**Patient History/Subjective Exam**

* Chief complaint
* History of Present Illness
  + Onset
  + Duration
  + Trajectory
  + Intensity
  + Localization
  + Exacerbating factors
  + Alleviating factors
* Past Dental History
* Medical History

**Diagnostic testing**

| **Essential Armamentarium** | **Adjunctive Armamentarium** |
| --- | --- |
| * Blood pressure cuff and stethoscope (or electronic BP monitor) * Intraoral mirror (metal) * Explorer/periodontal probe * Refrigerant spray + cotton swab * Cotton roll * Bite tester (ie. Tooth Slooth, Professional Results, Inc., Laguna Niguel, CA or Fracfinder, Denbur, Oak Brook, IL) | * Oral or forehead thermometer * Heat testing device * Electric pulp testing device and toothpaste * Fiber optic light * Dye (ie. methylene blue or To Dye For, Roydent, Johnson City, TN) * Selective anesthesia armamentaria (syringe, needle, anesthetic drug) |

**Methods**

* *Vital signs:*  **Blood pressure** and **pulse** should be measured on any patient considered for administration of local anesthetic agents or prescribed drugs. **Respirations**may be measured by observing the patient to determine if they show any signs of labored or rapid breathing. Any patient presenting with swelling should have a **temperature** reading via an oral or forehead thermometer.
* *Extraoral examination:*  A visual examination can detect facial symmetry, swelling, sinus tracts and lymphadenopathy, as well as associated tenderness. The temporomandibular joint should be palpated and the patient asked to open and close to detect joint or muscular abnormalities, or trismus.
* *Intraoral examination:* 
  + Detailed hard tissue examination: A visual and tactile examination can detect **decay**, leaking restorative margins, or **fractures**. Coronal **discoloration** should be noted. External cervical resorption can sometimes be palpable as a concavity or scratchy surface felt with an explorer just subgingivally.
  + Detailed soft tissue examination
    - Along with a generalized oral cancer screening exam, the area in question should be examined for intraoral **swellings** and **sinus tracts**. Palpation of the area during PDL testing can also determine if the area is soft or firm, and elicit purulence from an otherwise difficult to visualize sinus tract.
    - A limited periodontal examination should include measurement for **periodontal probing defects** and **mobility**. Especially narrow defects, secondary to root fractures or perio-endo drainage, may require the use of a flexible plastic probe and/or local anesthesia to accurately detect. Mobility measurements should be correlated with other clinical findings to best determine their cause, such as when mobility is related to fracture.
  + Clinical testing
    - All clinical tests must include the use of controls and consideration of referral patterns of pain in the same and opposing quadrant. Controls should be tested before suspected teeth so as not to mask symptoms when sensations linger. NSAID use should be noted given its effects to mitigate testing responses.
    - **Pulp sensitivity tests:** Generally not indicated in teeth with previously initiated or completed endodontic treatment, unless cold or heat sensitivity is a part of the chief complaint. Cold testing is considered first line testing, whereas heat and EPT are reserved for when insufficient information is obtained from remaining tests in order to make a definitive diagnosis.
      * ***Cold testing:*** A steady stream of refrigerant spray should be applied to the cotton end of a cotton swab until the cotton is dripping and cold vapors can be seen emanating. Alternatively, #2 or #4 cotton balls held with cotton pliers can be used. The cold cotton should be applied immediately to the buccal or facial surface of individual teeth. Patients should be instructed to raise their hand as soon as they feel sensitivity and keep their hand raised until the sensation goes away. The cotton should be held firmly on the tooth surface until a response is felt, waiting at least five seconds to allow for delayed responses. A fresh spray of refrigerant should be applied for each tooth tested to assure that the cotton remains cold. Once a sensation is reported, patients can be asked to rank teeth by intensity, and asked specifically if a hypersensitive tooth replicates their chief complaint. If no sensation is felt, cold testing may be repeated on the occlusal or lingual/palatal surfaces of teeth, though it is important to note that false positives (ie. teeth that do not respond to cold despite vital pulp tissue within) are possible.
      * ***Heat testing:*** Indicated only if heat sensitivity is part of the chief complaint. Only heated gutta percha should be utilized given risks of tooth or tissue damage with other heated elements. Commercially available heat tips used with an obturation downpack unit set at 200 degrees Fahrenheit provide a convenient means for heat testing. A gutta percha cone should be warmed and pressed into the welled tip, assuring overflow of material so that only gutta percha contacts the

tooth surface. The unit should be continuously heated until the gutta percha is hot to the touch through a gloved hand, and left heated for the duration of the test. The heated gutta percha should otherwise be applied in the same manner as with cold, with responses ranked by duration and intensity. If a commercially available heat tip is not available, gutta percha cones may be heated, melted and rolled into a ball by use of a plastic instrument tip heated under a flame. The hot and sticky ball of gutta percha can then be held on the plastic instrument and applied to the tooth.

* + - * ***Electric pulp testing:*** Specific manufacturer instructions must be followed for EPT units; however, all involve a circuit composed of a metal rest applied to the contralateral lip commissure, and the electrode end of the unit dipped in toothpaste to create conduction. Patients should be forewarned that they will feel “tingling or sensitivity” at which point they should raise their hand so the tester can be removed. The electrode should be applied to the buccal or facial tooth structure and the test run until its upper limit, unless a response is elicited sooner. Comparison of response quality is important as some patients will still report “vibration” even without a true response to the EPT. The electrode should only be applied to sound tooth structure, though if only a small amount is available, bridging may be done by applying the electrode to an instrument like an explorer that can touch a narrow collar of available tooth structure. It can be useful to call the EPT by its abbreviated name or describe it as a “computerized test”, as using the word “electric” can be disconcerting to patients.
    - **PDL tests**
      * ***Percussion:*** In cases of severe reported pressure discomfort, percussion should first be measured by finger pressure. If no tooth is tender, or pain is reported to be mild or absent, the handle end of a metal intraoral mirror should be used to tap individual teeth while asking the patient to report discomfort associated, and make comparisons to controls.
      * ***Palpation:***  If not yet measured via finger pressure during the soft tissue examination, palpation of the buccal/facial and palatal/lingual mucosa surrounding a tooth is required to measure for associated tenderness.
      * ***Biting:*** A cotton roll should be placed in between teeth, starting with control teeth and saving the suspected tooth for last. Patients should be instructed to bite down as hard as they can and release quickly while being questioned about discomfort associated. If no symptoms are elicited with the cotton roll, a commercially available plastic bite tester should be utilized with the welled tip applied to each individual cusp with firm biting pressure as the patient is questioned about discomfort.

**Adjunctive Methods**

* In cases of suspected fracture, a **fiber optic light** may be used to shine a concentrated light source on a tooth in a darkened environment. The fracture line will cause a break in light transmission allowing for better visualization of fracture extension. Similarly, methylene blue or vegetable based **dyes** may be applied to fractures followed by a water or saline rinse. The dyes will settle into the fractured segments for better visualization.
* **Selective anesthesi**a may be utilized when clinical testing cannot localize a source of active pain. As pain can be most difficult to localize between the maxillary and mandibular arches, methods will aim to localize pain between; however, tailoring protocols requires thought and creativity by the provider. Anesthetic agents should be given following local anesthesia delivery protocols (see quick reference guide), beginning mesially and moving distally, favoring infiltration first and block anesthesia last, and moving from the maxilla to the mandible. PDL and IO injections are not recommended as part of selective anesthesia given their effects to anesthetize more than one tooth. Selective anesthesia is considered successful once the patient reports relief of their pain.

