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A Philosophical Approach to Establishing a Diagnosis

Brian G. Murphy

Professor, University of California, Davis, California, USA

Lesions in the oral cavity and jaws of veterinary species are common, and the pathologist's correct diagnosis can play an important role in the well-being of animals and owners alike. Unfortunately, multiple factors can conspire to make the diagnosis of oromaxillofacial lesions difficult: some lesions can be rare and one-of-a-kind, lesions may require extensive decalcification, the existing literature is arguably less comprehensive for oromaxillofacial diseases than for other body systems, and perhaps most importantly, lesions with markedly different outcomes can demonstrate coalescing morphologic features. It is the authors' opinion that the factors that make these lesions challenging to diagnose can also make them intellectually attractive, and the pursuit of the most appropriate diagnosis a rewarding one. This book was written with this concept ever in mind.

While lesions in the oral cavity and jaws can share multiple morphologic features with lesions in other body systems, some of these lesions are unique and found nowhere else. In addition, pathologic lesions arising from the jaw can be unique, as maxillary and mandibular bone tissue are embryologically and physiologically unlike the bone of the appendicular skeleton. Perhaps most importantly, the oral cavity and jaws of mammals include teeth, the sole anatomic structures that bridge the skeletal and digestive systems. With pathology, the tooth-mucosa (dentogingival) junction may facilitate a potential break in the integrity of the internal/external environments.

One of the most important goals for a diagnostic pathologist is to establish the most accurate diagnosis – *to put the lesion into the correct categorical box*. To accomplish this, veterinary pathologists have long utilized the framework of human oromaxillofacial disease as a template for organizing the lesions of veterinary species. While humans and veterinary species share certain features of oromaxillofacial pathophysiology, it is the authors' opinion that the lesions that occur in human beings do not fully capture the diversity of pathology that occurs in veterinary species. Likewise, many clinicopathological entities in humans are defined or subclassified by specific demographic, behavioral, and/or environmental factors that have unknown significance in animals.

Diagnosis is a form of categorization, and the process of diagnostic categorization is a human construct. We created categorization as a means of dividing up the natural world. Organizing veterinary oromaxillofacial pathology through lesion categorization is a process that has been going on for more than a century, and many individuals have made important contributions to this effort. Unfortunately (or perhaps fortunately), nature is highly complex. Because this effort to diagnose and categorize is a difficult one, it is essentially an iterative process, and organizational attempts will always remain works in progress.

To establish a diagnosis, many pathologists adhere to a heuristic process of morphologic pattern recognition. For the experienced pathologist, this cognitive process may occur at a level beyond conscious recognition. The diagnosis *just feels right*. Although the end goal of establishing a correct diagnosis may be met, a dependency on the process of pattern recognition alone remains an imperfect one, as oromaxillofacial lesions can and frequently do share overlapping morphologic features.

Parabolic curves can be constructed as simple, two-dimensional metaphors representing the diversity of morphologic types found within a particular type of lesion (Figure 1.1). For such curves, the diversity of a particular morphologic feature or collection of features within a lesion can be represented along the *x*-axis, while the frequency of occurrence of those features in a population of lesions is mapped along the *y*-axis. In such a metaphor, a steep and narrow parabola suggests that relatively little morphologic diversity exists within

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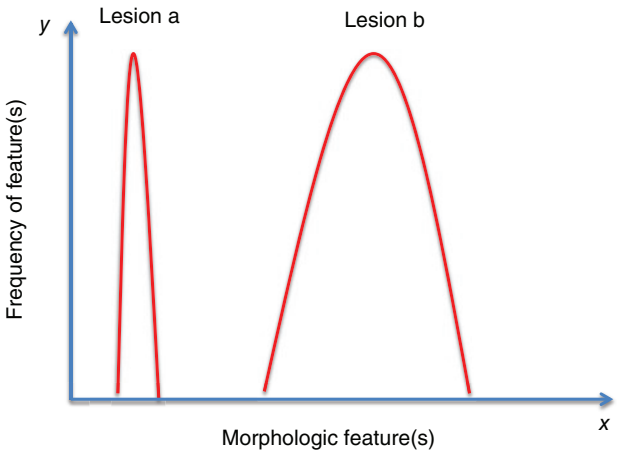

Figure 1.1 Parabolic curves representing lesion diversity and frequency. For a given lesion, the *x*-axis can represent a single morphologic feature or set of morphologic features that collectively comprise the lesion in question. The *y*-axis represents how common the particular morphologic feature(s) is/are within a group of similar lesions; lesions with a broad curve are morphologically diverse and, therefore, more difficult to diagnose.

the lesion type, while a broad-based parabola suggests the opposite. Superimposition of these curves graphically demonstrates this concept of overlapping morphologic features (Figure 1.2). Structural overlap between lesions presents a diagnostic challenge for the pathologist and is a concept that will be revisited throughout this book.

Throughout this book, sets of differential diagnoses are provided for most of the described lesions. Differentials are based upon (i) clinical/gross features, (ii) radiographic findings, and (iii) microscopic features. In general, if a lesion is a differential in two or more of these categories, that entity will be listed in the box. It is the opinion of the authors that the examination of histologic features frequently allows the designation of a principal diagnosis along with one or more differential diagnoses. These differential diagnoses are important and should be included in the report sent to the submitting clinician. Assigning a principal diagnosis and accompanying set of differential diagnoses effectively conveys a measure of ambiguity, which may have great value for the clinician. For these reasons, a defining set of differential diagnoses has been included for each lesion type described in this book.

To assist in this difficult yet rewarding endeavor, the judicious use of appropriate immunohistochemical assays and/or special stains can be invaluable to inform the final diagnosis. Perhaps even more importantly, clinical data, most typically available through the submitting clinician, should be sought out. A conversation with the submitting clinician, patient signalment, anatomic location of the lesion, and lesion natural history can be invaluable facets informing the final diagnosis. Radiographic imaging studies and/or three-dimensional imaging studies like computed tomography may be available. The opinion of the clinician/radiologist regarding such studies, or better

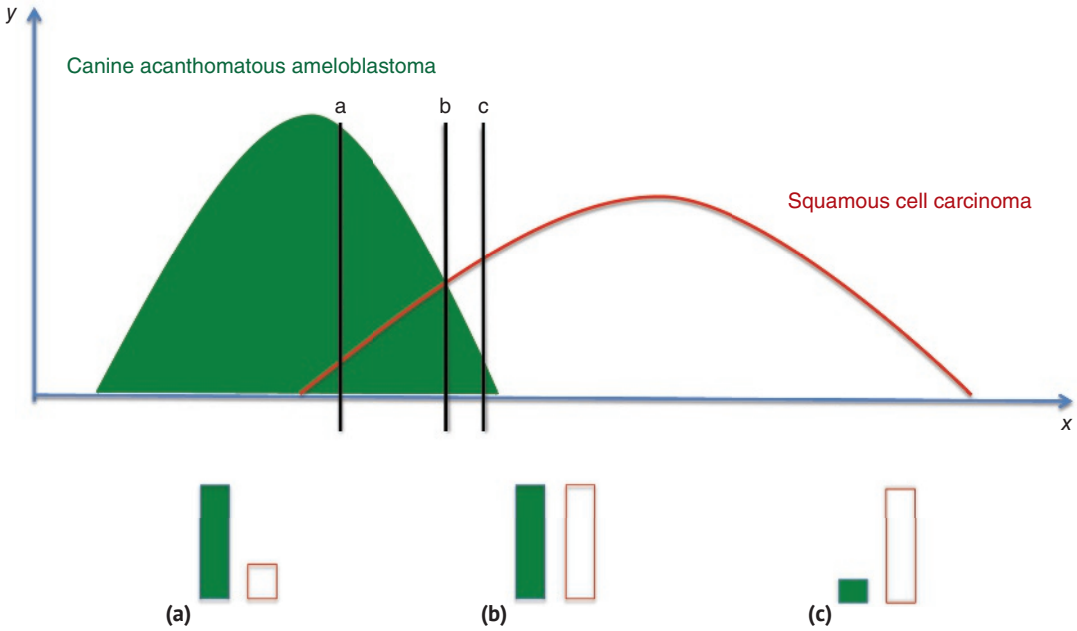

Figure 1.2 Superimposed parabolic curves are a metaphor for the morphologic overlap between related lesions. Some lesions, like squamous cell carcinoma (SCC) and canine acanthomatous ameloblastoma (CAA), can either be morphologically distinct lesions (extreme right and left edges of the two bell curves) or share multiple features (within the region of curve overlap). Sections a, b, and c represent lesions that are most likely to be CAA, equally likely to be SCC or CAA, or more likely to be SCC, respectively.

yet, the diagnostic images themselves, should be reviewed by the pathologist in conjunction with the gross and histological features of the submitted sample. The final diagnosis for some oromaxillofacial lesions is largely based on clinical diagnoses.

If not openly offered, the opinion of the submitting clinician should be sought out, as an astute clinician will often have made a preliminary clinical diagnosis prior to submission. This *clinical diagnosis* may be correct, based upon the clinician's experience, the anatomic location, results of diagnostic imaging studies, signalment of patient, clinical signs, and prior biopsy results. The diagnosis of relatively common oromaxillofacial lesions, such as odontogenic cysts and equine tooth root-associated nodular hypercementosis (cementoma) are highly dependent upon their anatomic relationship with teeth, jawbones, and/or the paranasal sinuses. Some clinicians have a curious policy of withholding such information from the pathologist in a dubious attempt to "not influence the diagnostic process." These same clinicians would likely be at a loss if their clients withheld important clinical information for the same reason.

There is also value in seeking out the opinions of subject matter experts, colleagues, or even trainees. The common use of digital images facilitates rapid communication, and networks of colleagues around the world are often willing to lend a hand. Finally, following a challenging lesion *down the road of time* can be a valuable learning experience. Does the eventual clinical outcome fit the diagnosis, and most importantly, can one learn from it?