A 3D viscoelastomeric technique for modeling intraoral injections.

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Introduction
Identification of anatomical landmarks is key for the clinical application of foundational anatomy. A common application utilizing landmarks in dentistry is the practice of intraoral injections. The purpose of this project is to develop a technique for first year dental students to perform intraoral injections on cadaveric specimens and allow a 3-D visualization of these injections. In order to accomplish this, alginate, a hydrocolloid, was chosen as a material common in the field of dentistry with visco-elastic properties appropriate for injections and visualization. While initially a flowable aqueous suspension, alginate undergoes an irreversible cross-linking reaction that results in an elastic rubber-like consistency. For our purposes, we created a very thin alginate solution that could be injected. Thin alginate has been used in several casting techniques including in the art world. The normal light gray color of alginate is often very close to the color of cadaveric material. In order to better distinguish the injected alginate mixture, we added liquid food coloring to the water used in preparation of the colloid solution.

Figure 3a. The alginate mixture will be thin and should be homogeneous. 3b) Draw the mixture into the syringe before attaching the needle. Mixture prepared with red colored water on the left and blue colored water on the right.

Significance
This technique allows for: 1) the practice of intraoral injections on cadaveric specimens and 2) visualization of the area infiltrated by an injection of a particular volume. This technique can easily be adapted to other injection sites. While needle insertion for incisive injections can be performed, the cadaveric material did not allow for the deposition of the alginate mixture at this site. Likewise in some of the greater palatine injections, it was difficult to deposit alginate.

Students need to be well prepped and organized prior to mixing the alginate and doing this activity as the setting time is relatively brief as well as temperature dependent. The sequence of this activity in a regular head and neck dissection course should be considered carefully.

References
1. Amalgamated Dental Company. Improvements in or relating to materials for taking impressions for dental or other purposes. British patent 675, 518. 1967.