

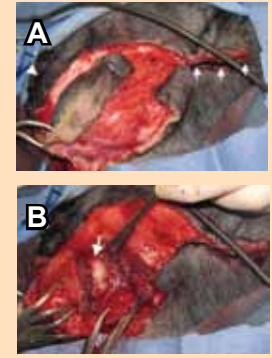
**SMALL MOUTHS, BIG HOLES:**  
The Value Of En Bloc Resecton!

Our philosophy at the Center is to approach aggressive, malignant neoplasms in.....an *aggressive* manner! *Aggressive meaning at least a 1 cm tumor-free margins around the entire lesion.* Advanced imaging is required for tumors of the caudal oral cavity and head in order to determine if a plan that includes obtaining tumor-free margins is even possible. MRI and CT imaging provides the “map” to achieve this goal.



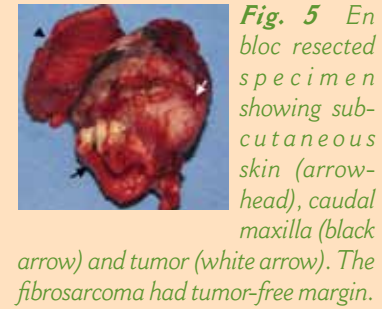
**Fig. 2** MRI showing the fibrosarcoma juxtaposed with the caudal maxilla and zygomatic arch.

Fibrosarcoma is undoubtedly an aggressive tumor regardless of location. In this case, the patient had a large fibrosarcoma of the lateral head (Fig. 1). The imaging report indicated no bone involvement, however it was clear that in order to acquire tumor-free margins, bony structures would likely require resection (Fig. 2). The preoperative plan included *en bloc* resection of the entire left lateral cheek area including skin, surrounding masseter and digastricus muscles, and the tumor including 2 cm margins. Paralesional bony structures included the caudal maxilla and zygomatic arch as likely candidates for resection depending on actual proximity to the tumor.

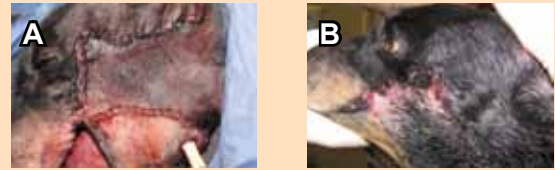


**Fig. 3** The initial commissurotomy incision is extended around the tumor (A) and below the eye (arrowhead), eventually communicating with the lymph node staging incision (arrows). Note the tumor (arrow) within the masseter muscle (B).

Generally, we focus on fulfilling the plan for resection, with the reconstruction a secondary concern that must await the outcome of the surgery. If reconstruction and wound closure are paramount concerns, then it is probably natural to be more conservative during the *en bloc* resection. Conservative surgery often results with tumor-positive margins and a concomitant poor prognosis. Incomplete resection is defeating for both the surgeon, client, and especially the patient who might have to undergo additional adjunctive therapy. This case typifies the advanced surgical procedures that can result in tumor-negative margins and a successful outcome. *After all, when you refer your clients and their pets for surgery, wouldn't you prefer the surgeon get it all!*



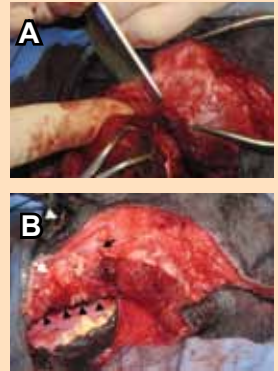
**Fig. 5** En bloc resected specimen showing subcutaneous skin (arrowhead), caudal maxilla (black arrow) and tumor (white arrow). The fibrosarcoma had tumor-free margin.



**Fig. 6** Postoperative result showing wound closure using a lateral neck advancement flap (A). The 2-week suture removal visit showed good wound healing (B).



**Fig. 1** Intraoral (A) and external (B) view of a lateral cheek fibrosarcoma in a 13-year-old Dachshund dog.



**Fig. 4** The zygomatic arch is resected (A) along with the caudal maxilla (B) to reveal the zygomatic salivary gland (white arrow) below the eye (white arrowhead). Note the cut edge of the zygomatic arch (black arrow) and hard palate mucoperiosteum (black arrowheads) following caudal maxillectomy.

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9041 GAITHER ROAD, GAITHERSBURG, MD 20877

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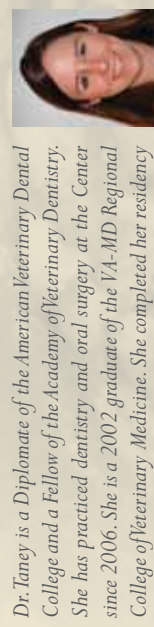
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Dr. Mark M. Smith and Dr. Kendall Taney are partners in the Center for Veterinary Dentistry and Oral Surgery established in 2006. Dr. Smith is a Diplomate of the American College of Veterinary Surgeons and the American Veterinary Dental College. He was Professor of Surgery and Dentistry at the VA-MD Regional College of Veterinary Medicine at Virginia Tech for 16-years before entering private practice in 2004. Dr. Smith is Editor of the Journal of Veterinary Dentistry and co-author of Atlas of Approaches for General Surgery of the Dog and Cat.



Dr. Taney is a Diplomate of the American Veterinary Dental College and a Fellow of the Academy of Veterinary Dentistry. She has practiced dentistry and oral surgery at the Center since 2006. She is a 2002 graduate of the VA-MD Regional College of Veterinary Medicine. She completed her residency at the Center and has also performed internships in both general medicine and surgery, and specialized surgery.

Dr. Emily Edstrom is a 2010 graduate of the Colorado State University School of Veterinary Medicine. She completed a rotating internship in small animal medicine and surgery at VCA Veterinary Referral Associates in Gaithersburg, MD. She is a member of the American Veterinary Dental Society.



**BEYOND THE MOUTH:  
Closing The Locked Open Mouth!**

*What is locked jaw syndrome?* Locked jaw syndrome is defined as the inability to open or close the mouth. There are multiple causes for patients to experience closed-locked jaw, including trauma with TMJ ankylosis, masticatory myositis,



**Fig. 2** Bulging of soft tissue below the zygomatic arch (arrow) indicative of right lateral displacement of the mandibular coronoid process causing open-locked jaw.

TMJ luxation or dysplasia, or trigeminal neuritis. Reasons for our patients to experience open-locked jaw include subluxation of the temporomandibular joint due to joint instability or deformation of the mandibular condyloid process that can lead to malpositioning of the coronoid process lateral to the zygomatic arch, causing the mouth to become locked in an open position (Fig. 1).

This can be a painful and traumatic experience for patients and their owners, causing them to seek veterinary attention quickly. Can open-locking jaw be managed conservatively? Yes, in fact many owners report that the mandible will reduce spontaneously or can be reduced manually with gentle palpation. Patients will typically present with jaws in an open-locked position, and the practitioner may notice a bulge on the side of the laterally displaced coronoid process. This "bulge" is important because it allows

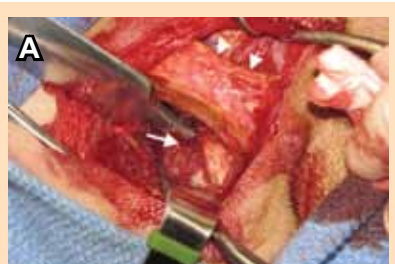
us to determine which side is being displaced and which side needs to be corrected (Fig. 2). *What can be done surgically?* Definitive corrective surgery is indicated in patients to prevent chronic and progressively worsening episodes of locking jaw, which will eventually lead to arthritis. In these patients, we are able to remove a portion of the zygomatic arch as well as the dorsal aspect of the coronoid process in order to prevent further displacement (Fig. 3 and 4). This procedure has been very successful alleviating locking jaw and owners that are very happy to have a normal dog again. Although this is a relatively uncommon disorder in dogs, it is important to know that something can be done to help these patients!

**Fig. 4** Removal of the zygomatic arch (A) may be sufficient to prevent open-locked jaw, however resection of the coronoid process ensures success through a relatively small incision (B).



**Fig. 1** Model showing open-locked jaw secondary to lateral displacement of the mandibular coronoid process (arrow) in relation to the zygomatic arch (arrowheads).

include subluxation of the temporomandibular joint due to joint instability or deformation of the mandibular condyloid process that can lead to malpositioning of the coronoid process lateral to the zygomatic arch, causing the mouth to become locked in an open position (Fig. 1).



**Fig. 3** Intraoperative view showing the reduced coronoid process (arrow) allowing exposure of the zygomatic arch (arrowheads).

**ORAL SURGERY:  
An Unexpected Finding!**

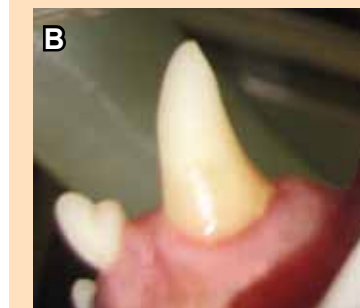
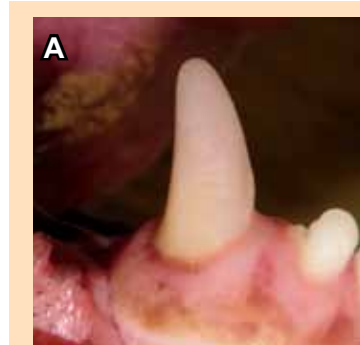
This dog was referred to our practice for root canal therapy when his owner noted that the mandibular canine tooth was pink in color (Fig. 1). Teeth can become non-vital after blunt force or other trauma, but the owner could not think of any such event. A study was done that showed that 98% of teeth that are discolored are non-vital and should be treated with root canal or extraction. Whenever we plan to do a root canal, our first step is to take a dental radiograph to make sure the tooth is a viable candidate for an endodontic procedure. We always want to recommend procedures that will work and are in the best interest of the patient. During our initial oral examination, we also noted that the patient was missing a mandibular first premolar tooth just caudal to the discolored canine tooth. Areas with missing teeth are also always radiographed to check for impaction or retained roots.

When we radiographed the left rostral mandible we found a very different reason for the canine tooth to be discolored and non-vital. The patient's mandibular first premolar tooth was indeed impacted, and had developed a large dentigerous cyst in the mandible that compromised the blood supply to the canine tooth (Fig. 2). Dentigerous cysts develop from the cells surrounding an impacted tooth. They can expand rapidly and can cause pathologic bone fracture and potentially undergo malignant transformation. Unfortunately, the amount of bone destruction from the cyst was affecting the canine tooth and it could not be saved with a root canal. However, with extraction of all affected teeth along with debridement of the cyst wall, we expect complete resolution of this problem. Bone graft or bone graft substitute can be placed in the defect after extraction of affected teeth and debridement of the cyst wall. A biopsy of the cyst wall is always taken as a precaution. With primary closure of the mucoperiosteal flap, healing should occur rapidly (Fig. 3). Clients should be advised to have dental radiographs taken where there are missing teeth to avoid the complication of dentigerous cyst that can destroy surrounding structures and even lead to pathologic fracture.

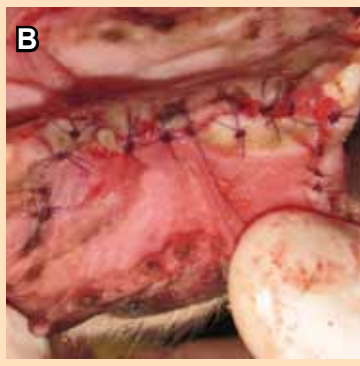
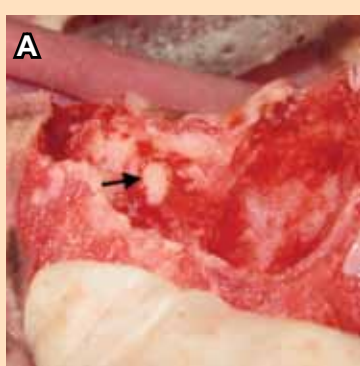
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**Fig. 2** Radiograph showing the impacted right mandibular 1st premolar and a large cystic lesion surrounding it. The adjacent teeth including the canine are also involved.



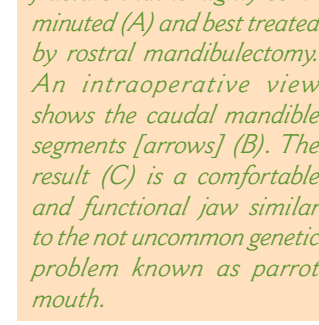
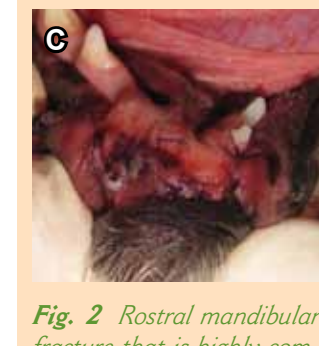
**Fig. 1** Pink colored right mandibular canine tooth indicating that the tooth is non-vital (A). Note the normal appearing left mandibular canine tooth (B).



**Fig. 3** Image showing the impacted first premolar tooth (arrow) during surgical treatment of the cyst (A). Extractions, cyst debridement, and wound closure completes the procedure (B).

**ORAL SURGERY:  
When Teeth Go From Bad To Worse!**

Periodontal disease can have many consequences, but one of the worst is how it can affect the integrity of the jaws. Severe periodontal disease can cause so much bony destruction that pathologic fractures of the mandible can occur (Fig. 1). Small breed dogs are more commonly affected. Once the bone has been compromised to the point of fracture, healing can be complicated. First and foremost, all diseased teeth must be extracted before repair of the fracture is attempted. Any diseased teeth near the fracture line will likely cause further bone loss and prevent bony union. Sometimes if the fracture has occurred in a rostral location and the bone quality is poor, a salvage rostral mandibulectomy can be performed (Fig. 2). One of the most common locations for a fracture to occur is at the mandibular M1, which is too far caudal for a mandibulectomy procedure (Fig. 3). The next question is, how do you repair these fractures? Non-invasive techniques are the best option for maxillofacial fractures, but without teeth interdental wiring is not an option for stabilization. In edentulous cases, we use an acrylic splint with circumferential cerclage wires around the mandible to stabilize the fracture (Fig. 4) The splint is placed within the mouth and allows the animal to begin eating immediately following surgery. This appliance is left in place anywhere from 4-8 weeks. Once radiographic signs of healing have occurred, the appliance can be removed. Action is required when the mandibular first molar teeth are bad. Let us know if we can help extract these teeth while keeping the mandible intact.



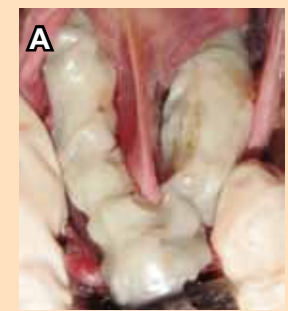
**Fig. 2** Rostral mandibular fracture that is highly comminuted (A) and best treated by rostral mandibulectomy. An intraoperative view shows the caudal mandible segments [arrows] (B). The result (C) is a comfortable and functional jaw similar to the not uncommon genetic problem known as parrot mouth.



**Fig. 1** The right aspect of a bilateral mandibular fracture shows the horrible periodontal disease (A) that led to severe bone loss (B) and the pathologic fracture.

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**Fig. 3** Fracture of the left mandible at the mesial root of the first mandibular molar secondary to severe periodontal disease.



**Fig. 4** Intraoperative view (A) of a bilateral acrylic splint to stabilize right and left mandibular fractures. A postoperative radiograph shows good reduction and splint placement for mandibular fracture repair (B).