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Introduction

Approach to lesions of the medial thalamus is challenging, and is dependent on lesion's characteristics and location.

Two approaches, the contralateral transcallosal ipsilateral transchoroidal (cTCal-iTChor) and the contralateral transcallosal contralateral transchoroidal (cTCal-cTChor) were compared in this study with respect to the best exposure of the medial thalamus.

Methods and Materials

Three formalin-fixed human cadaveric heads (6 sides) were examined microsurgically by the aforementioned approaches and compared using the navigation system.

Multiple polygons of exposed sections of the medial thalamus were assessed to calculate area of exposure. Surgical freedom at different regions of the medial thalamus, as well as angle of attack to the center of the medial thalamus were compared to study the advantages and drawbacks of the compared approaches.

Results

The exposed areas of the superior (mean $[\pm SD]$ 80 ± 32 vs 23.5 ± 13 mm², $p=0.02$), anterior (47.8 ± 27 vs 23 ± 7 mm², $p=0.03$), posterior (59.2 ± 21 vs 33.7 ± 16 mm², $p=0.04$), and total area (188 ± 45 vs 103 ± 33 mm², $p=0.001$) were significantly larger in cTCal-iTChor compared to cTCal-cTChor. Volume of surgical freedom was advantageous via the cTCal-iTChor compared to cTCal-cTChor at the postero-superior and antero-superior regions of the medial thalamus, 38 ± 10 vs 17 ± 12 mm³, $p=0.04$ and 39.3 ± 19.3 vs 3 ± 8 mm³, $p=0.01$ respectively. cTCal-cTChor afforded significantly larger angle of attack to the surface of the medial thalamus compared to cTCal-iTChor, 25 ± 6 vs 17 ± 2 degrees, $p<0.001$, respectively

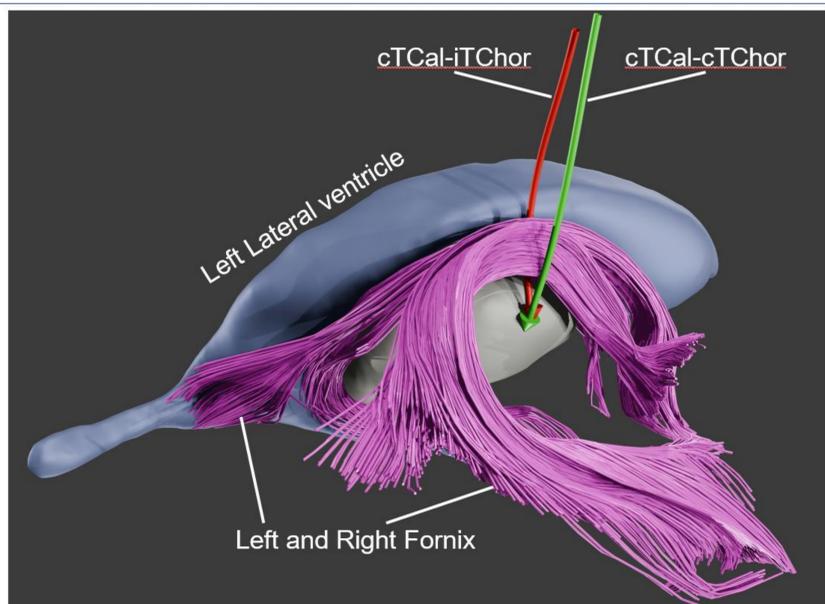


Figure 1. Illustration depicting trajectories of the contralateral transcallosal ipsilateral transchoroidal (cTCal-iTChor) and contralateral transcallosal contralateral transchoroidal (cTCal-cTChor) approached to the opposite medial thalamus.

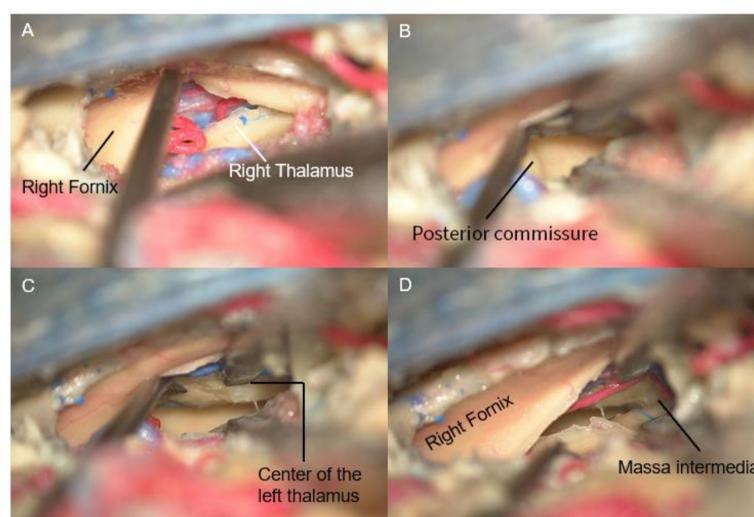


Figure 3. Exposure of different left medial thalamic regions via the cTCal-cTChor approach. A, Dissection starts with visualization of the ipsilateral velar surface of the right medial thalamus and access into the velum interpositum by retracting the right fornix upwards. B, As the dissection is deepened below the roof of the third ventricle, the posterior commissure and the posterior medial aspect of the left medial thalamus is seen. C, The center of the opposite medial thalamus is visualized, but the superior regions of the latter are obstructed by the fornix. D, Directing the view to the anterior aspect of the medial thalamus can visualize the massa intermedia.

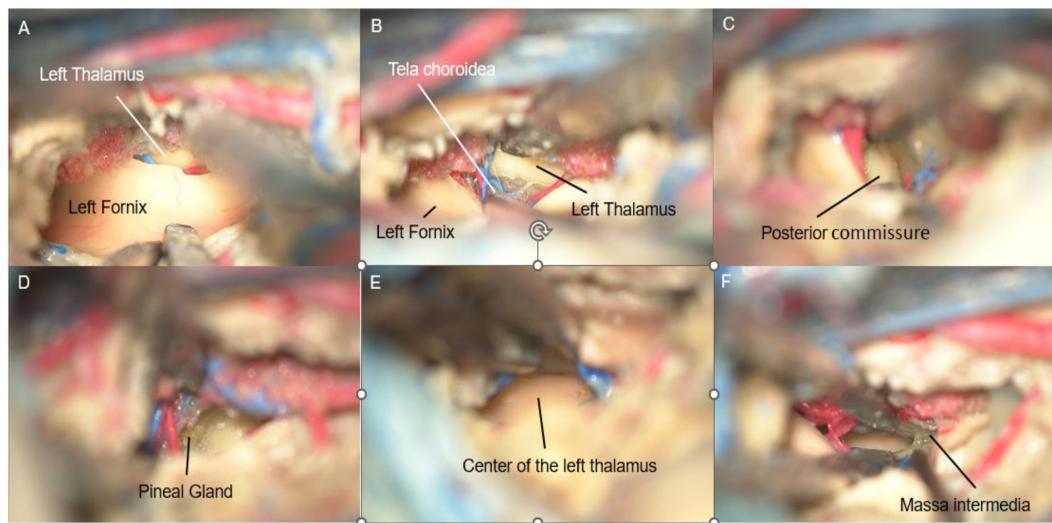


Figure 2. Exposure of different left medial thalamic regions via the cTCal-iTChor approach. A, Visualization of the velar surface of the opposite medial thalamus. B, The inferior layer of the tela choroidea needs to be dissected to open more inferior portions of the medial thalamus. C and D, Directing the view to the posterior aspect of the medial thalamus can visualize the posterior commissure and pineal gland. E and F, The center of the opposite medial thalamus and massa intermedia can be seen.

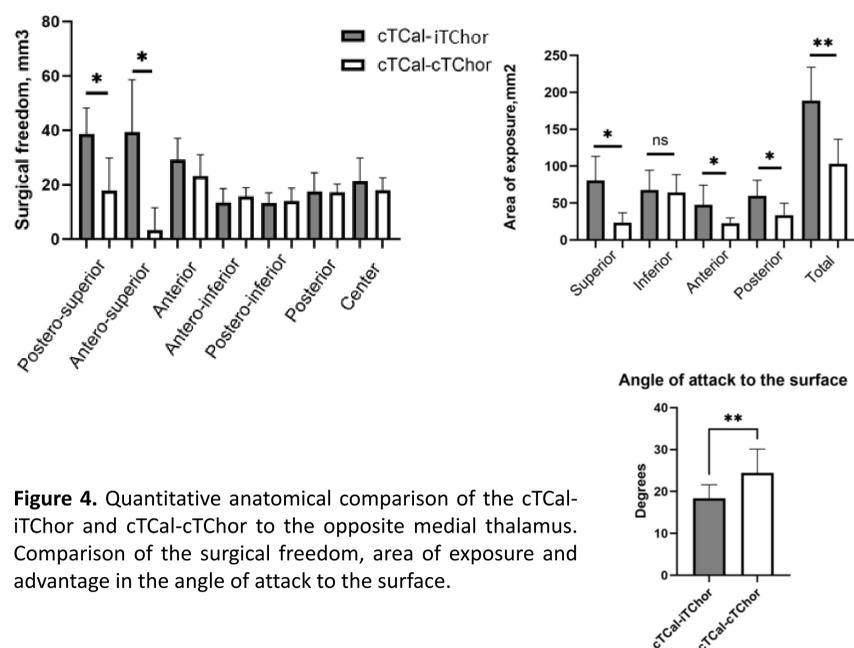


Figure 4. Quantitative anatomical comparison of the cTCal-iTChor and cTCal-cTChor to the opposite medial thalamus. Comparison of the surgical freedom, area of exposure and advantage in the angle of attack to the surface.

Conclusions

The cTCal-iTChor approach is preferable for exposure of medial thalamic lesions located at the velar surface of the thalamus. Both approaches described relatively similar surgical freedom at the medial thalamus. Considering the larger angle of attack to the surface of the thalamus in cTCal-cTChor, it is more advantageous in exposing lesions of the medial thalamus extending in the medial-lateral direction.

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