of cortex, the sagittal plane displays the triangular shape of the insula and depicts the various gyri and sulci which compose the anatomy of the insular cortex. The addition of other imaging sequences in the sagittal plane, such as FLAIR, T1-weighted STIR-FSE or contrast studies, can be used to better display lesions around the Sylvian cistern. Neurosurgeons using the Sylvian fissure as a surgical approach will find the sagittal plane as a good anatomical guide for preoperative planning.

**REFERENCES:**


