Radiological characterisation of the anterior skull base and frontal sinus in the sagittal plane

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Introduction

Computed tomography aids in planning frontal sinus surgery. This study examines the anterior skull base, frontal sinus and frontal recess to inform operative approaches to the frontal sinus.

Methods

Retrospective review of 100 CT scans of adult sinuses. All ages and ethnicities were included. Patients with skull base tumours or previous anterior skull base surgery were excluded. The shape of the anterior skull base in the sagittal plane [Figure 1], antero-posterior width of the frontal recess [Figure 2], lateral extent of the frontal sinuses [Figure 3] and lowermost point of the skull base [Figure 1] were recorded by two independent reviewers.

Figure 1. Shape of anterior skull base measured from fixed points - the top of frontal sinus if present, the most convex point of anterior skull base and the junction of the front wall of sphenoid and skull base.

Figure 2. Antero-posterior width of the frontal sinus opening was determined.

Figure 3. Assessed first to see whether FS extended beyond the mid-pupillary line, and then if so, further dividing the orbit into thirds, to determine whether it was the middle or lateral third.

Results

There were 40 males and 60 females with a mean age for 46.6 years (Range 16-82 years). Four shapes of the skull base were identified. The mean width of the frontal recess was 7.6mm. The frontal sinus extended to the lateral third above the orbit in 9% of cases. There was asymmetry of shape of the skull base in 10% and it was low-lying in 13.5% of cases.

Shape 1. Most commonly observed. Smooth curvature of anterior table above horizontal line between nasal beak and front face of sphenoid.

Shape 2. Higher convex point

Shape 3. Oblique line without convex point

Shape 4. Most convex point below horizontal line as previously described.

Conclusion

The Authors provide classification of the anterior skull base in the sagittal plane. Furthermore, the finding of an average frontal recess width of 7-8mm, and that 90% of frontal sinuses only extend to the medial 2/3rds above the orbit, suggest that the endoscopic approach is applicable in the majority of cases of frontal sinus surgery.