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Incidentally detected total agenesis of the falx cerebri: Potential significance of this rare finding

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ABSTRACT

Absence of the falx cerebri is a rare radiological finding, which is generally described in relation with varying degrees of holoprosencephaly or other structural central nervous system anomalies. We present a case of non-syndromic, asymptomatic absence of falx cerebri in an elderly patient, which was discovered incidentally on a computed tomography examination of the head. The superior sagittal sinus was narrowed, but present. Relevant anatomic and embryological considerations are discussed, as well as potential implications for clinical practice.

1. Introduction

Absence of the falx cerebri is a rare finding, and it can be easily missed if not looked for carefully. Fenestration, hypoplasia and partial agenesis are the more commonly described variations in the literature [1,2]. However, total agenesis of the falx cerebri is very less frequently described, and it has always been discovered when evaluating other structural lesions or incidentally detected intraoperatively in all the previously described literature. Falcine agenesis is also commonly associated with varying degrees of holoprosencephaly [3]. We present a case with falcine agenesis and narrowing of the superior sagittal sinus without demonstrable anomalous venous channels or any degree of cerebral hemispheric fusion.

2. Case report

An 87-year-old female with a history of dementia was admitted for hip fracture. During her admission, a CT head was obtained for onset of confusion. This was unremarkable except for an incidental complete absence of the falx cerebri in the midline (Fig. 1). The superior sagittal sinus appeared to be small in caliber (Fig. 2); however, there were no large anomalous venous channels identified on the present unenhanced examination. There was no cerebral hemispheric fusion or other evidence of congenital brain parenchymal abnormalities. The patient's acute symptoms subsequently subsided and she was eventually discharged to long term care.

3. Discussion

Anatomical variations of the falx cerebri are rare, and there are few cases published in the literature to date. Such variations include fenestration, hypoplasia, partial agenesis, and more rarely total agenesis. We could locate only two case reports of total agenesis of the falx cerebri characterized on cross sectional imaging, one of which was associated with agenesis of the superior sagittal sinus [13,14]. Isolated abnormalities of the falx cerebri are extremely uncommon.

It is important to discuss anatomic variations of the superior sagittal sinus with falcine abnormalities, as their embryological development is interlinked. The falx cerebri develops from interhemispheric mesenchyme and the superior sagittal sinus develops from the sagittal plexus of veins. These develop between 8 to 11 weeks of gestation and are divided into anterior and posterior parts, the anterior part developing first [4–7]. At approximately 11 weeks, the falx cerebri attaches to the developing calvarium within the midline interhemispheric fissure, enclosing the superior sagittal sinus within its superior reflections.

Anatomical variations of the superior sagittal sinus described in the literature include duplication (segmental or complete), hypoplasia (unilateral or complete) and atresia (segmental or complete) [8–11]. In a case report from the pre cross-sectional imaging era, the author proposed that, since the superior sagittal sinus was normally developed, agenesis of the falx cerebri was not possible [15] and the absence of the anterior falx was presumed to be traumatic in etiology. This reiterates the fact that isolated falx cerebri anomalies are rare due to close interactions between the falx cerebri and superior sagittal sinus during the embryological development.

On CT and MRI, the total absence of the anterior and posterior parts

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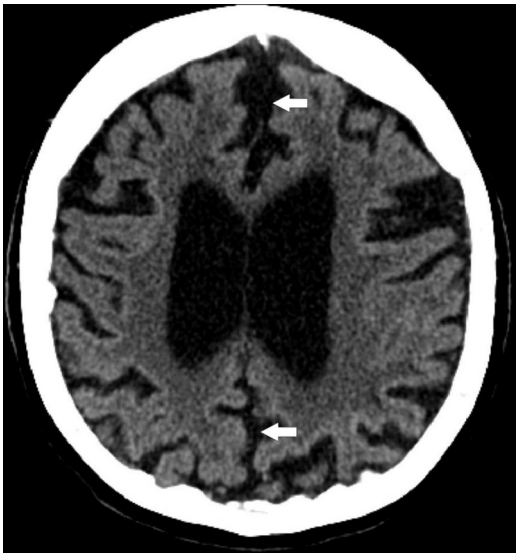

Fig. 1. Unenhanced CT head demonstrates absence of the normal falx cerebri in the expected midline location (arrows).

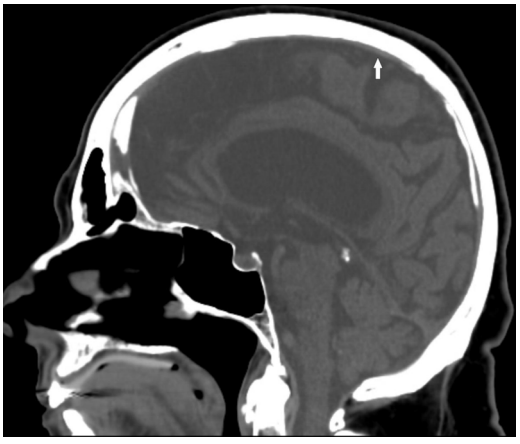

Fig. 2. Unenhanced CT head demonstrates small caliber of the superior sagittal sinus (arrow).

of the falx cerebri at the interhemispheric fissure is suggestive of total agenesis of this structure. Some secondary abnormalities may be seen as a result of absent falx cerebri, such as cerebral gyral interdigitation due to gyri crossing the midline. However, the latter finding is also seen in association with Chiari II malformation because of the hypoplasia and/or fenestration of the falx cerebri [12]. In cases where there are associated abnormalities of the superior sagittal sinus, imaging is useful to detect other anatomical variations of venous drainage pathways, which may occur to compensate for absence of the superior sagittal sinus [8–11].

Isolated absence of the falx cerebri has important neurosurgical implications. The falx cerebri acts as an important landmark for identification of the midline during interhemispheric dissections, and if its absence is not known or recognized, this may result in intraoperative complications [13]. An absent falx cerebri may also allow a subdural hemorrhage to cross midline, resulting in potential misdiagnosis.

4. Conclusion

Absence of the falx cerebri is a very rare finding. In our case, it was an isolated, incidentally detected finding with no other structural abnormality such as cerebral hemispheric fusion. We found that the superior sagittal sinus in our patient was small; however, there were no large venous channels to account for an alternate venous drainage pathway. Awareness of this variant is necessary to avoid intraoperative complications during neurosurgical operations in which the falx is used as a landmark, as well as to accurately diagnose subdural hemorrhages crossing midline in this condition.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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