

## The Economics of Dental Radiography

A fundamental principle of medicine we follow is making a diagnosis prior to initiating patient treatment. We accomplish this by taking a good medical history, performing a complete physical exam, and doing any other necessary tests such as blood chemistry and radiology. Why is it then, that so few veterinarians have the dental radiology equipment requisite for accurate and thorough evaluation even though periodontal disease remains the most commonly diagnosed condition in our profession?

This suggests that dental disease goes undiagnosed, poorly diagnosed and even inaccurately diagnosed. Or are most veterinarians merely “winging it”, flying by the seat of their scrubs when it comes to addressing this important disease? Simply put, veterinarians who do not employ radiography in their assessment of dental disease are missing pathology on an ongoing basis. Verstraete and colleagues demonstrate that this is not idle speculation: <sup>1</sup>

- In dogs already showing gross evidence of periodontal disease, dental radiography provided additional, clinically useful or essential information in 72% of cases.
- Radiographs of anatomy *without* obvious clinical disease revealed significant lesions in 28% of patients.
  - Further, periapical lesions were discovered in nearly 10% of dogs showing no other evidence of problems- pathology that would have been totally missed without this diagnostic tool.
- In cats with evident dental disease, radiographs provided additional useful or essential information fully 86% of the time.
- Unexpected clinically significant lesions were observed in 42% of cats *without* overt disease.

Following are several examples of common clinical presentations in which dental radiology contributed significantly to an accurate diagnosis and successful outcome:

### Case 1:

These are images of a mature dog that presented for routine periodontal therapy.

- Radiographs revealed an unapparent infected right mandibular 3<sup>rd</sup> incisor (403) secondary to periodontitis involving the obviously fractured 2<sup>nd</sup> incisor (402)(figure 1).
  - Without the benefit of radiography the infected 3<sup>rd</sup> incisor would likely have been missed.
  - We extracted both teeth (figures 2 & 3).
- Furthermore, x-rays demonstrated advanced tooth resorption affecting both the right and left maxillary 3<sup>rd</sup> premolars (107 & 207), both of which had unusual third accessory roots. (figures 4 & 5)
  - This condition had been noted on the last two annual visits.
  - Although no treatment was required to treat either of these teeth (the crowns were yet unaffected by the resorption), we advised the client to continue returning for follow-up radiographs to monitor the process and diagnose additional pathology should it develop.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

### Case 2:

The second example evaluates a middle-aged canine receiving “routine” periodontal treatment.

- We noted the absence of the right mandibular 2nd premolar (406) and two zones of remaining gingival inflammation (figure 6).
  - Radiographs of the region (figure 7) showed two retained root tips as well as an apical lucency of the 1st mandibular premolar (405) indicative of endodontic disease.
  - Interestingly, the lucency was not obvious on the initial radiograph but was readily apparent on the post-extraction image. Closer examination shows the widened pulp canal as compared with the neighboring tooth (figure 8).
  - Treatment included extraction of the diseased premolar and removal of the retained root tips



Fig. 6



Fig. 7



Fig. 8

**Case 3:**

The next patient presented with a swollen right maxilla we might normally associate with an infected upper 4th premolar.

- A radiograph readily showed a grossly abnormal tooth which we extracted.
- The right maxillary first molar (109) was also extracted because the infection involved that tooth as well.
- Most surprising to us was the radiograph of the totally normally looking left maxillary 4th premolar (208); this image revealed gross tooth abnormalities and the presence of lucencies involving the alveolar bone (figure 13).
  - This hidden significant pathology would have been missed had it not been simple to compare the two sides radiographically.
  - Evaluation of each tooth clearly demonstrates the difference in root canal widths, suggesting that both of these teeth failed to develop properly.



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14



Fig. 15

**Case 4:**

Our final example is a cat with early tooth resorption of the left mandibular molar (309).

- We extracted the tooth, however the mesial root fractured during removal (figure 18).
  - Radiographs verified that all root material was removed (figure 19).



Fig. 16



Fig. 17



Fig. 18



Fig. 19

These cases are significant because they demonstrate common periodontal conditions that we see in our hospitals on a regular basis. In each, dental radiography contributed significantly to the diagnosis and treatment of the patient and a positive clinical outcome.

So why would a conscientious veterinarian delay buying this important medical equipment? Money is likely a major factor. It is totally natural to worry about how to justify a major capital expenditure. Will it pay for itself in a reasonable amount of time, if ever? Fortunately, for dental radiology equipment, the answer is an emphatic “yes.” The following is a reasonable summary of how an investment in this equipment is financially sensible and prudent.

Although my own practice is exclusive to dentistry, I operate out of a large general practice with specialty departments in internal medicine, dermatology, and surgery. While I see referrals from the local veterinary community, the bulk of my caseload comes from our general practice as your own practices will generate caseload for your dental departments. The following data is based on some fairly conservative assumptions with two cases a day, operating four days a week.

**Chart 1: Potential Income**

	Day	Week	Month	Year
<b>2 cases per day--4 days a week</b>	2	8	34.66	416
<b>Income from radiology per se</b>				
Charging \$90/case	\$180	\$720	\$3119	\$37,432
Charging \$50/case	\$100	\$400	\$1733	\$20,796
Charging \$00/case	\$0	\$0	\$0	\$0
<b>Income from additional pathology found</b>				
Extractions: 1 per case, \$75/extraction	\$150	\$600	\$2599	\$31,194
Doxyrobe <sup>®</sup> : 1 per week		\$75	\$325	\$3900
Bone enhancement: Concil <sup>®</sup> , OsteoAllograft <sup>®</sup> : 0.5/week		\$62.50	\$271	\$3250
<b>Total Yearly Income From Radiology</b>				<b>\$38,344—\$75,776</b>

**Chart 2: Initial Equipment Investment**

X-Ray Generator	\$4000
Sensor	\$9000
Laptop Computer	\$1500
Training	\$800
<b>Total Initial Investment</b>	<b>\$15,300</b>

To explore a totally conservative scenario, assume one generates only \$150 of additional income on each dentistry case. With that, it would take 51 “dentistry days” (less than two months!) to earn back the entire initial investment. If you prefer to lease equipment, a typical three year lease costs approximately \$450/month in which case it would take the first three “dental days” of each month to recoup the lease expenditure with the other days being profit.

Dental radiology can be an enormous profit center provided the practitioner and staff commit to the decision to practice advanced dentistry. This requires obtaining both equipment and training and being vigilant in diagnosing and treating periodontal disease as a fundamental practice of your hospital.

It is true that, often, extraction is the best course of action to treat advanced periodontal disease. However, don't overlook the option of curettage followed by a perioceutic (e.g. Doxyrobo®) or a bone augmentation product (e.g. Osteoallograft®) to treat a periodontal pocket. Even if the income described above is reduced by half, or even three-quarters, dental radiology makes sense on economic factors alone. Even if you charge nothing for routine radiographs (not my recommendation!) you will recover the equipment costs within the first six months from the treatment of previously undiagnosable disease. There is no other piece of veterinary equipment that will pay for itself so quickly.

It is likely that the increased income will not only pay off the initial investment quickly, but it can also fund the salary of a technician dedicated to your “new and improved” dental department. This technician, who should be truly passionate for dentistry, is provided extra training and be responsible for marketing the dental department.

Making dental radiography a fundamental value of your practice and a routine part of dentistry is good for the patient, is healthy to the hospital's bottom line, and provides the veterinarian with the satisfaction of practicing on the cutting edge of our profession

**Footnotes:**

1. F. J. Verstraete, et al, Diagnostic value of full-mouth radiology in dogs, AJVR 1998 59:6 686-691
2. F. J. Verstraete, et al, Diagnostic value of full-mouth radiology in cats, AJVR 1998 59:6 692-695

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