ALGORITHM TO CONFIDENTLY IDENTIFY THE CEREBRAL LOBES ON CT AND MRI

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Objectives

• To demonstrate a systematic approach in identifying the major fissures of the brain on routine cross section images.

• To apply the knowledge of fissures to define the major cerebral lobes.

• To recognise all the major surface cerebral sulci and gyri.

• To list the frequency of expected sulcal anatomy.

• To re-enforce the method learned to localise lesions in the cerebral cortex of the brain through practice cases.

Disclosure: There is no financial or any commercial interest connected with this presentation
## Sulcal anatomy frequency

<table>
<thead>
<tr>
<th>Contiguous</th>
<th>Interrupted</th>
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</thead>
<tbody>
<tr>
<td>- Interhemispheric fissure 100%</td>
<td>- Precentral sulcus 100%</td>
</tr>
<tr>
<td>- Sylvian fissure 100%</td>
<td>- Inferior temporal sulcus 100%</td>
</tr>
<tr>
<td>- Occipito-parietal fissure 100%</td>
<td></td>
</tr>
<tr>
<td>- Central sulcus 92%</td>
<td></td>
</tr>
<tr>
<td>- Calcarine fissure 92%</td>
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History of lobar anatomy nomenclature

Friedrich Arnold (1803–1890)
- Frontal
- Parietal
- Occipital

Above terms used to first describe the cranial bones

Louis Pierre Gratiolet (1815–1865)
- Frontal
- Parietal
- Occipital
- Temporal
- Insular

Yaşargil
- Frontal
- Parietal
- Occipital
- Temporal
- Insular
- Limbic

This presentation is restricted to identifying the Frontal, Parietal, Occipital and Temporal lobes

Parietotemporal line: An imaginary line that connects the point of emergence of the parietooccipital sulcus (on the superomedial border of the cerebral hemisphere) with the preoccipital notch.
How to localize the central sulcus on sagittal images medially

1. Find the close to midline sagittal slices.
2. Identify the corpus callosum.
3. Identify the cingulate gyrus and sulcus.
4. Follow the cingulate sulcus posteriorly and superiorly. This is the marginal branch – ( bracket sign).
5. This lies is in the paracentral lobule.
6. First sulcus in front of marginal branch is the central sulcus.
How to localize the central sulcus on axial images

1. On the top brain slices identify the **interhemispheric fissure**.
2. Find a sulcus running parallel to the interhemispheric fissure anteriorly. This is the **superior frontal sulcus**.
3. Follow the superior frontal sulcus posteriorly until it joins a sulcus that runs perpendicular to it. This is the **precentral sulcus**.
4. The sulcus posterior and parallel to the precentral sulcus is the **central sulcus**.

Confirming
1. Find the **brackets**.
2. Postcentral sulcus is **bifid**.
How to localize the postcentral sulcus on axial images

1. On the top brain slices identify the interhemispheric fissure.
2. Posteriorly find a sulcus that is running parallel or slightly obliquely – **interparietal fissure**.
3. Follow the interparietal fissure anteriorly where it intersects a sulcus running perpendicular to it. This is the **postcentral sulcus**.
4. The sulcus immediately anterior to the postcentral sulcus is the **central sulcus**.

Confirming
Find the **Up Side Down Omega ω**
Identify the Sylvian – lateral fissure.
2. Follow the Sylvian – lateral fissure posteriorly.
3. The posterior end is cupped by the supramarginal gyrus of the parietal lobe.
4. The sulcus at the anterior border of the supramarginal gyrus is the postcentral sulcus.
5. The sulcus just in front of it is the central sulcus.
Unravelling the Sylvian fissure

1. Two horizontal rami
   - Anterior
   - Posterior

2. Two ascending rami
   - Anterior
   - Posterior
How to localize the occipitoparietal fissure on sagittal images

1. Find the close to midline sagittal slices
2. Draw the base line
3. Draw a line 45 degrees to base line
4. The occipitoparietal fissures runs parallel to this line
5. Occipitoparietal fissure

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How to localize the occipitoparietal fissure on axial images

1. Find the top slice of the lateral ventricles
2. Find the deepest sulci posteriorly perpendicular to interhemispheric fissure
3. This is the occipitoparietal fissure
4. Now follow it inferiorly and anteriorly

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Understanding the major surface sulci

1. Inferior frontal sulcus
2. Precentral sulcus
3. Central Sulcus
4. Postcentral sulcus
5. Interparietal sulcus
6. Sylvian fissure
7. Superior temporal sulcus
8. Inferior temporal sulcus

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Understanding the surface gyri

1. Middle frontal gyrus
2. Inferior frontal gyrus
3. Precentral gyrus
4. Postcentral gyrus
5. Supramarginal gyrus
6. Angular gyrus
7. Superior parietal lobule
8. Superior temporal gyrus
9. Middle temporal gyrus
10. Inferior temporal gyrus

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Understanding gyri on para medial slice

1. Parietal
   a) Straight Gyrus
   b) Frontal orbital gyrus
   c) Superior frontal gyrus
   d) Precentral gyrus

2. Parietal
   a) Postcentral Gyrus
   b) Superior parietal lobule

3. Occipital
   a) Cuneus
   b) Medial Occipitotemporal gyrus

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Cases
Where is this lesion?

This is the Parietooccipital sulci that separates the Occipital lobe from the Parietal lobe.

This lesion is in front of the sulci and hence is in the POSTERIOR PARIETAL LOBE.
Where is this lesion?

This is the Parietooccipital sulci that separates the Occipital lobe from the Parietal lobe.

This lesion is in the superior aspect of the occipital lobe and hence is in the CUNEUS GYRI OF THE OCCIPITAL LOBE.
Can you name these parts of the Sylvian fissure?

1. Two horizontal rami
   - Anterior
   - Posterior

2. Two ascending rami
   - Anterior
   - Posterior

The lesion is above the Sylvian fissure and anterior to the central sulcus, so it is in the posterior frontal lobe.
This is the Sylvian fissure that separates the Temporal lobe from the Parietal lobe.

This lesion is superior to the fissure and hence is in the PARIETAL LOBE.
Where are these lesions?

This is the **Central sulcus** that separates the Frontal lobe from the Parietal lobe.

The lesion in front of the sulci is in the **PRE CENTRAL GYRUS**.

The lesion posterior to the sulcus is in the **POST CENTRAL GYRUS**.
Can you name these sulci with hemosiderin deposits?

Click for Answer

- CENTRAL SULCUS
- PRECENTRAL SULCUS
- POSTCENTRAL SULCUS
References


