

CASE REPORT

Unilateral absence of the lunate sulcus: an anatomical perspective

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Abstract

The present study examines the gross anatomical features of anomalous lunate sulcus detected incidentally in a cadaveric brain and discusses its clinical importance. The absence of lunate sulcus was carefully studied in a dissected brain specimen. The absence of lunate sulcus was observed unilaterally on the right side of a cadaveric brain specimen. The lunate sulcus was clearly appreciated on the left side whilst on the right side it was absent. The right hemisphere of the cerebellum was also bigger in size as compared to the left. The absence of lunate sulcus is a rare finding, which may be detected incidentally. The anatomical knowledge of the lunate sulcus may be important for neurosurgeons operating on the occipital lobe and the radiologists interpreting CT scan.

Keywords: lunate, sulcus, gyrus, occipital, lobe, brain, anatomy, anomaly, variation.

Introduction

The cortex of the cerebrum is folded into different gyri that are separated by sulci. The folding is related to increase in the surface area. The pattern of folding is determined by differential growth of specific functional areas and that is the reason why the different sulci are found at particular places. Thus, the topographical anatomy of the sulci is influenced by the growth of the different functional areas. The lunate sulcus (LS) is present in the occipital lobe (OL) of the human brain. The LS when present, is situated in front of the occipital pole with a vertical orientation and is sometimes joined to the calcarine sulcus but the two are often considered to be separate [1]. The OL is anatomically important as it lodges the visual area (area No.17). The lunate sulcus is a type of operculated sulcus. There have been few studies on the lunate sulcus in MRI scans [2] but there is paucity of literature on the gross anatomical studies of the LS and its variations.

Materials and methods

During routine dissection, we detected anomalous pattern of LS in a cadaveric brain specimen. The individual had died of pneumonia. The brain was carefully studied for the presence of LS and appropriate measurements were taken. The specimen was also photographed (Figure 1).

Results

Anomalous LS was observed in the brain of a 45-year-old male cadaver. The LS was present on the left side only. The LS was vertical in shape on the left side (marked with arrow in Figure 1) measuring 0.8 cm

in length, with the right one being absent. The right cerebellar hemisphere was larger than the left one. No other associated anomalies were observed.

Discussions

The LS is a well-defined sulcus in the anthropoid brains but not in the human brains and it forms the anterior boundary of primary visual striate brain [3]. The earliest description of the LS can be traced back to the beginning of the early 20th century [4]. It was found that in apes and some monkeys, the LS formed the antero-lateral boundary of the primary visual area or striate cortex, which denotes the ‘Stripe of Gennari’ in the histological sections [5]. Standard textbook of anatomy describes the LS to be present, just in front of the occipital pole, placed vertically and sometimes joining the calcarine sulcus but often existing as a separate sulcus [1]. A research study had pointed out that in humans the lunate sulcus is frequently “fragmented” [3].

The anatomical location of the LS may serve as a potential marker of the cognitive development in extinct hominid species [2]. The presence of the LS has been described to be variable. The LS has been described to be present in the right and the left cerebral hemispheres in the frequency of 26.4% and 32.7%, respectively [2]. No single study has ever described absence of LS accompanied with asymmetrical cerebral hemisphere as depicted in the present study and that makes the present case report a rare entity. Past reports have described the LS to be present in 60% of the right and 64% of the left hemispheres [6]. Thus, there is a possibility that LS may be more frequently found on the right side but our study also demonstrated the presence of the LS on the left side.

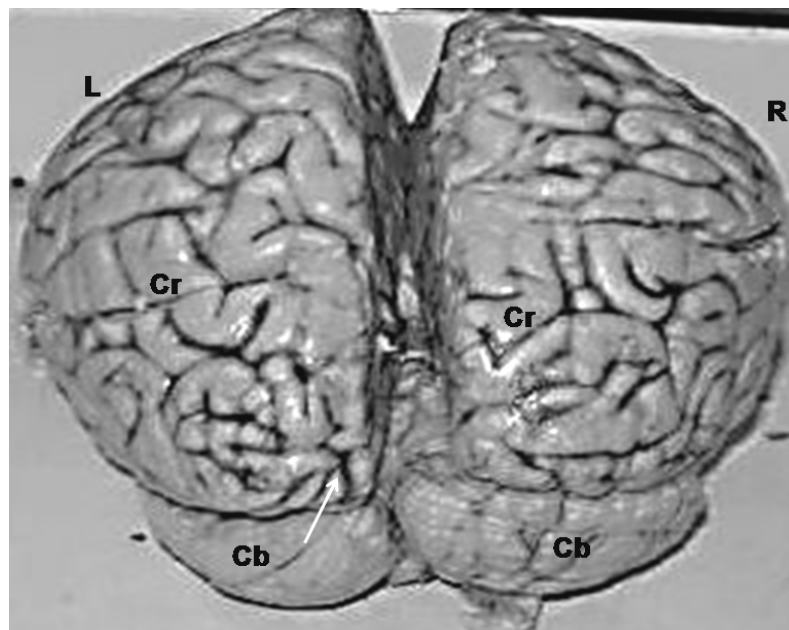


Figure 1 – Photograph of brain showing occipital lobe and lunate sulcus: L – left side; R – right side; Cb – cerebellum; Cr – cerebrum. The lunate sulcus is shown on the left side with an arrow (white color), while it is absent on the right side. The right lobe of cerebellum is bigger than the left lobe and this can be clearly appreciated in the photograph

The primary visual cortex (V1) is situated around the calcarine sulcus extending to the occipital pole with minimum area of representation on lateral surface of the occipital lobe [2]. It was found that in 35% cases, there was an extension of area 17 to the lateral surface of occipital pole, an area substantially posterior to the exact location of the LS in humans [7]. Topographical anatomy of lunate sulcus as a landmark may be mistaken in some cases prior to surgery and that is the main inference of the present study.

☒ Conclusions

The anatomical knowledge of the presence of sulcus and gyri may be important for neurosurgeons operating on the posterior lobe tumors. There is no doubt that advanced medical technology provides much needed information but awareness of such anomalies may be beneficial to the surgeons who are being exposed to the vagaries for the first time, during any operations. Radiologists interpreting MRI scans may also be aware of such variations in their daily clinical practice.

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