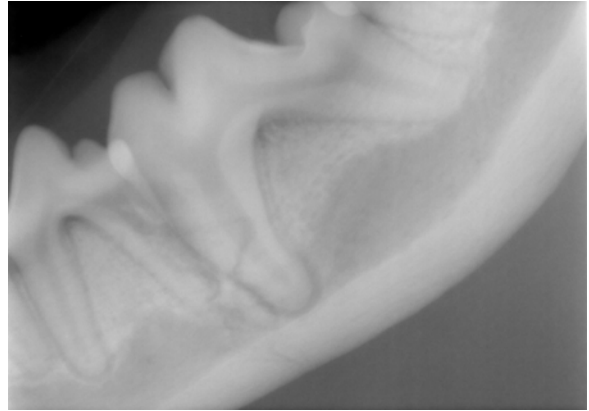


## RADIOGRAPHIC INTERPRETATION: A CASE STUDY.

For some years now, we in the veterinary dental community have been preaching to our colleagues in general practice on the imperative of obtaining diagnostic intra-oral dental radiographs on virtually all dental patients. It seems this message is now being taken to heart as more and more general practices have equipped themselves to provide this essential diagnostic service. However, obtaining a diagnostic image is only the first step. The next step is to interpret the image accurately. With that in mind, I am going to attempt to make it a habit to include radiographic interpretation a regular feature of The CUSP.

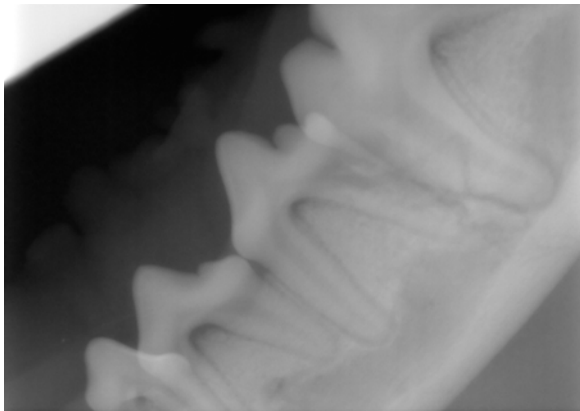
With the permission of the practitioners involved, I would like to share a recent case with you. I do not want to give anything away but I want you to look at just the two radiographs on this page without looking further yet.

This is a one-year-old Boston terrier with a history of facial trauma roughly 36 hours prior to presentation to the referring clinic. The attached radiographs of the left mid-mandible were obtained under general anesthesia.



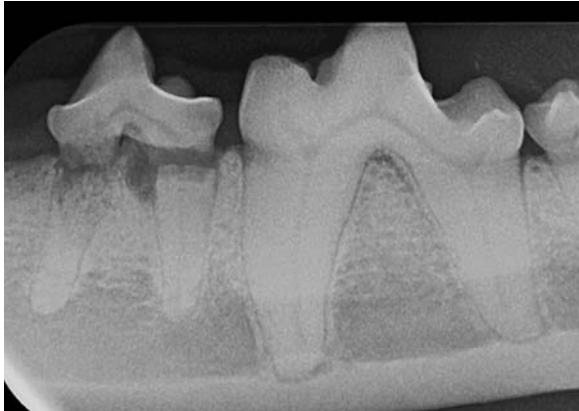
So what are we seeing here? There appear to be fracture lines but what is it that is broken? This highlights the limitation of viewing a two-dimensional representation of a three dimensional object. There is a lucent line that seems to involve the distal root of the 4<sup>th</sup> premolar (308) and the 1<sup>st</sup> molar (309). Are these roots fractured?

Ponder this and then move on to the next page.



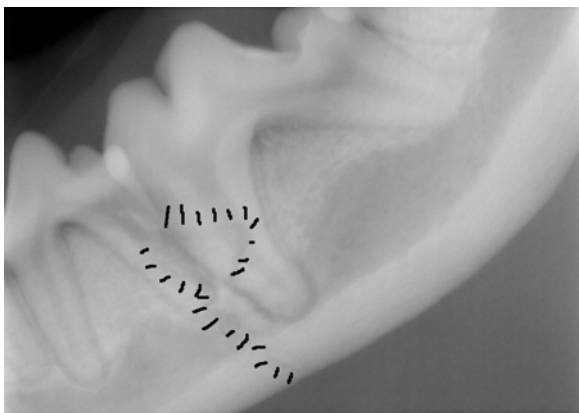
Radiographs are two-dimensional  
Patients are three dimensional

Root fracture certainly does happen, but when it does it is usually at the fulcrum point at the top of the bony socket (alveolus) as in this image of an old root fracture of the lower left 4<sup>th</sup> premolar in a miniature poodle.



Also, the root fractures tend to be right through the root from one side to the other. In the rads of the Boston terrier, there appears to be a triangular section broken out of the mesial aspect of the mesial root of the 1<sup>st</sup> molar deep within the confines of the alveolus. In evaluating these images we need to ask, how could a root fracture of that shape happen in that location? It seems exceedingly unlikely that it could happen. So if the root is not fractured, what is? The only other dense tissue there is bone.

In the marked image below, I have tried to highlight the various fracture lines in the mandible. One line is on the buccal side of the teeth and the other is on the lingual side. What we have here is a mandibular fracture running dorso-ventral in the region between the distal root of the 4<sup>th</sup> premolar and the mesial root of the 1<sup>st</sup> molar.



This could have been a very simple fracture to

manage as there is no displacement or mobility across the fracture line, the mandibular neurovascular bundle in the mandibular canal has not been traumatized and there are substantial and healthy teeth on either side of the fracture line for the retention of an intra-oral splint. In fact, simply bonding the 4<sup>th</sup> premolar and 1<sup>st</sup> molar to each other with a reinforced, bonded composite splint on the lingual aspect of these two teeth and putting the dog on soft food/restricted activity would likely have done the trick very well. It would have been a quick, painless, bloodless bit of restorative work and removal of the splint would also have been quick, painless and bloodless.

Making the distinction between mandibular fracture and root fracture is essential because mis-interpretation of the situation will result in serious problems – and that is what happened. The primary care clinicians assessed that the fractures were of the distal root of the 4<sup>th</sup> premolar and the mesial root of the 1<sup>st</sup> molar and so decided that these two teeth needed to be extracted. They started that surgery and then realized they were on the wrong path and took this intra-operative image.

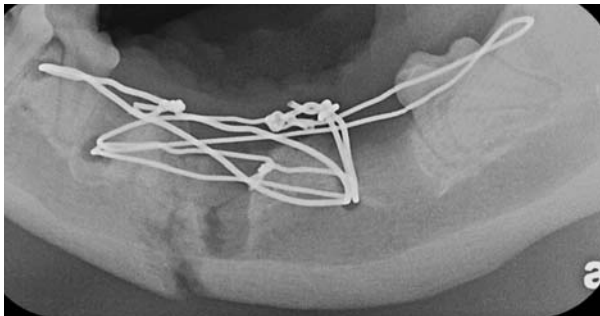


At this stage they have removed the 1<sup>st</sup> molar and the distal root of the 4<sup>th</sup> premolar. They were having trouble removing the mesial root of the 4<sup>th</sup> premolar and noted the mobility and displacement across the mandibular fracture and so aborted the procedure and contacted us. We arranged to see the dog the next day.

At this point, we have a displaced and mobile mandibular fracture, enough distraction to cause concern regarding the health/integrity of the neurovascular bundle and insufficient dental structure distal to the fracture line to hold an intra-oral splint. While I really dislike the use of orthopedic wire for managing facial fractures

(see this for more on that - [MandFx.pdf](#)), I was left with few options.

Treatment involved removal of the rest of the 4<sup>th</sup> premolar and then open reduction of the fracture using orthopedic wire through various pilot holes and bridging the fracture at various angles. Following placement of the wires, the buccal and labial flaps were sutured over the wires and bone in order to isolate the wires from communication with the oral cavity. To do this, I also actually sutured the flap over the top of the 2<sup>nd</sup> molar, figuring I could re-expose or extract this tooth at follow-up.



With mandibular fractures, the dorsal border of the mandible is known as the tension side and the ventral border is the compression side. This is because both gravity and the resistance to mastication push the chin ventrally (down) while the muscles of mastication pull the distal portion of the mandible dorsally (up). Therefore it is important to counter-act the tension across the dorsal border of the fracture and this is what these wires were doing. The small gap ventrally is not a great concern because the forces of compression would be inclined to close this gap as the wires 'stretch' or loosen post-operatively.

The patient was sent home on soft food, restricted activity and pain medications. He had already received a two-week injection of antibiotics from the referring clinic. Follow-up examination was scheduled for six weeks.

At follow-up, the soft tissues looked like this:

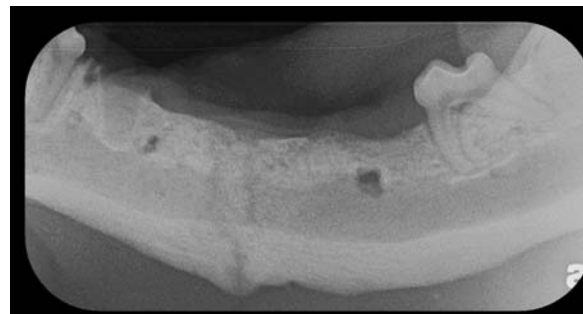


Some of the knots in the wire are visible under the mucosa near the distal part of the site but the mucosa is intact and healthy. What really surprised me was that the 2<sup>nd</sup> molar had re-erupted and the gingiva around it looked perfectly happy and healthy. Remember, I had buried this tooth under the flaps. Isn't nature amazing!

Radiographically, we had this:



I was very happy with this so I made an incision along the dorsal margin of the site to reflect the soft tissue and removed all the wires and the 3<sup>rd</sup> premolar. Here is the final post-op rad:



Then I dealt with other 'micro-dog' issues (see [microdogs.pdf](#)) such as extracting some supernumerary maxillary incisors and extracting several other teeth to alleviate the serious

crowding and rotations (see the pre-op photos) that would have pre-disposed to uncontrollable periodontal disease.



I also removed the right maxillary 2<sup>nd</sup> molar because the discolouration of the crown indicated that the pulp in this tooth was dead ([endo\\_dx.pdf](#)).



In the end, the fracture healed well and so we have a happy ending and that is what really matters.