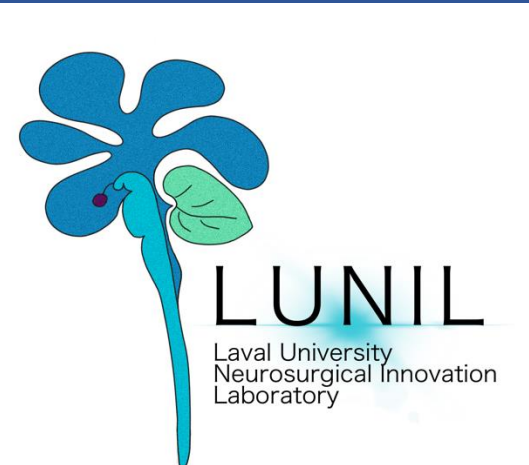


The tragus-facial angle: proposition of a new method to estimate the trajectory of the frontal branch of the facial nerve

Guilherme Gago, MD¹; Antonio Strangio, MD¹; Martin Côté, MD¹; Pierre-Olivier Champagne, MD, PhD¹
¹Université Laval



Context

Pterional craniotomy is considered a workhorse in skull base surgery. Inferior extension of the skin incision for expanded approaches (such as orbitozygomatic craniotomies and variations), requires wider dissections and can lead to injury to the frontal branch of the facial nerve (FN). Properly understanding the trajectory of the facial nerve and its relationship with surface anatomical structures is essential for its intraoperative preservation. Several methods with varying levels of complexity have been proposed to estimate the position of the facial nerve, with no consensus.

We aim to describe a new and simple method to estimate the position of the frontal branch of the facial nerve for frontotemporal approaches.

Methods and Materials

Formalin-fixed, silicon-injected cadaveric heads were dissected under microscope from the stylomastoid foramen to the distal part (15 cm) of the frontal branch of facial nerve. We measured the distances between the anterior edge of the tragus (point A) and two other points: a point on the same vertical line as point A at the intersection with the facial nerve (point B) and another point on an horizontal line from point A at the point of intersection with the frontal branch (FB) (point C). From these points, the angle between AB and BC (tragus-facial angle) was measured (figure 1A). Furthermore, we calculated the distance between a point 1 cm below point A on the vertical plane (A') and the FB horizontally (figure 1B).

Proposed Method

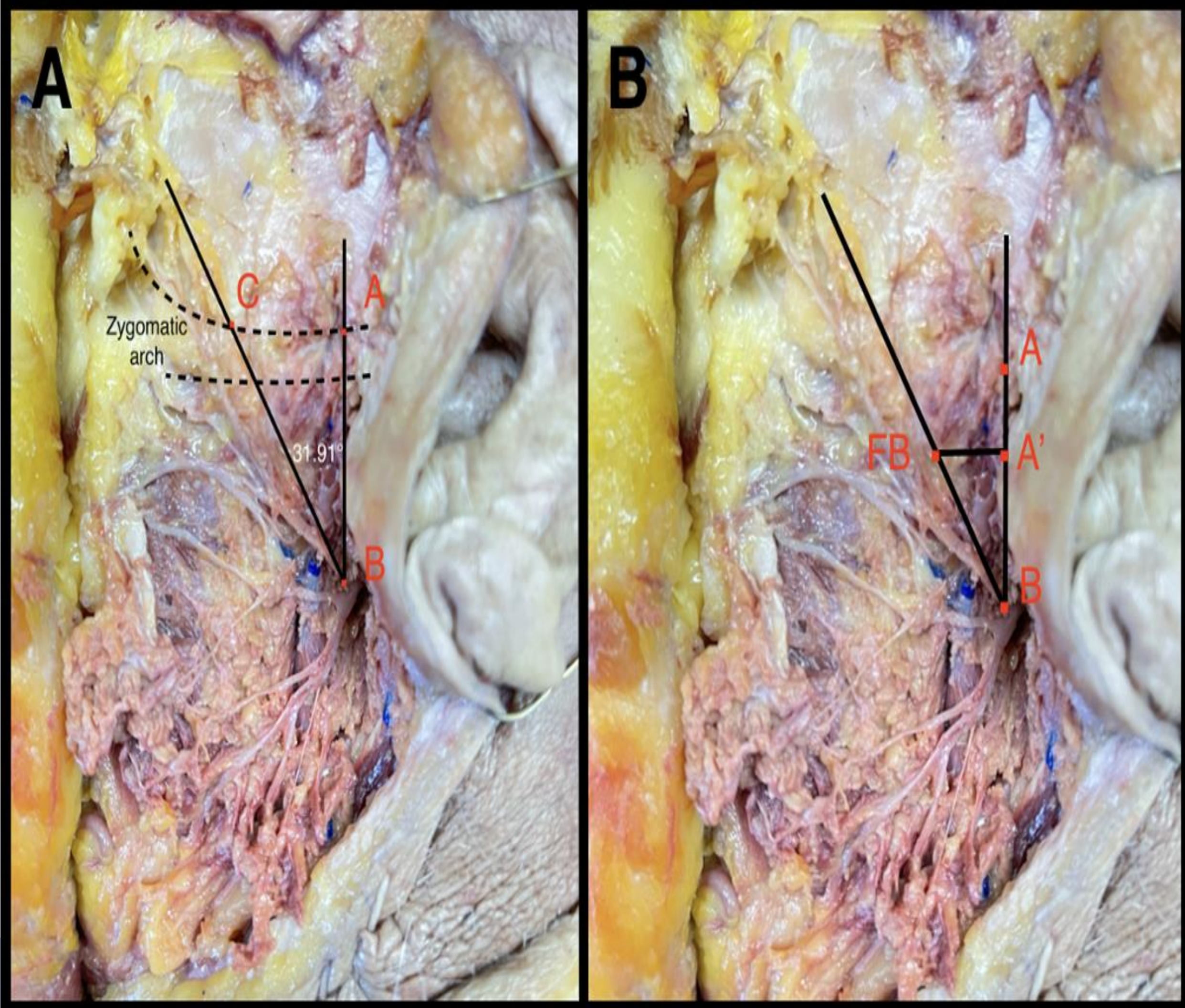


Figure 1: Cadaveric dissections showing Tragus-Facial angle calculation (A) and A'FB measurement method (B).

Results

A total of 10 specimens were dissected. Right and left sides were dissected in the same proportion (50%). Data is summarized in table 1. The mean tragus-facial angle was 31,91° (SD +- 3,71), ranging from 26,56 to 36,87 degrees. The mean AB distance was 26.8 mm (SD +- 2.66). Thus, to estimate the trajectory of the frontal branch with the tragus-facial angle method, the branch would follow the BC line: approximately 2,5 cm below the tragus at an angle of 30 degrees with the vertical plane. (Figure 2) The A'FB ranged from 9 to 13 mm with a mean of 10.92 mm (SD +- 1.18).

	Mean	SD	Range
AB	26.8 mm	2.66	20-30
AC	16.3 mm	2.05	13-19
BC	30.8 mm	2.56	25-34
Tragus-Facial Angle	31,91 °	3,71	26,56-36,87
A'FB	10,92 mm	1,18	09-13

Table 1: Summarized data from 10 specimens.

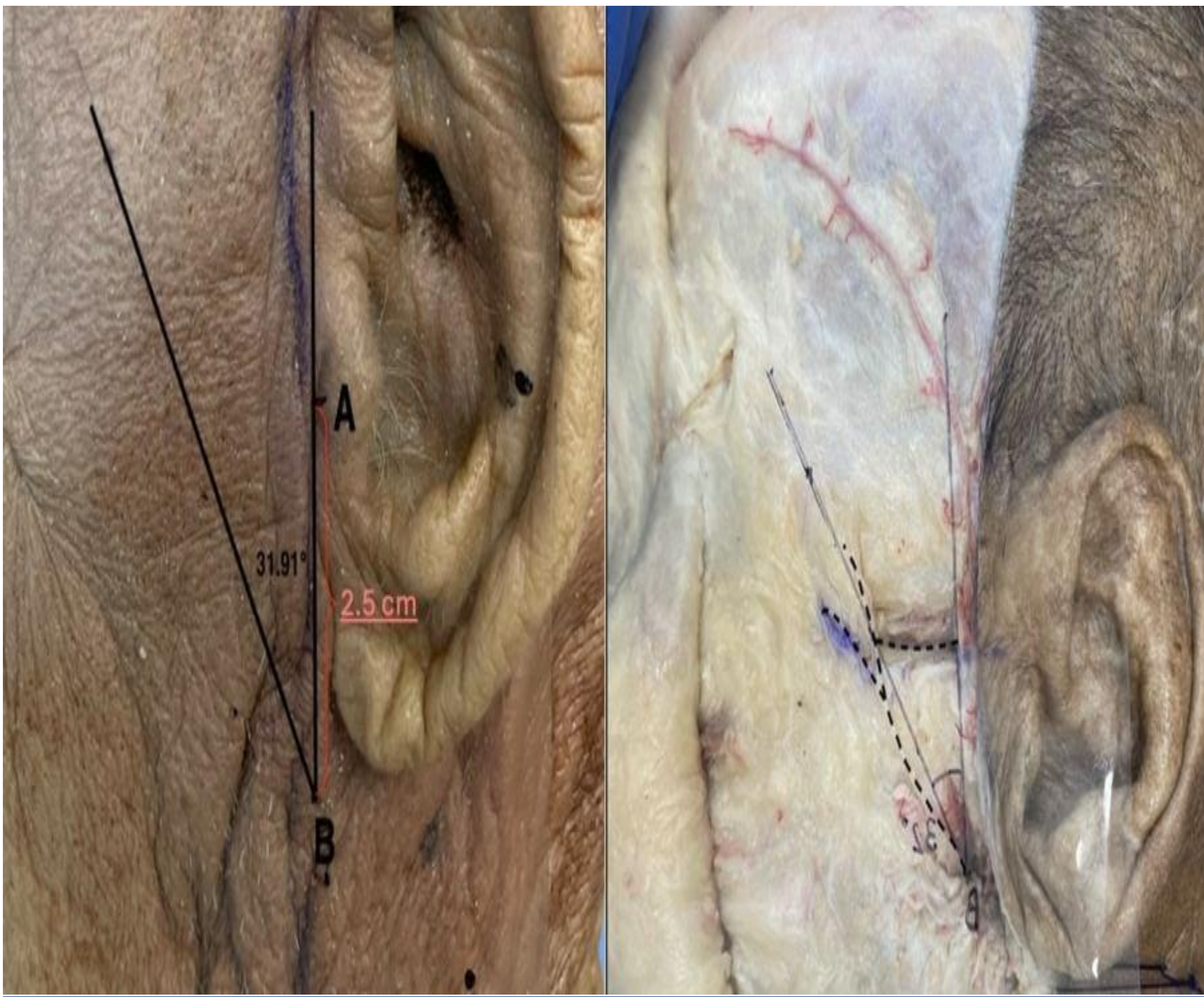


Figure 2: Left: Estimation of the position of the FB of the facial nerve according to the tragus-facial angle on the skin of a specimen. Right: Confirmation of the position of the facial nerve after dissection

Conclusions

The method described has acceptable variability and represents a simple alternative for estimating the position of the facial nerve during anterolateral approaches.

Contact

Guilherme Gago
Université Laval
Avenue Roland-Beaudin 992, AP 807, G1V0J8
Guilherme.gago@gmail.com
+55 53999700007/ +1 4189513980

References

- Shin, KJ., Lee, SH., Gil, YC. *et al.* Topography of the frontal branch of the facial nerve and its clinical implication for temporal direct browplasty. *Sci Rep* 13, 14255 (2023). <https://doi.org/10.1038/s41598-023-40206-5>
- Pankratz J, Baer J, Mayer C, Rana V, Stephens R, Segars L, Surek CC. Depth Transitions of the Frontal Branch of the Facial Nerve: Implications in SMAS rhytidectomy. *JPRAS Open*. 2020 Mar 4;26:101-108. doi: 10.1016/j.jpra.2019.11.009. PMID: 33251317; PMCID: PMC7680882.
- Campero A, Socolovsky M, Martins C, Yasuda A, Torino R, Rhoton AL. Facial-zygomatic triangle: a relationship between the extracranial portion of facial nerve and the zygomatic arch. *Acta Neurochir (Wien)*. 2008 Mar;150(3):273-8; discussion 278. doi: 10.1007/s00701-007-1404-x. Epub 2008 Jan 30. PMID: 18231707.
- Soloperto D, Di Maro F, Le Pera B, Marchioni D. Surgical anatomy of the facial nerve: from middle cranial fossa approach to endoscopic approach. A pictorial review. *Eur Arch Otorhinolaryngol*. 2020 May;277(5):1315-1326. doi: 10.1007/s00405-020-05841-y. Epub 2020 Feb 12. PMID: 32052144.