The Art of Diagnosis in Endodontics

Part 1: Obtaining a pain history

Introduction

Diagnosis is an ‘art of using scientific knowledge to identify a disease process’. In addition, it entails defining the aetiology and differentiating the disease process from other similar occurring conditions.

In dentistry, we’re able to diagnose commonly occurring conditions routinely. Yet we’re occasionally faced with unusual presentations that can be easily misdiagnosed and therefore mismanaged. It’s my strong belief that one can broaden their clinical experience in improving the art of diagnosis by improving their understanding on assimilating the findings of history taking, clinical assessment, special tests and radiographs (where necessary) before making an accurate diagnosis. After all, the practice of ‘evidence-based dentistry’ is built on core foundations of scientific evidence, patient needs and preferences, and the clinician’s expertise and experience.

I hope this series of articles will help practitioners in refining their knowledge by taking a methodical approach in reaching a diagnosis. I summarise a combination of “scientific” and “pragmatic” tips that I have learnt and found useful over the past few years to achieve this.

Part 1: Obtaining a pain history

Part 2: Clinical examination, special tests and radiographs

Part 3: Classification of endodontic diagnosis

Part 4: Cases with challenging diagnoses: The unusual presentations

Endodontics: What is the aim?

The endodontic specialty involves:
• Preservation of pulp health.
• Treatment and prevention of pulpal pathoses and apical periodontitis.

To achieve this aim, we need to be able to diagnose:
• Health versus disease.
• Conditions that can predispose to endodontic pathoses.

Patients’ presenting concerns

We often hear, ‘The patient tells you the diagnosis’. This hold true in most cases where an accurate history is ascertained. Table 1 summarises a series of questions in a systematic and chronological order to obtain an accurate pain diagnosis. I also offer explanations for using these questions and how these reflect to foundations in dentine, pulp and periapical physiology.

Some of these questions have been modified from the acronym SOCRATES to obtain a detailed pain history. Some of these questions may not apply to all cases, depending on the nature of the problem (e.g., previously root filled tooth versus vital tooth).

What you get depends on:
• What you ask
• How well you listen
• Time—busy practice and emergency appointments?

Look:
• Does the patient look well/flushed/distressed/anxious?
• Is the patient pointing to a specific area or tooth?
• Is the patient jumping from place to place with different symptoms?
Understanding the pulp-dentine complex

Dentine sensitivity without pulpal inflammation is due to fluid movement within the dentinal tubules. Cooling, drying, evaporation and hypertonic chemical stimuli cause the dentinal fluid to flow away from the dentin-pulp complex and lead to an increase in pain.

Heating causes the fluid to flow toward the pulp. Any stimuli that causes movement of fluid toward the pulp is less painful than stimuli that causes movement away from the pulp. Dentine sensitivity is usually described a short lived pain which resolves on removal of the stimulus.

Within the pulp are:

A-delta fibres: Sharp
- Response to hydrodynamic mechanism
- Low threshold of excitability
- Does not necessarily signify pulpal injury or inflammation

C fibres: Dull, boring, throbbing
- Nociceptive activity indicative of pulpal injury
- Hyperalgesic pulp—exaggerated or persistent pain
- Slow conducting, high threshold—‘all or nothing’
- Spontaneous; irreversible

Once pulpal inflammation becomes irreversible and contained within the pulp (with no spread into the periradicular areas), the symptoms are nonspecific to a tooth and last from a few seconds and ‘linger’ to a few minutes/hours after withdrawal of the stimulus. The symptoms can also become spontaneous in nature, elicited in the absence of any stimulus. In a necrotic pulp, there can be an absence of any symptoms. Therefore:
- Patients present with a number of differing stories,—some asymptomatic, some in acute pain, some exacerbated by cold, some relieved by cold, etc.
- These symptoms are reflected on the status of the pulp vitality.
- Exclude the presence of non-odontogenic pain.
- Pulpal diagnosis is one of the hardest diagnoses to arrive at. During clinical examination (series 2 of these papers), all clinical assessments and special tests undertaken should be used to make a definitive diagnosis.

The spread of inflammation or infection into the periradicular areas (specifically the periodontal ligament) reflects the patient story: The pain is localised to a specific tooth. The feeling of tooth being ‘raised’ and tender to pressure or biting are common presenting features. This may not always reflect on the radiographs as an apical radiolucency, until the cortical plate is breached.

This also explains why, once there is an established sinus tract or a perioendo lesion, many of these patients will present asymptptomatically but have a history of symptoms that needs to be established accurately. More on this in Paper 2.

Concluding remarks:

Obtaining a detailed pain history is just the first part, yet the most important aspect, of making an accurate diagnoses. We will ‘join the dots’ as we read along the subsequent papers in more detail.
Table 1: A list of questions that will help you obtain a detailed history from the patient.

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<th>QUESTION</th>
<th>CLINICAL RELEVANCE</th>
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| Are you experiencing any symptoms today?                                | This helps ascertain:  
  • If the patient requires management of their acute symptoms at this visit.  
  • If the current symptoms differ to symptoms experienced previously (asked later).  
  Obtain a thorough history of the symptoms they are experiencing whilst they are seated in the dental chair. Some of the questions below can be used as an aid to facilitate this discussion.                                                                                       |
| When did you first experience symptoms from this tooth/region?           | This establishes a ‘timeline’ of events, from when the symptoms first started.  
  • Obtain a history of the symptoms first experienced and whether these events differ from the current symptoms.  
  This also allows one to draw a picture of the progression of symptoms from onset to present time and correlate this to changes within the pulp and or peri-apical tissues.                                                                                   |
| When was the initial root canal treatment carried out and why?           | This provides a history of treatment undertaken on the specific tooth in question.  
  A brief history on why root canal treatment was previously undertaken, if the patient is able to recall this (e.g., caries, fracture, deep restoration, incidental finding).  
  The timing of the cementation of the coronal restoration will help ascertain if there was a possible delay and breach in providing a coronal seal.                                                                                   |
| Has the crown/onlay/bridge ever de-cemented/de-bonded since it was first fitted? (If the tooth has an existing extra coronal restoration) | To ascertain:  
  • If there was a possible breach in the coronal seal  
  • The likely difficulties in removing the extra coronal restoration during root canal treatment                                                                                                                                                                                                                     |
| Is it a specific tooth /area that hurts?                                 | This establishes the site of the pain experienced.  
  Is this localised to a tooth/sexant/quadrant? Pulpic pain is usually difficult to localise to a specific tooth. Patients would generally point to an ‘area’ as opposed to a specific tooth. Pain involving peri-apical tissues is usually well localised to a tooth, due to the involvement of the periodontal ligament fibers. |
| Describe the symptoms you experience.                                   | Allow the patient to give their version of symptoms. This establishes the character of the pain.  
  Certain words to look out for: sharp, shooting, dull, ache, discomfort, tender, swelling, pressure, constant, throbbing, pulsating, tooth feels raised.  
  Is the pain short lived or lingering in nature? How long to the symptoms persist?  
  These words help determine, at a histologic level, the involvement of acute (A-delta fibers) or chronic nature (C-fibers) of the pain experienced and whether this could be reversible or irreversible.                                                                 |
| Does the pain radiate to adjacent areas?                                | This may either indicate referred pain, spread of infection or pain of non-odontogenic origin.                                                                                                                                                                                                                                                        |
| Is the pain particularly worse at any time of the day or night?          | Pain can present with diurnal variations. On occasions, pulpitic pain can mimic symptoms of non-odontogenic pain. Parafunctional habits, clenching or grinding resulting in the involvement of the muscles of mastication may need to be excluded as the aetiology.                                                                                                       |
| What happens when you have a hot drink?                                 | This causes movement of fluid within the dental tubules in an Inward direction, triggering the nerve complexes within the pulp-dentine junction and resulting in pain. In reversible pulpsitis, where there is clinical evidence of recession, dentine exposure or a crack, this is a short-lived symptom which resolves within seconds of removal of stimulus.  
  In irreversible pulpsitis, (where the pulp is histologically inflamed) application of heat to the tooth will cause exacerbation of the symptoms. There is no room for the swelling within the pulp chamber to expand. The symptoms will persist for a few minutes to hours on removal of the symptoms.  
  Note: Irreversible pulpsitis has varying presentations. If the pulp was necrotic or part necrotic, application of hot may not always elicit any symptoms.                                                                                     |
| What happens when you have a cold drink?                                | This causes movement of fluid within the dental tubules in an Outward direction, triggering the nerve complexes within the pulp-dentine junction and resulting in pain. In reversible pulpsitis, where there is clinical evidence of recession, dentine exposure or a crack, this is a short-lived symptom which resolves within seconds of removal of stimulus.  
  In irreversible pulpsitis, (where the pulp is histologically inflamed) application of a cold stimulus will provide relief to the patients symptoms.  
  Where the pulp is partly healthy (other parts being either necrotic or inflamed), application of a cold stimulus will result in persistent pain for a few minutes to hours on removal of the symptoms  
  Note: Irreversible pulpsitis has varying presentations. If the pulp was necrotic or part necrotic, application of hot may not always elicit any symptoms.                                                                                     |
| Are the symptoms alleviated by use of analgesics?                       | The use of non-steroidal anti-inflammatory drugs can help with reduction in inflammation within the pulp and therefore with short term symptomatic control.                                                                                                                                                                                                 |
| Are you able to chew or bite on the teeth in the area?                  | This question can be directed to ascertain if there is presence of a crack in the tooth or whether the inflammation has spread beyond the pulp into the peri radicular areas.                                                                                                                                                                                   |
| Is your sleep disturbed? Do you experience symptoms spontaneously without any stimuli (hot/cold/biting on the teeth)? | This is a common presentation in patients with pulpsitis where spontaneous pain involving the A-d fibers can stimulate.                                                                                                                                                                                                                                                       |
| How severe would you rate your pain on a scale of 0–10, 10 being the worst| Ascertain severity of pain experienced.                                                                                                                                                                                                                                                                                                                                                                               |
| Other questions, if relevant:                                          | This may reflect previous or current discharging sinus and suppuration.                                                                                                                                                                                                                                                                                                                                         |

References:  
The American Association of Endodontists (AAE) guidelines on Diagnosis published in 2013 (www.aae.org). Examination procedures required to make an endodontic diagnosis (8)