



Development and Clinical Application of a Customized CAD/CAM-CBCT Guide for Sphenopalatine Ganglion Approach: A Two-Case Report.

Sandoval, H.F (1). Corro, C (1). Álvarez, C. (1), Nehme, M. (1), Saldivia, J (2). Espinoza-Mellado, P (3). Rosa, A (1,3) 1. University of Chile, , 2. CRS Hospital Provincia Cordillera (SSMSO, Chile), 3. Pontificia Universidad Católica de Chile

OBJECTIVE

To evaluate the feasibility, safety, and preliminary outcomes of a customized CAD/CAM-CBCT guide for precise access to the sphenopalatine ganglion (SPG), focusing on:

- Accuracy of SPG targeting in dentate and edentulous patients
- Clinical efficacy of anesthetic and botulinum toxin administration
- Improvement in pain and related symptoms

INTRODUCTION

- Precise access to the SPG is essential for treating certain headaches and neuralgias but remains technically challenging.
- Integration of CBCT and CAD/CAM technology may enhance accuracy and reproducibility of interventional procedures.
- This report presents the development of a customized 3D-printed guide and its clinical application in two cases: migraine and post-traumatic trigeminal neuropathy.

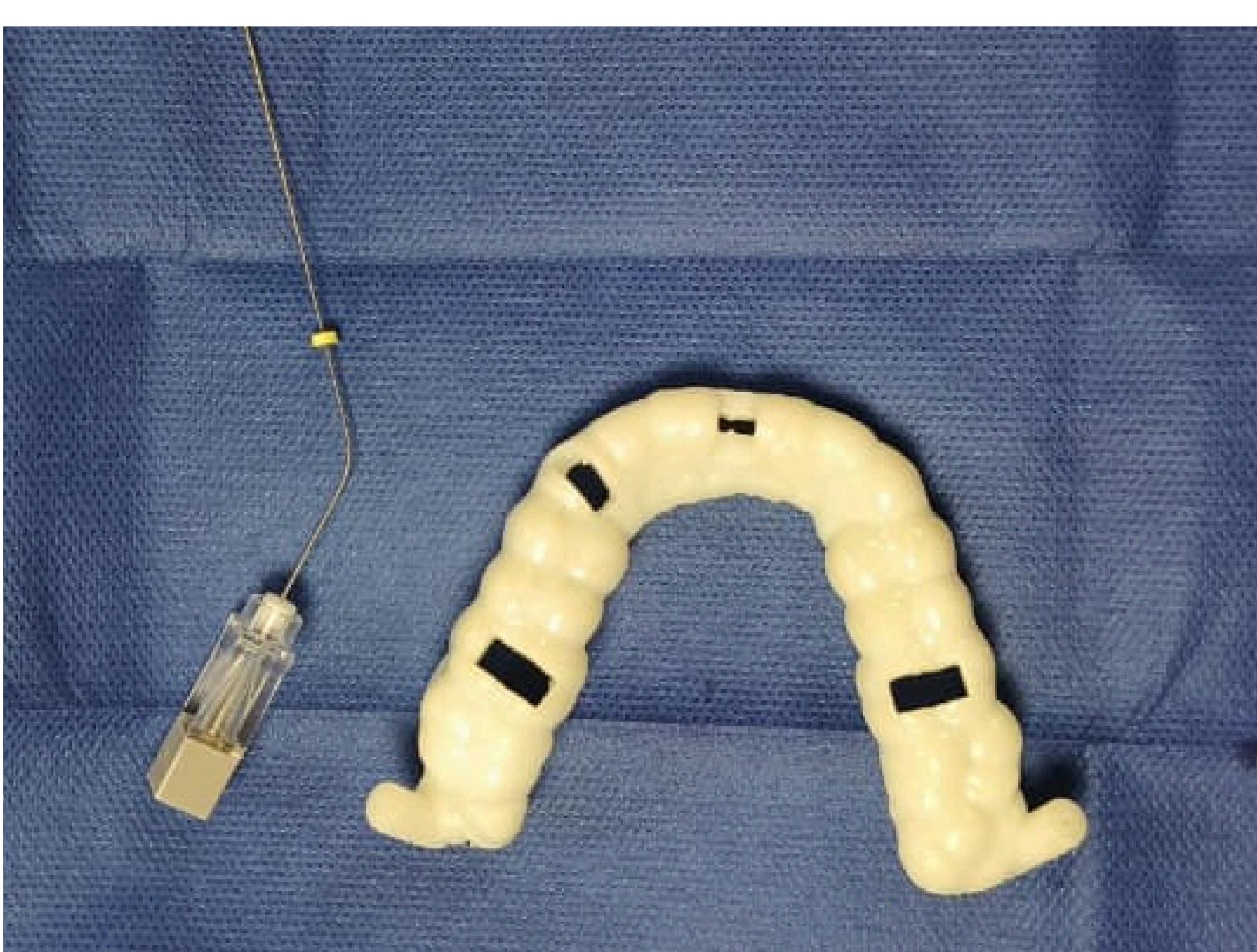


Fig. 1. CAD/CAM-CBCT Guide for SPG Access in Dentate Patient

METHODS

Design: Two-case clinical report.

Workflow:

1. Maxillary CBCT acquisition.
2. Maxillary model generation.
3. Fusion of CBCT (DICOM) and model data in CAD software.
4. Virtual design of the customized guide targeting the pterygopalatine fossa.
5. Guide fabrication via 3D printing (CAM).

Intervention:

- Case 1: Episodic migraine (dentate) → Guided SPG anesthetic injection.
- Case 2: Post-traumatic V2 neuropathy (edentulous) → Guided anesthetic and botulinum toxin injections.

RESULTS

Case 1 (Episodic Migraine, Dentate):

- 3 mL of 3% Mepivacaine via guided SPG injection → Full V2 anesthesia.
- Reported 80% pain reduction and reduced migraine attack frequency (<1/month).

Case 2 (Post-traumatic V2 Neuropathy, Edentulous):

- Guided SPG injection with 3 mL of 3% Mepivacaine → Progressive neuropathic area reduction (50%, then 70%).
- Subsequent guided botulinum toxin injection → Complete pain relief and resolution of attacks.

Safety: Both procedures were well tolerated without complications.

POSSIBLE MECHANISM OF ACTION

- Local Anesthesia: Achieves V2 blockade and SPG modulation.
- Botulinum Toxin: May reduce peripheral sensitization, neuroinflammation, and central sensitization through targeted SPG delivery.

CONCLUSIONS

- Customized CAD/CAM-CBCT guides are feasible, safe, and accurate for SPG access in both dentate and edentulous patients.
- Facilitated effective administration of anesthetics and botulinum toxin, with significant pain relief and clinical improvement.
- This promising approach warrants further validation in larger studies to confirm reproducibility and long-term benefits.

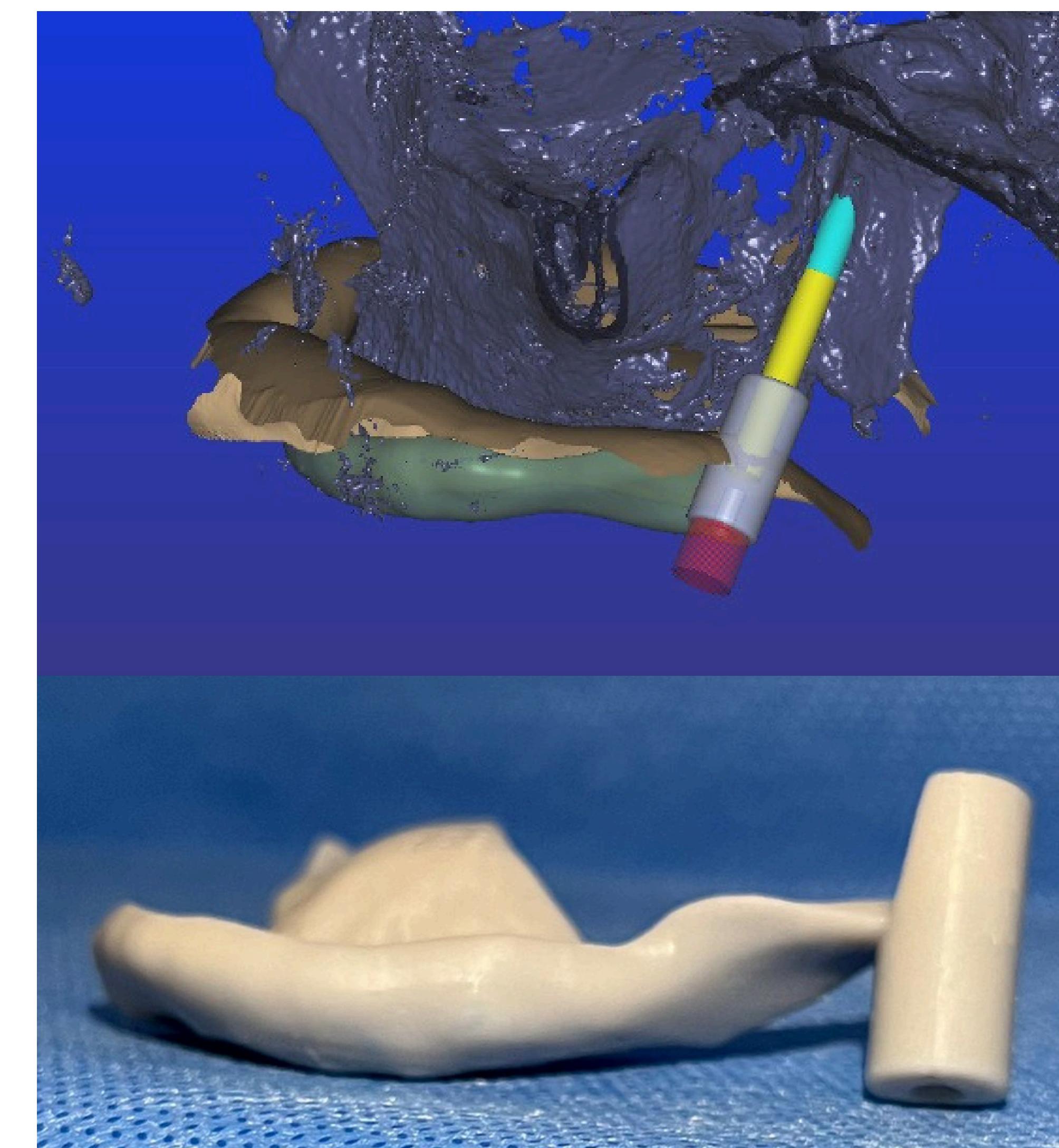


Fig. 2. CAD/CAM-CBCT Guide for SPG Access in Edentulous Patient



Fig. 3. Local Anesthetic Administration to the SPG Using the CAD/CAM-CBCT Guide in a Dentate Patient

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