Flattened Sheet Like Fornix Forming A 'Cobra Hood' Deformity: A Previously Unreported Variant of Fornicial Anatomy and its Implication in Surgical Approach to the Third Ventricular Tumors

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Introduction

The fornix is an important tract carrying bidirectional fibers that connect the hippocampus with subcortical centers. The fimbria runs backwards and at the tail end of the hippocampus continues upwards, forwards and medially as crus of the fornix. Each crus is a thick discrete fiber bundle, which meets its fellow from the opposite side to form the body of the fornix. The body of the fornix is triangular and is formed by these two symmetrical cord-like bundles of fibers.

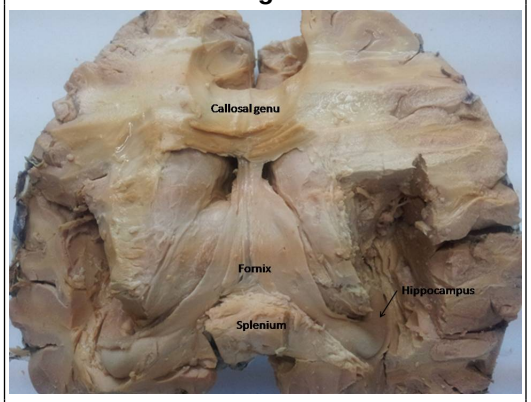
Here we report what to the best of our knowledge is a hitherto unreported variation in the fornix. Knowledge that such a variation occurs has implications in planning surgery for lesions of the third ventricle.

Methods

Fornicial anatomy was studied in 10 cadavers of normal adult healthy males who died in road accidents.

In five out of ten brains dissected, the crura and body of the fornix were seen as a flat broadsheet rather than the usual compact cord-like appearance. To the naked eye it resembled the hood of a cobra and therefore we chose to label it a "cobra hood" deformity of the fornix.

Fig 1



Superior view of the fornix showing the cobra hood deformity.

Each sheet-like crus was triangular in shape with its apex at or near the level of the anterior commissure and its base at the tail of the hippocampus. The bilateral sheets together appeared as a larger triangle with the hippocampal commissure seen as a small triangle on the midline at its base, at the level of the splenium of the corpus callosum.

Results

In 5 out of the 10 brains, the crura and the body of fornix were broad and flat, like a sheet bilaterally rather than usual compact bundle. Tha maximum width was approximately 16mm on the right side (Mean width: 11.7 mm) and 11mm on the left side (Mean width: 8.5mm).

Discussion

A broad-sheet-like deformity of the fornix covering the roof of the third ventricle like a hood has not been reported previously. his assumes significance, suggesting that this type of fornix abnormality could be present in the normal population. When an interforniceal or subchoroidal approach to lesions of the third ventricle is planned, detailed imaging studies of the fornix are not routinely done. Therefore there is high chance of inadvertent injury to this structure resulting in post-operative memory deficits.

In an individual patient harboring a third ventricular lesion, special imaging sequences to study the disposition of the fiber tracts of the fornix in relation to the roof of the third ventricle should be obtained to preserve post-operative quality of life.

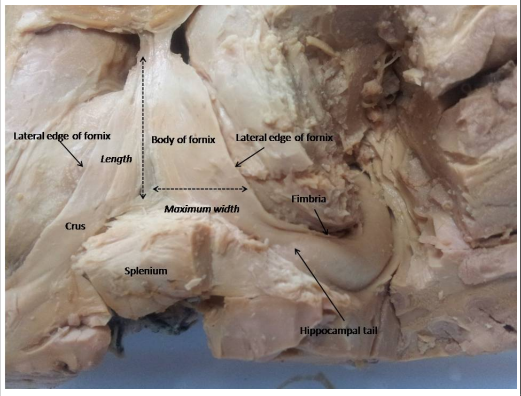
Table 1: Morphometric data of the fornix sheet

Dimension	Right side	Left side	Total
A-P length	31.5 ± 0.72 mm	30.5 ± 0.64 mm	30.6 ± 0.75 mm (29.7-31.5 mm)
Width at the anterior end	3.88 ± 0.12 mm	2.37 ± 0.14 mm	3.1± 0.23 mm (2.35 – 3.88 mm)
Width at the mid-point	8.49 ± 0.44 mm	7.61 ± 0.33 mm	7.05 ± 1.68 mm (3.6 – 10.45 mm)
Maximum width	11.77 ±3.27 mm	8.45 mm ±2.47	10.31 ± 3.22 mm (6.22 – 15.88 mm)
Thickness at the lateral edge	1.62 ± 0. 35 mm	1.62 ± 0.35 mm	1.96 ± 0.45 mm (1.62 -2.21 mm)

Conclusions

To best of our knowledge this anatomical variant has not been described before. The knowledge of this variation will be useful during subforniceal or interforniceal approach for posterior third ventricle tumours, especially in latter, as unexpected lateral span of the fornix in the surgical corridor can lead to inadvertent damage to the fornix leading to memory defects.

Fig 2



Depiction of various measurements taken.