

## **Variation in and assessment of inferior alveolar nerve block landmarks in children and adolescents**

Soi Park<sup>1</sup>, Younjin Lee<sup>1\*</sup>, Younyoung Lee<sup>1</sup>, Tiffany Tran<sup>1</sup>, and Gary D. Richards<sup>2</sup>

<sup>1</sup>Doctor of Dental Surgery Program and <sup>2</sup>Department of Biomedical Sciences, A. A. Dugoni School of Dentistry, University of the Pacific, San Francisco

**OBJECTIVES:** In earlier work (Lambert et al., 2017) we demonstrated the efficacy of new landmarks for inferior alveolar nerve (IAN) block injections. While the latter study focused on adult morphology, the landmarks were shown to be effective in cases where the M<sup>3</sup>/<sub>3</sub> were present but unerupted. Based on these results a question arose as to their applicability of the landmarks to children and adolescents, given the known changes in mandibular foramen position during growth. Here we quantify the position of the mandibular foramen relative to standard landmarks during growth and assess the new landmarks applicability for IAN injections in pre-adolescents.

**METHODS:** We compiled a sample of skulls (n=30) from the Institute for Craniofacial Study and Dental History, UOP. The skulls were CT scanned on a GE LightScribe VCT scanner. The data was reconstructed with a standard convolution kernel (0.3-mm isotropic voxels). These individuals were divided into three age groups: 1) 2.5-3.9 years; 2) 5.9-6.9 years, and 3) 7.1-7.9 years of 10 individuals each. Isosurfaces of the cranium, mandible, and a duplicate mandible were created. The mandibles were positioned, one with the condyles on the articular eminence and one in the glenoid cavity. A distance of 21-23 mm was maintained between the incisal occlusal surfaces to mimic an open mouth. We then constructed an orthoslice parallel with the occlusal plane. A second plane was positioned parallel to the latter one and at the level of the coronoid notch. Other planes were placed on the injection plane of the new landmarks and Frankfort Horizontal. Mandibular foramen height was assessed relative to these planes, as was the depth of needle penetration.

**RESULTS:** The position of the occlusal plane in Group 1 was 0-2.0 mm below the mandibular foramen while that for Group 2 was 0-4.4 mm below the foramen. Group 3 differed by having some foramina below and some above the occlusal plane, -2.57-4.81 mm. The position of the mandibular foramen was found to be below the coronoid notch as follows: Group 1, 2.2-6.7 mm; Group 2, 1.5-4.5 mm, and Group 3, 1.4-5.6 mm. We also observed right/left difference in these measures. A plane through the dm<sub>1</sub>/dm<sub>2</sub> and maxillary tuberosity, mimicking the path of the injection needle, terminates consistently above the mandibular foramen.

**CONCLUSIONS:** We show that our new IAN block landmarks provide a similar degree of certainty as found in the late adolescent-adult series (~90%). We also show that the use of the coronoid notch as a height locator for the injection is applicable in infants-adults and that it might be preferable to the use of the occlusal plane. In the latter case the needle tip is positioned ~2-5.5 mm above the foramen in all cases regardless of age.