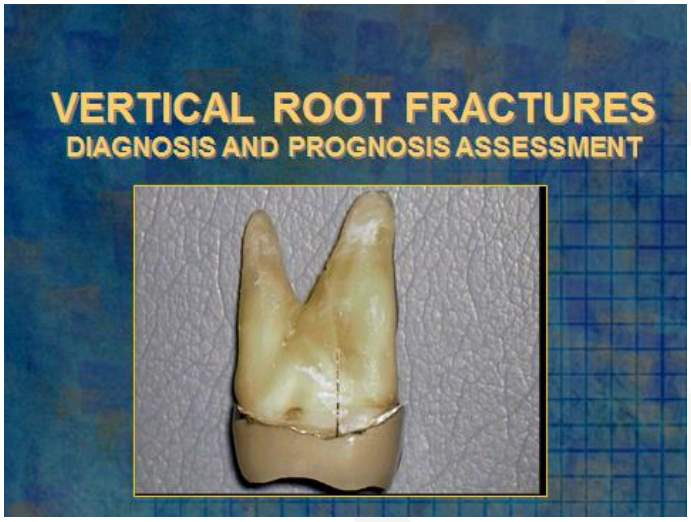
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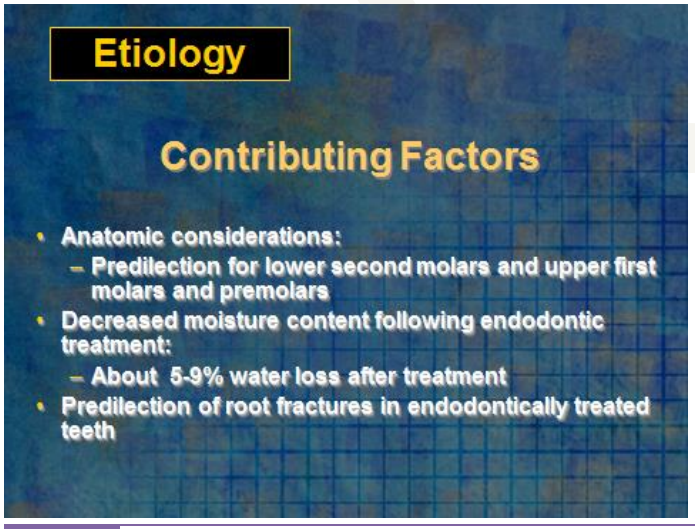
A Vexing Problem: Diagnosing Vertical Root Fractures

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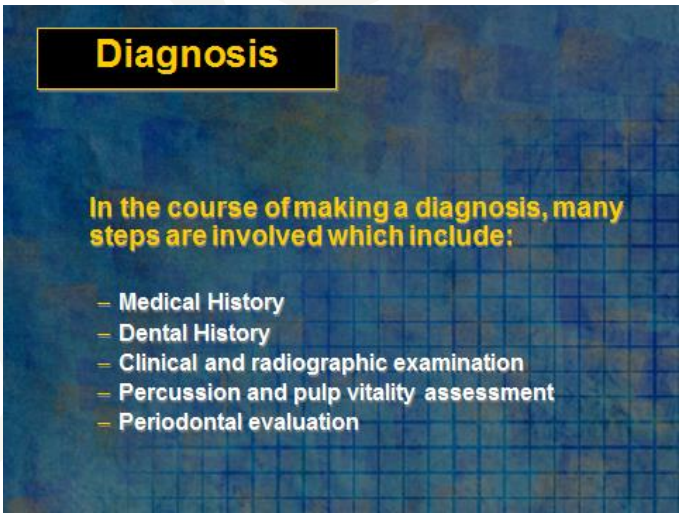
Abstract
Vertical root fractures (VFRs) are often difficult to recognize, especially in the early stages. A protocol S-O-A-P (subjective, objective, assessment, procedure) that will enable the practitioner to identify these often hidden root fractures is described in this paper.
Key words:
Key Words: Root Fracture, Toluidine Blue Dye, CBCT, Informed Consent.

One of the hardest diagnoses to make it to recognize when a patient has an occult vertical root fracture (VRF). Roots are like egg shells—once they crack, they can never be made "whole" again.

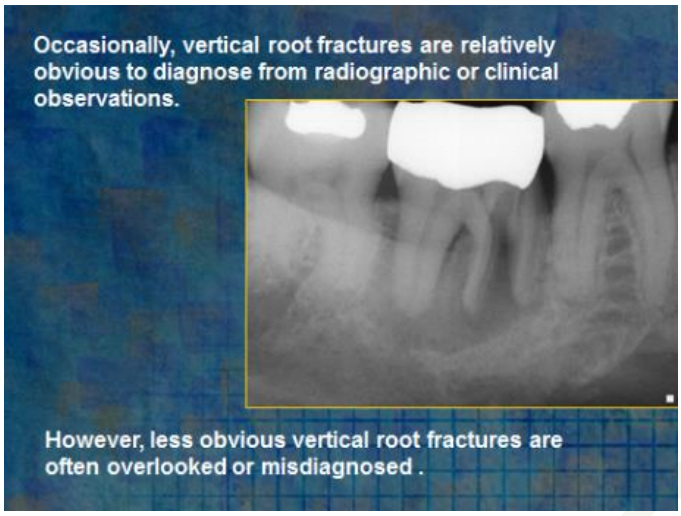




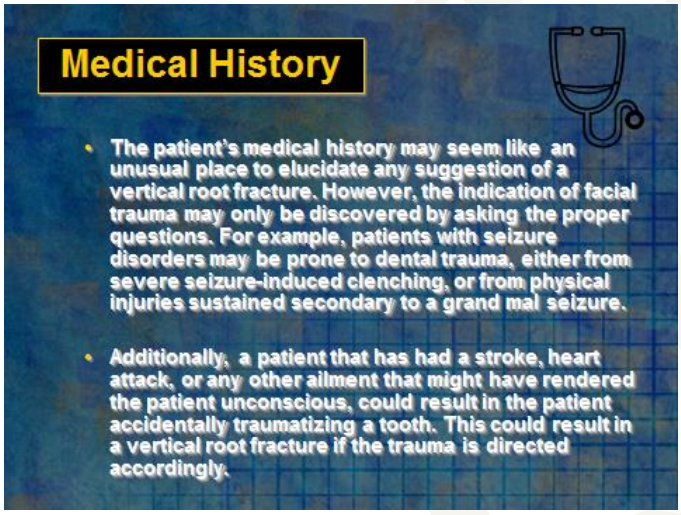
VRF is more commonly found in mandibular second molars, maxillary first molars and premolars. Teeth with prior endodontic therapy that remain unrestored with proper occlusal coverage are also at greater risk of VRF due to the slight loss of moisture content.



To accurately diagnose a VRF, there is a protocol that must be followed. To skip over any of these steps may lead the practitioner to a misdiagnosis. Unfortunately I have seen many VRFs that were avoidably misdiagnosed, thus leading to a lot of unnecessary and inappropriate treatment.

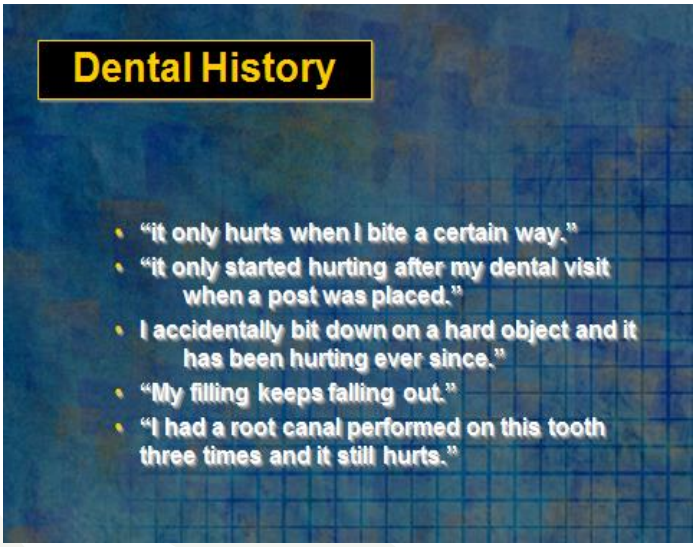


The determination of a vertical root fracture is a combination of subjective and objective findings. If the clinician does not ask the right questions, he or she will not get the right answers.

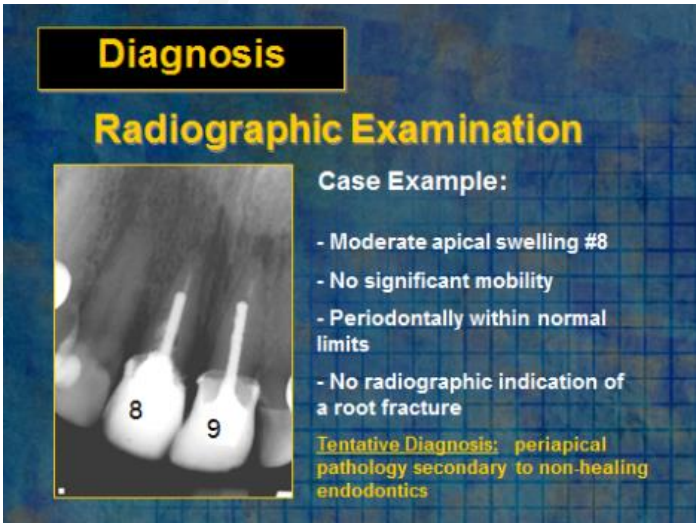


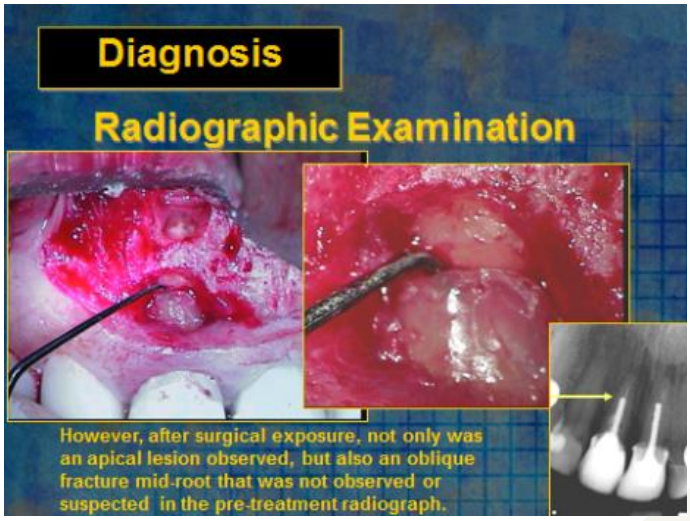
A medical history may possibly include a heart attack (patient falls on face during an attack), stroke or an epileptic seizure. So it is essential that the dentist listen carefully to what the patient reports in the medical history.

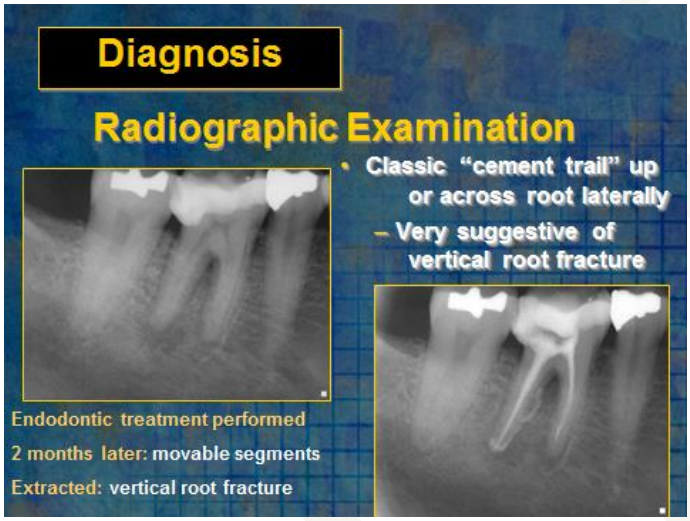
The dental history often provides early clues that a VRF may have occurred. Examples of common chief complaints are listed here.



Here is just one example where periapical images may be slightly suggestive of a VRF, but a full-thickness flap retraction may be necessary for diagnostic purposes just to confirm a suspicion! Of course, now with the advent of CBCT combined with the knowledge of interpreting the "slices" from different planes, the clinician may be able to avoid the surgical flap for an accurate diagnosis.



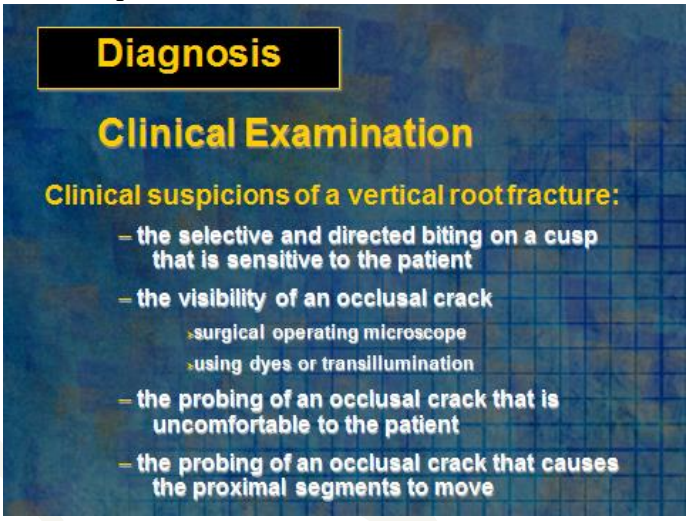


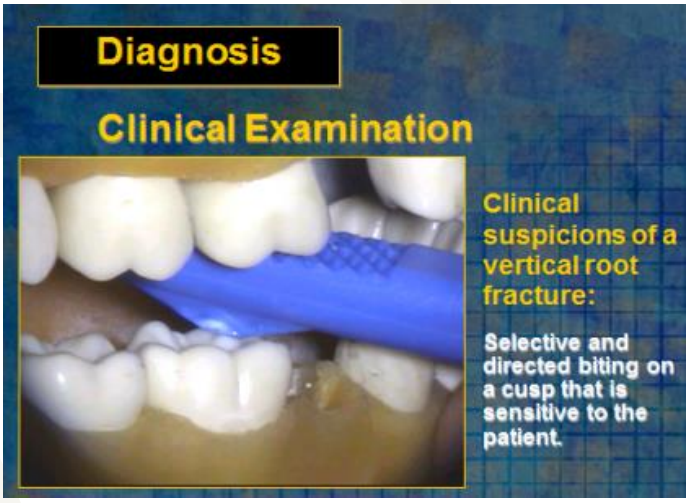


Whenever the clinician observes periradicular demineralization, the first consideration in the differential diagnosis should be VRF.

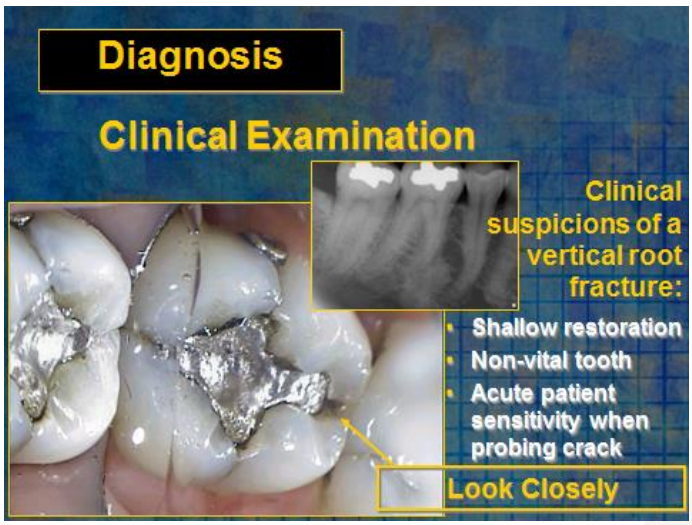
The clinical examination, conducted after gathering a full medical/dental history, includes a number of investigative techniques, e.g.:

- Examining the suspect quadrant with a bright light and sufficient magnification (=>3.5 mag.) when the teeth are dried; of course, a dental operating microscope is much better for detecting M-D fracture lines on occlusal surfaces.
- Applying toluidine blue dye on the dried occlusal surfaces, using isopropyl alcohol slightly moistened on a 2 X 2" gauze to remove the excess dye before searching for the suspected VRF.

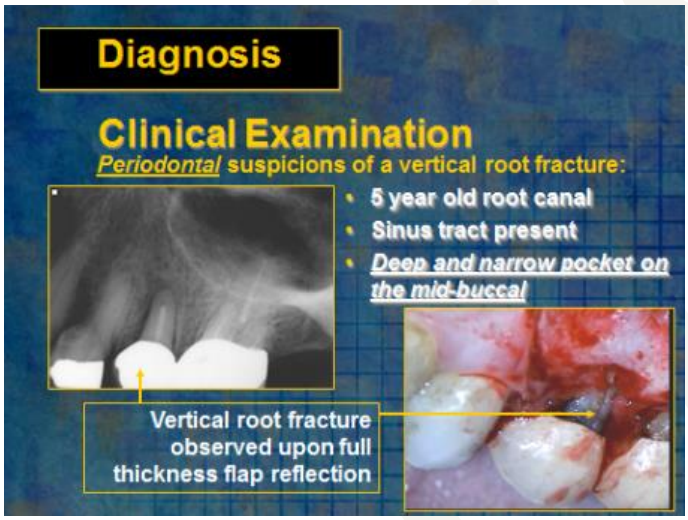


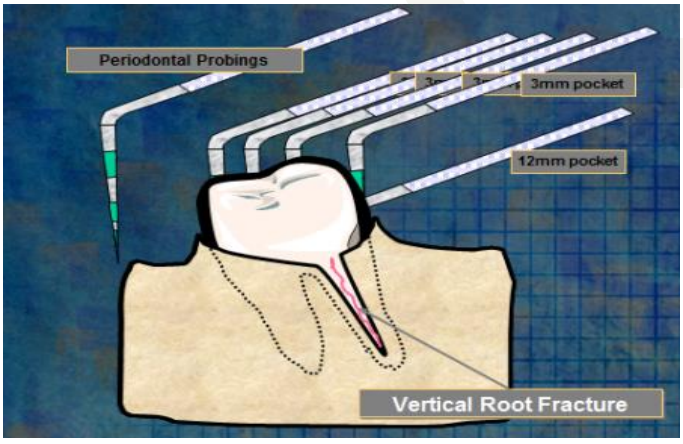




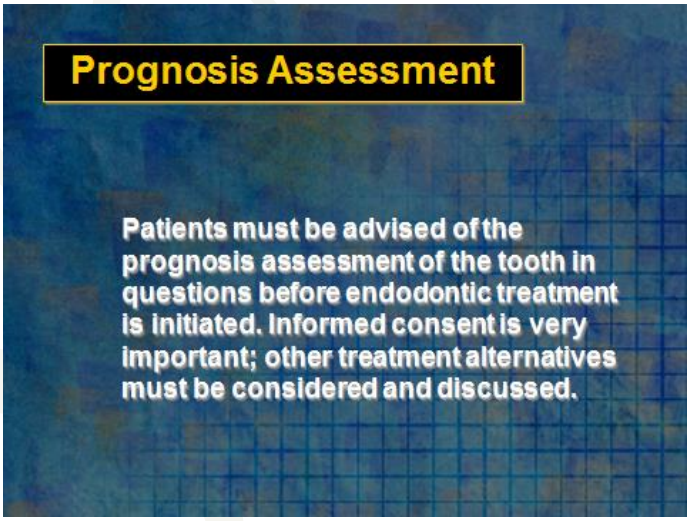


Look carefully with a probe for a narrow, deep periodontal pocket. Absent moderate periodontal disease, if a probe suddenly props down to 12mm along one side of one root, it quite likely that a VRF exists.





If a VRF is discovered, it is very important to inform the patient of the very guarded to poor prognosis if the patient wishes to attempt to preserve the tooth. In the USA, we have patients sign an "Informed Consent" form if the patient insists on gambling to retain the tooth. These forms are very helpful if the tooth has to be removed a few months later, because patients may forget that they were cautioned about the poor prognosis.



In summary, a VRF is quite challenging to diagnose, but if the clinician is aware of how to detect these vexing entities it will provide the highest quality of care for the patient and bring a quiet sense of professional satisfaction to the clinician.

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