

# Point of Care

*The Point of Care section of JCDA answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. If you would like to submit or answer a question, contact editor-in-chief Dr. John O'Keefe at [jokeefe@cda-adc.ca](mailto:jokeefe@cda-adc.ca).*

## Question 1

How do I diagnose degenerative joint disease (osteoarthritis) of the temporomandibular joint?

Osteoarthritis is one of the most common arthritides affecting the temporomandibular joint (TMJ). Although the term “degenerative joint disease” is often used synonymously with osteoarthritis, it is simply a descriptive term that does not identify the cause. Degenerative joint disease of the TMJ is thought to be a manifestation of an imbalance between adaptive (remodelling) and nonadaptive (degenerative) responses. When active bony degeneration and pain accompany the condition, it is often referred to as osteoarthritis. As bony remodelling occurs, the condition may become stable, and it is then referred to as osteoarthrosis.

Generally, 8% to 12% of patients with a TMJ disorder who present to our clinic receive a diagnosis of degenerative joint disease. A large proportion of these patients are post-pubescent to premenopausal females. The condition can occur unilaterally or bilaterally. Typically, there is a destructive phase lasting approximately 12 to 18 months, followed by a 12- to 18-month reparative and healing phase (when the condition “burns out”). This pattern is quite different from that observed with osteoarthritis of other joints of the body (e.g., knee joint), which typically affects older women and men and in which the degenerative process often progresses, leading to disability and joint replacement.

Etiological factors include acute trauma (e.g., direct blow to the chin), mechanical overloading of the joint and internal derangement (particularly with disc deformation and perforation). Occlusion remains to be proven as a causal factor, although secondary occlusal changes may accompany TMJ degenerative changes.

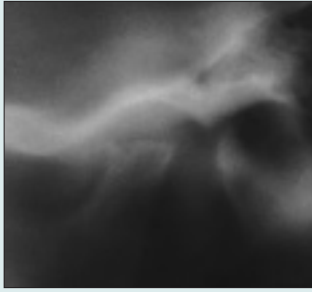
Important clinical characteristics of active degeneration include limited mandibular movement, joint pain during function, secondary tenderness on palpation of the TMJ capsules and masticatory muscles, and joint crepitation, but these features are not found in all patients. For example, although joint crepitation is a good predictor of degenerative joint disease, some TMJs affected by degenerative joint disease may not reveal crepitation on examination.

Advanced imaging is required for definitive diagnosis. Panoramic and plain film imaging (e.g., transcranial, transpharyngeal and transorbital projections) may identify

gross TMJ changes, but these methods are of limited diagnostic value because of anatomical superimposition, beam angulation and magnification issues that prevent accurate display of the osseous components. Tomography, specifically axially corrected tomography, is considered a gold standard for assessing the osseous components of the TMJ. Cone-beam volumetric tomography, which incorporates computer acquisition to create 3-dimensional, anatomically accurate visualizations, has recently become available. In addition to producing detailed, distortion-free images of the bony components of the TMJ, the average cone-beam scan results in a considerably lower dose of radiation than that produced during conventional and computed tomography.

**Figure 1** displays an axially corrected tomographic image of the left TMJ (sagittal view) of an 11-year-old girl referred to our clinic in May 1999. The noticeable loss of bone and the irregular shape of the left condyle are clearly evident relative to the normal right TMJ (**Fig. 2**). The patient received nocturnal splint therapy specifically designed to provide orthopedic stability, glucosamine sulphate (1000 mg twice a day) and pain medication during symptomatic periods, and was re-evaluated at 8- to 12-week intervals. Two years later the left TMJ exhibits condylar remodelling, flattening and sclerosis of the articular eminence (**Fig. 3**). In August 2004 (**Fig. 4**) further osseous remodelling and reduction in size of the condyle are evident, but these most recent radiographs have been interpreted as showing no further signs of active degeneration (the condition has “burned out”), and the patient is now completely asymptomatic. Given this stabilization of osseous components and symptoms, the patient will be reassessed by our multidisciplinary team with a view to decisions on orthodontic and surgical therapy to correct an orthopedically unstable bite relationship.

Once a diagnosis of degenerative joint disease has been confirmed, treatment includes, as appropriate, patient education, with ample reassurance that the condition is generally self-limiting; instruction in self-care management for temporomandibular disorders (e.g., soft food diet,



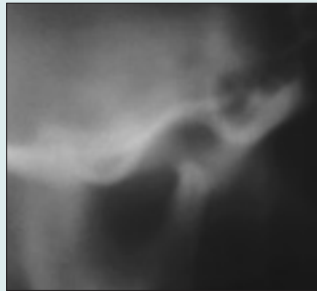
**Figure 1:** Active bony degeneration of the left temporomandibular joint (TMJ).



**Figure 2:** The right TMJ osseous structures are normal.



**Figure 3:** The left TMJ exhibits condylar remodelling, flattening and sclerosis of the articular eminence.



**Figure 4:** End-stage degeneration of the left TMJ.

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minimizing parafunctional habits); physiotherapy to increase joint mobility; use of nonsteroidal anti-inflammatory drugs (NSAIDs), preferably a COX-2 inhibitor, 3 of which are available on the Canadian market today (many over-the-counter NSAIDs adversely affect joint healing with long-term use); long-acting opioids; and long-term therapy with a nocturnal splint appliance to regain or maintain orthopedic stability. Intra-articular injections of steroids and arthrocentesis are indicated for certain patients but are rarely required in our experience. Most patients are advised to use the food supplement glucosamine sulphate, which has been shown by our own clinical research to be a useful pharmacological adjunct for adult patients with TMJ degenerative joint disease. ♦



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## Question 2

Is an electronic apex locator useful in endodontic therapy?

The goal of orthograde endodontic therapy is to chemo-mechanically clean, shape, disinfect and fill the entire root canal system, preparatory to sound coronal restoration. Confining the instrumentation, irrigation and obturation procedures to the root canal system (thus avoiding the periapical tissues) is generally accepted to result in more

predictable and comfortable root canal therapy. This can only be accomplished if the length of the canal space (i.e., the position of the apical terminus) is determined accurately.

In our opinion, the apical terminus of the canal is located where the periodontal and pulpal tissues meet. Theoretically (and schematically), this point has often been

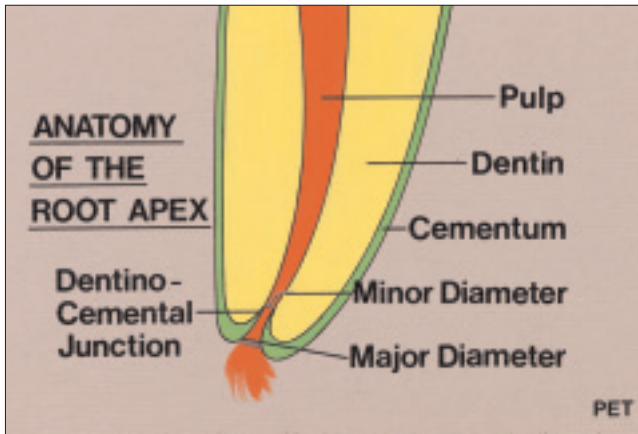


Figure 1: Anatomy of the root apex.

depicted as the “apical constriction” or the “minor diameter” of the root, which may or may not coincide with the cementodentinal junction (Fig. 1). In reality there is great variance in the morphology of the apical constriction and its position relative to the apical foramen and the radiographic apex.

Traditionally, a number of methods were used to determine the working length, including tactile sensation, blood or moisture on a paper point and radiography. Clinicians use this information, along with knowledge about root apex anatomy, to estimate the location of the apical constriction. Unfortunately, radiographs do not always accurately represent the apical anatomy. Difficulties include the superimposition of anatomic structures, the density of bone or the thinness of root apices, curvatures off the radiographic plane and variations in operator interpretation. In addition, cemental deposition, anatomic features and radiographic angularity may lead to incorrect conclusions.

Electronic apex locators were developed to aid in precisely locating the apical constriction. Since the first-generation instruments were introduced in 1969, technological advances have constantly improved the reliability, efficiency and versatility of these machines. The current fourth-generation instruments can determine the position of the apical constriction with an accuracy of up to 96%. These instruments are generally not affected by fluids within the canal and can be used with all types of files.

Although highly accurate, these instruments have limitations and must be used with care. Inaccurate readings can result if any of the following conditions are present:

- contact of the file with caries or metallic restorations
- flooding of chambers of multirrooted teeth with irrigant (especially if the irrigant is electroconductive)

- lack of apical patency
- large apical diameters (caution is advised when apical constrictions are affected by resorption, apicoectomy or lack of development)
- presence of lateral canals, canal intersections or perforations
- technical difficulties, such as weak batteries and faulty connections.

In addition, it may be prudent to avoid using electronic apex locators in patients with cardiac pacemakers, although the evidence regarding possible problems in this situation is still inconclusive.

When used prudently, electronic apex locators offer many advantages. Most important is their accuracy, which may be even greater than that of radiography. Endodontic procedures can be performed more efficiently and are more comfortable for the patient because fewer radiographs are required. The patient’s radiation exposure is thus reduced, which is particularly beneficial for pregnant women, sedated or physically handicapped patients, and young patients. In addition, these instruments can help the clinician to differentiate between perforations and canals.

In summary, we feel that the reliability and accuracy of electronic apex locators make them useful adjuncts to endodontic therapy. They are helpful for determining the precise position of the apical constriction and thus in measuring working length. Radiography offers the advantage of revealing the canal curvature and provides a medicolegal record of treatment. Together, these techniques offer the best chance of successful case management. ♦



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### Question 3

Is it better to provide endodontic treatment in a single appointment or in multiple appointments?

Completing orthograde endodontic therapy in a single patient visit appears to be increasing in popularity. Although single-appointment therapy may be technically feasible, provided enough time is available, the question remains whether such an approach is prudent in all cases.

The trend to single-visit therapy relates to the considerable potential advantages to both clinician and patient:

- **Efficiency:** The dentist does not have to re-familiarize himself or herself to the patient's particular anatomy or landmarks.
- **Convenience:** The patient does not have to endure the discomfort of repetitive local anesthesia, treatment procedures and postoperative recovery.
- **Economics:** Shorter chair time and fewer materials increase the dentist's profitability. The patient misses less work and incurs fewer extra costs, such as travel and parking.
- **Patient management:** Most patients prefer to have their treatment completed as quickly as possible, and apprehensive patients derive special benefits from single-visit treatment. In some cases, health considerations favour single appointments (e.g., when prophylactic antibiotics or sedation is required)
- **Restorative consideration:** Prompt completion of endodontic treatment may be required to allow immediate placement of a coronal restoration (immediate post-core placement contributes to the success of treatment by ensuring an effective coronal seal).

These advantages, although attractive, would not be persuasive if clinical results were compromised or the incidence of postoperative pain or swelling increased. In this regard, several studies have compared single-visit and multiple-visit endodontics in terms of success rates and pain for 2 categories of cases:

- **Category 1:** vital, noninfected cases and nonvital traumatic cases without signs of apical periodontitis
- **Category 2:** infected cases with evidence of apical periodontitis (periapical radiolucency, swelling, exudates).

One-appointment treatments can be carried out predictably for category 1 cases as long as tooth isolation, thorough mechanical instrumentation, irrigation with sodium hypochlorite, complete obturation and coronal restoration can be done as soon as possible. Rotary instrumentation has made this less tedious. There is also a higher success rate and fewer procedural problems (such as canal straightening) when less experienced operators use the NiTi rotary systems.

For infected cases (category 2), immediate attention should focus on disinfection of the canals. Current evidence suggests that mechanical instrumentation be completed at the first visit with sodium hypochlorite irrigation. A combination of calcium hydroxide and chlorhexidine should be placed in the canals for 1 to 4 weeks. Obturation can be done when clinical symptoms subside (pain, swelling) and there is no apical exudation.

The role of bacteria is of paramount importance in endodontic disease. Kakehashi and others have demonstrated that healing and repair were predictable in the absence of infection. For treatment of noninfected vital teeth, bacteria are absent and we maintain an aseptic environment to avoid introducing microorganisms into the root canal system. Such cases should undergo single-visit therapy. Controversy lingers in cases of infection, the question being whether we can adequately clean and disinfect in one appointment. What the evidence shows is that only a combination of effective mechanical cleaning and shaping, irrigation and use of an antibacterial dressing such as calcium hydroxide can reduce bacteria by 90% to 100%. This reduction in bacteria appears to be possible with a multiple-appointment protocol. Treatment success improves if obturation is delayed until the canal is free of bacteria; however, the significance of leaving some bacteria before obturation is unresolved.

Multiple appointment therapy should be considered in the following situations:

- asymptomatic nonvital teeth with periapical pathology and no sinus tract
- teeth with anatomic anomalies
- category 2 cases
- most retreatments
- patients with many allergies or previous flare-ups.

The prevention and elimination of apical periodontitis are the goals that define the discipline of endodontics. Once the clinician has determined how best to accomplish these goals, the decision of whether to provide treatment in a single visit or in multiple appointments will follow of itself. ♦

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**Question 4** Should antibiotics be prescribed when providing endodontic treatment? If so, what are the recommended drug regimens?

**Controlling Endodontic Infections**

Antibiotics are rarely necessary<sup>1</sup> and are often inappropriately prescribed for situations involving either a state of inflammation (e.g., pulpitis) or an infection with a site for drainage (e.g., sinus tract).<sup>2</sup> Instead, the most effective treatment for an endodontic infection is to access, debride and medicate the affected tooth to promote drainage, preparatory to disinfecting the root canal system (Figs. 1a to 1c; 2a to 2c). When the infection spreads beyond the roots, creating localized tissue swelling, an incision can be made to drain the area of infection and relieve pressure.<sup>3</sup> Antibiotics should be considered in the following situations:

- The patient is immunocompromised or in poor health.
- The infection is spreading and has become systemic.
- Swelling continues to spread despite attempts to disinfect the root canal system and establish drainage.



**Figure 1a:** Preoperative radiograph of tooth 21, which has been diagnosed with an acute periradicular abscess.

**Selecting an Antibiotic**

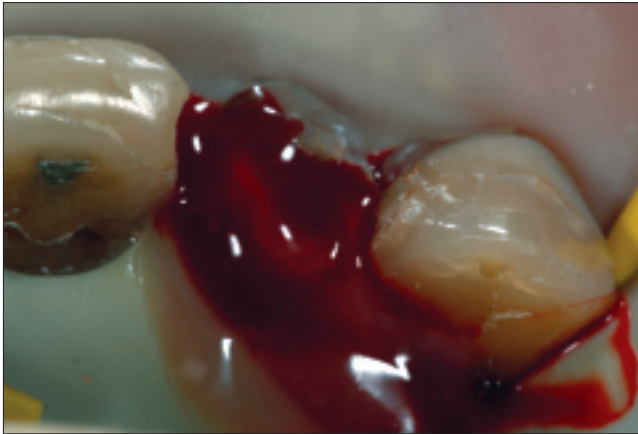
Various factors must be considered in selecting the best antibiotic, including the patient’s history of drug allergies and adverse reactions, the severity of the infection and the overall state of the patient’s health.<sup>4</sup>

Penicillin VK has a low cost and a narrow spectrum of bactericidal activity, has virtually no significant adverse effects in the absence of allergy (which is estimated at between 0.7% and 10% in the general population) and is efficacious against most of the bacteria associated with endodontic infections.<sup>4</sup> A recent survey found that this is the antibiotic of choice for odontogenic infections among members of the American Association of Endodontists (1-g loading dose followed by 500 mg 4 times a day for an average duration of about 1 week).<sup>2</sup> In Canada, this drug is available only in 150-mg or 300-mg capsules.

Amoxicillin has a broader spectrum of antimicrobial activity and is therefore suitable for treating immunocompromised patients with odontogenic infections.<sup>4</sup> Compared with penicillin VK, amoxicillin is more readily absorbed upon ingestion, has a longer half-life and sustains therapeutic blood levels for longer periods. As a result, doses of amoxicillin can be taken 3 times a day (1-g loading



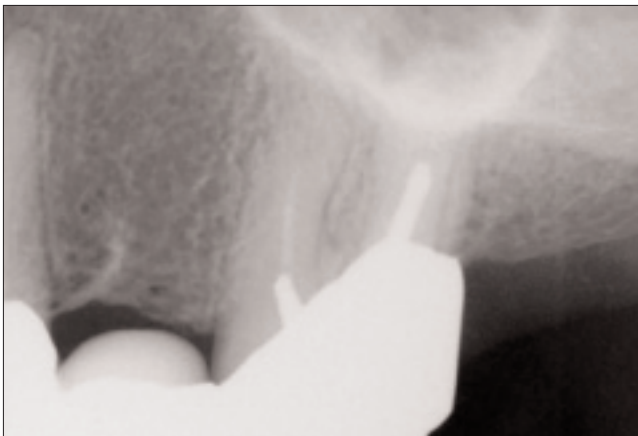
**Figure 1b:** The core material, prefabricated post and gutta-percha root filling material have been removed from the tooth.



**Figure 1c:** Considerable pus drained through the access opening. No antibiotics were necessary in the management of this case.



**Figure 2a:** Sinus tract draining through the palatal gingiva of tooth 26.



**Figure 2b:** The radiograph suggests the root canal system had been inadequately debrided and cleaned. Bacteria within the roots are contributing to the chronic radicular abscess. Endodontic retreatment will have to be performed and the canals chemo-mechanically debrided. Calcium hydroxide will be used as an intracanal medicament.



**Figure 2c:** Palatal gingiva at the time of obturation (2 weeks after endodontic retreatment). The soft tissue healed completely after debridement and disinfection of the canal system. No antibiotics were required in the treatment of this patient.

dose followed by 500 mg 3 times a day for 5 to 7 days).<sup>3</sup> However, for otherwise healthy individuals, the broader spectrum of activity of amoxicillin (relative to penicillin VK) may be more than is required and may contribute to the emergence of drug-resistant bacterial strains.

Clindamycin is suitable for patients who are allergic to penicillin, but it also has a broader spectrum of antimicrobial activity and is approximately 4–5 times more costly.<sup>2</sup> A loading dose of 300 mg is followed by 150 mg 4 times a day for 7 to 10 days.<sup>2,3</sup> The incidence of pseudomembranous colitis in association with this drug is estimated at only 1%.<sup>4</sup>

High rates of resistance to erythromycin among endodontic pathogens render this antibiotic obsolete for odontogenic infections.<sup>4</sup> Clarithromycin is a suitable alternative to erythromycin because it has better efficacy against oral anaerobic bacteria, is less likely to cause gastrointestinal problems and requires less frequent dosing (250–500 mg every 12 hours for 7 to 10 days).<sup>3,4</sup> ♦

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