Access to Dorello's Canal via Ventral, Anterolateral, and Posterolateral Routes

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Introduction

The intraoperative localization of the sixth cranial nerve (CNVI) has been a surgical challenge due to its intricate course and proximity to critical structures. Particularly, its interdural segment -traversing Dorello's canal (DC)- is closely related to the petroclival region, making it susceptible to injury during transpetrosal and transclival approaches. This study seeks to provide anatomical insights into DC and CNVI, with emphasis on their surgical relevance.

Methods and Materials

Fifteen cadaveric sides were dissected to perform the following three approaches (5 sides each): 1) Combined endoscopic endonasal/contralateral transmaxillary approach (EEA/CTMA); 2) Kawase approach and subsequently extended Kawase approach entailing transposition of cranial nerve five (CNV); 3) Retrosigmoid suprameatal approach (RISA). Morphometric and qualitative data were obtained.

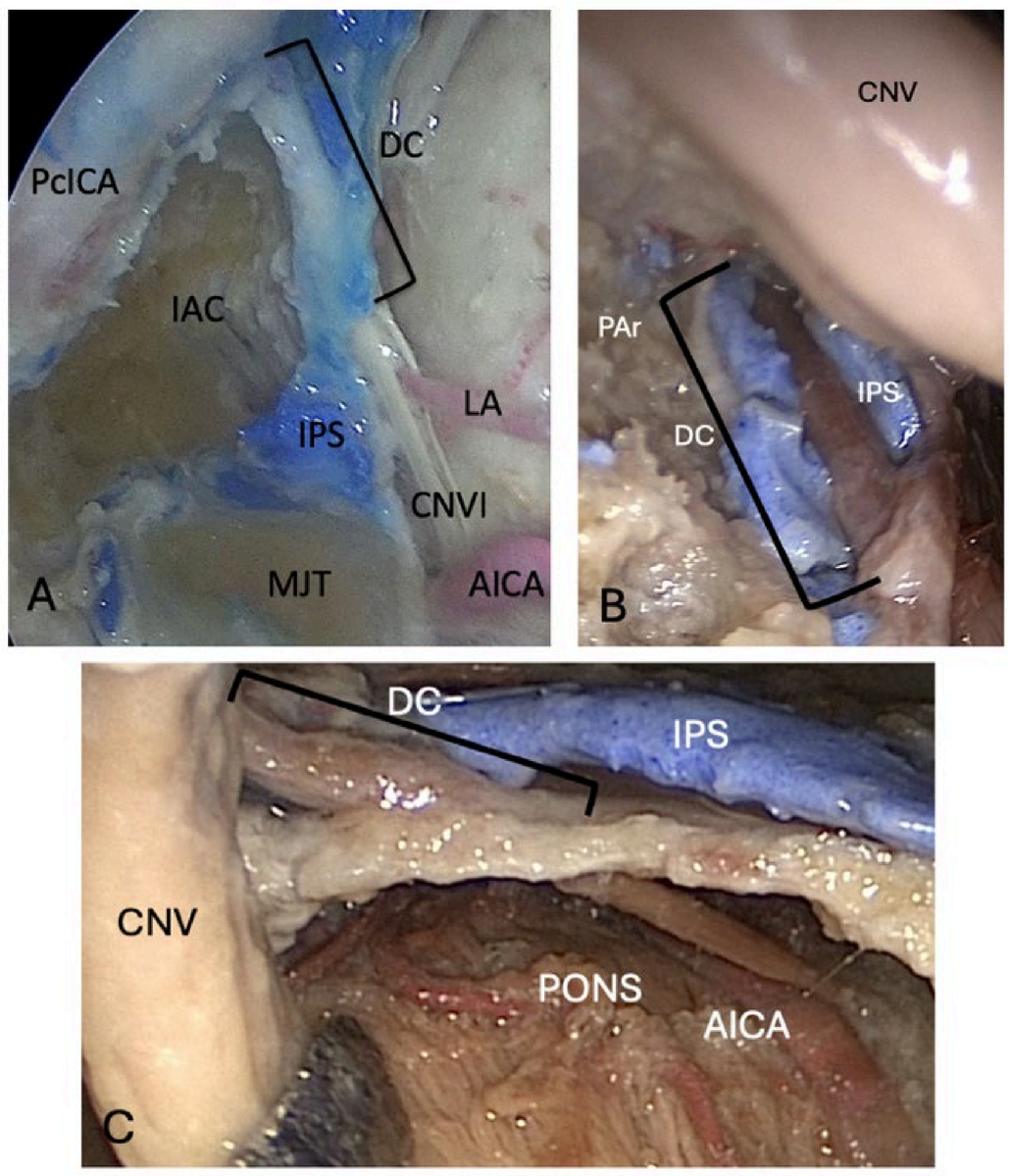

Figure 1. Access to DC through EEA/CTMA (A), RISA (B), and extended Kawase approach (C), PcICA=paraclival internal carotid artery, IAC=internal acoustic canal, IPS=inferior petrosal sinus, LA=labyrinthic artery, AICA=anterior inferior cerebellar artery, MJT=medial jugular tubercle, PAr=petrous apex removed.

Results

The mean lengths of the cisternal and interdural segments of CNVI were 19 mm (range: 14-25) and 8.6mm (range: 6-13), respectively. EEA/CTMA facilitated access to the entire DC and cisternal CNVI segments. The sphenoidal petrosal process consistently marked the transition of the interdural CNVI to its cavernous segment, while the inferior petrosal sinus (IPS) ran parallel and usually just lateral to DC. The standard Kawase approach provided access to 71.6% of the cisternal CNVI, while DC remained inaccessible. In contrast, the extended Kawase approach exposed 100% of the cisternal CNVI and 51.6% of the proximal DC, though visibility of the petrous apex and distal DC was obstructed by CNV. The IPS served as reliable landmark, ensuring CNVI integrity when drilling and arachnoidal dissection remained superior to its course and lateral to CNV. RISA enabled 100% exposure of cisternal CNVI and 89.6% of DC. However, the working corridor was narrower and while the IPS remained a useful landmark, the intradural opening and course of DC was encountered first and guided the depth of the petrous bone drilling (Figures1-3).

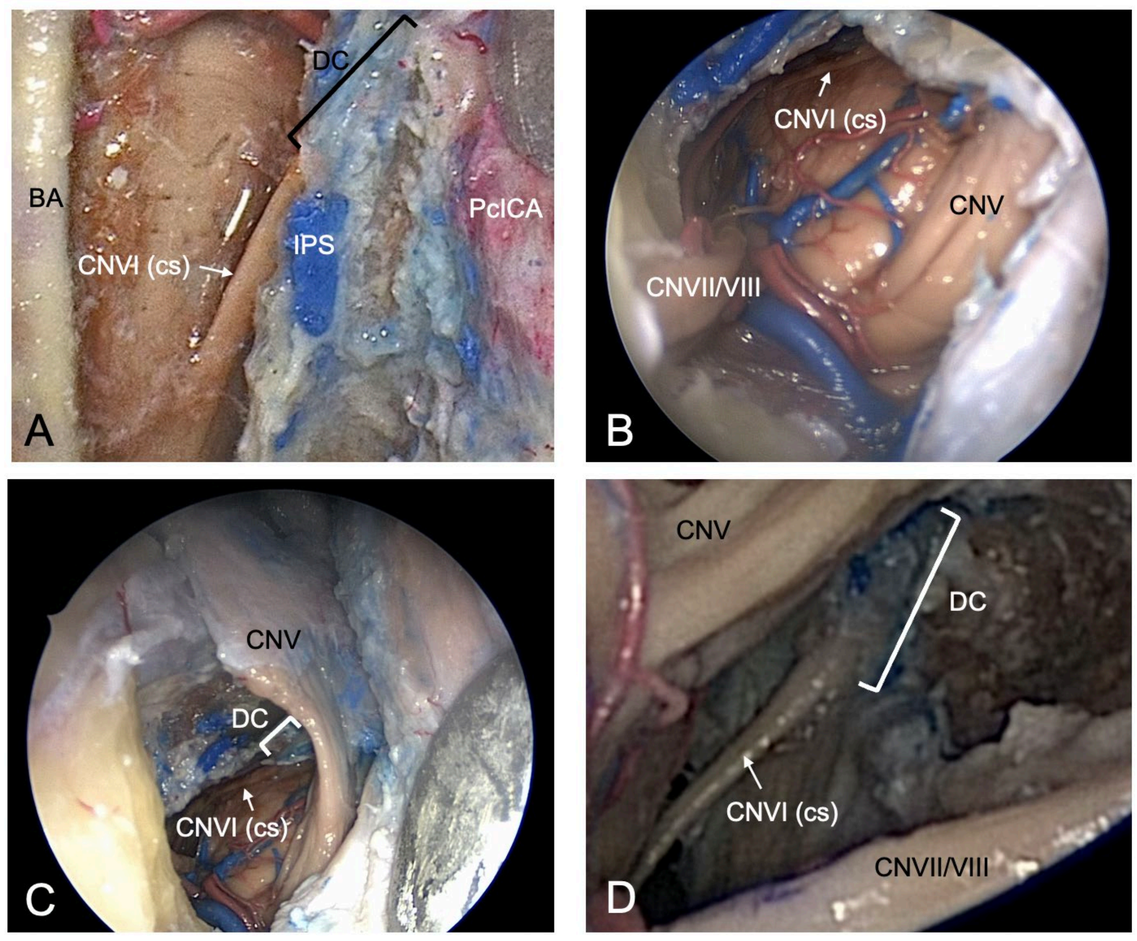

Figure 2. DC and cisternal segment (cs) of CNVI revealed through EEA/CTMA (A), extended Kawase approach (B, C), and RISA (D), BA=basilar artery, CN VII/VIII=cranial nerve seven/eight, panel B represents a magnified endoscopic view of panel C.

Conclusions

Precise anatomical understanding of DC in relation to different skull base approaches is crucial for minimizing morbidity and tailoring the approach to the pathology.

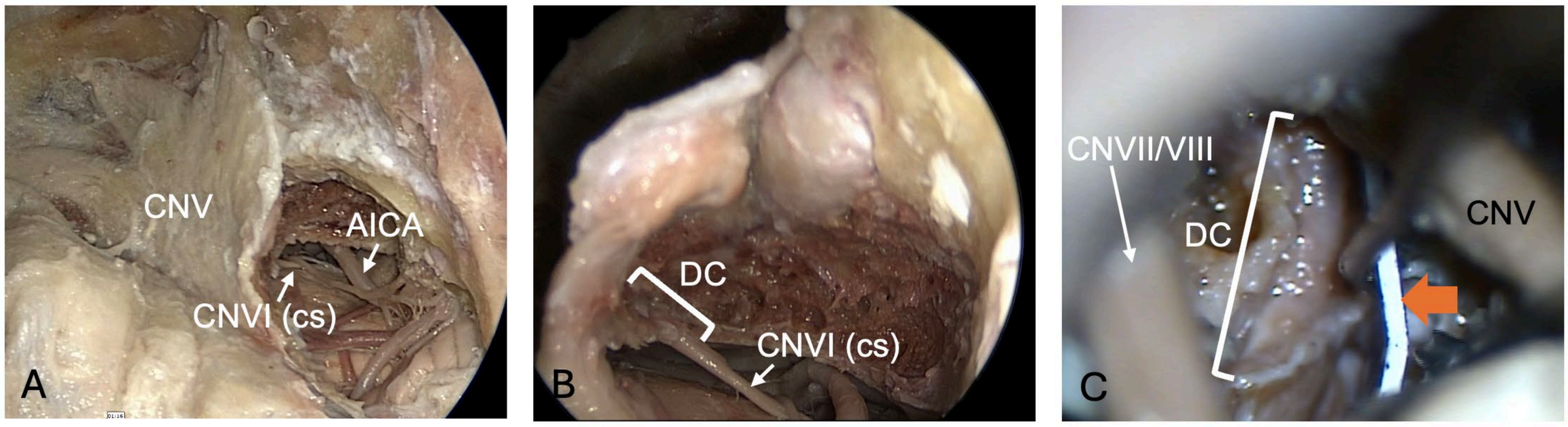

Figure 3. DC and cisternal segment of CNVI as seen during the Kawase approach (A), the extended Kawase approach (B), and RISA (C), the orange arrow points to the malleable ruler used for the measurements

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