



LEADERS IN SPECIALTY CARE

Arizona Veterinary Specialists' News

Things That Go Snap in the Night: Jaw Fractures

By Michael Balke, DVM, FAVD

Arizona Veterinary Dental Specialists



Dr. Michael Balke received his B.S. in biology in 1999 and his Doctor of Veterinary Medicine in 2003 from the University of Missouri. After graduation he worked as a general practice, small animal veterinarian in St. Louis, Missouri with an interest in dentistry. Dr. Balke joined Arizona Veterinary Dental Specialists in August 2012 and completed his veterinary dental residency and fellowship in August 2015 under the guidance of Drs. Chris Visser, Curt Coffman. Dr. Balke became a Fellow of the Academy of Veterinary Dentistry (FAVD) in 2016.

Dr. Balke's interests are oral and maxillofacial surgery, endodontic and periodontal therapy. Dr. Balke lectures on veterinary dental topics locally and at national meetings. Dr. Balke is a member of the American Veterinary Dental Society (AVDS), American Veterinary Medical Association (AVMA) and the Arizona Veterinary Medical Association (AZVMA).

Dr. Balke is a managing partner of Arizona Veterinary Dental Specialists, along with Dr. Coffman.

Jaw fractures are a common occurrence in veterinary medicine accounting for 1.5% to 3% of all fractures in the dog and 15% to 23% of fractures in the cat. Fractures of the mandible and maxilla often involve a multitude of vessels, nerves and teeth making them a challenge to diagnose and treat. In this newsletter we will review the basics of jaw fracture diagnosis and treatment in the dog and cat.

Jaw fractures most commonly occur in young, small breed animals. Trauma resulting from animal altercations, vehicle accidents and falling from elevated surfaces are the most common etiologies. Pathological fractures related to severe periodontal disease and neoplasia occur much less often. Iatrogenic fractures are rarely seen but typically occur in attempts to extract mandibular canine and first molar teeth.

Clinical signs of animals with oral fractures often include malocclusion, open mouth

appearance, oral bleeding, and inability to chew or orally apprehend objects or food. Fracture location tends to vary according to the cause of the fracture and the size and type of animal involved. Most fractures in small dogs occur in the area of the mandibular first molars. The roots of the mandibular first molars are larger in length relative to the height of the mandible and their roots extend further ventral to the mandibular canal when compared to large breed dogs. This large root to mandibular height ratio leads to increased stress on smaller mandibles compared to larger dogs, thus increasing the risk of fracture with traumatic forces. Severe periodontal disease can further weaken the mandible in the first molar region, and the simple act of chewing kibble can fracture the mandible. Oral fractures in larger dogs are more likely to occur in the mandibular ramus, incisive and canine areas. The most common site of fractures in cats is mandibular symphyseal injury. In both species mandibular fractures

...continued on page 2

...continued from page 1

occur more commonly than maxillary fractures. The maxilla has been shown to be more resistant to fractures because of its anatomic buttresses that distribute forces.

Trauma is the most common cause of jaw fractures and often there are other concurrent injuries. It is important to stabilize the patient and address any life threatening conditions before proceeding with oral trauma treatment. In cases of severe head trauma we prefer the patient be stabilized for 24-48 hours prior to anesthesia and fracture stabilization to address any significant neurological pathology and to allow oral-facial swelling to decrease. Often jaw fractures themselves are not immediately life threatening and more serious, injuries should be addressed first. It is important to start pain control and antibiotics as soon as possible in any jaw fracture because the delicate gingival tissue will often tear creating an open fracture within the oral cavity.

Accurate diagnostic imaging can be difficult with jaw fractures due to the anatomic complexity of the skull and oral cavity. Often an exam under general anesthesia with appropriate imaging is needed to determine the nature and extent of the fracture(s). Most veterinary clinics are able to perform skull radiographs, which can be used to identify some maxillary and mandibular fractures. A major challenge with skull radiographs is superimposition of soft tissue and contralateral bony structures that make identifying fractures difficult. Intraoral radiographs are an excellent diagnostic tool but are limited to the areas of the dental arches. Fractures associated with the ramus or condylar process of the mandible and maxillary fractures may be observed with standard radiographs but are best visualized using computed tomography.

The primary goal of jaw fracture repair is a rapid return to a functional, pain-free occlusion. Ideally the patient will have a normal occlusion once the fracture has healed. There are multiple

techniques that can be used to stabilize oral fractures depending on the type of fracture and patient. The three broad categories of jaw fracture management include noninvasive to minimally invasive management, open/surgical fracture management, and salvage procedures. Developing an appropriate treatment plan involves selecting the least invasive technique that will achieve a successful outcome. The more invasive the procedure is the more likely complications can arise. If there are stable teeth around the fracture line we prefer to use intraoral composite splints to stabilize fractures and avoid iatrogenic damage to the oral tissues (Figures 1-4). Composite splints work well to stabilize symphyseal separations and are much less invasive than cerclage wire around the rostral mandibles (Figures 5 and 6). We will use intraosseous wires in larger patients if we are unable to get adequate fracture apposition and stability with intra-oral composite splints. In rare cases of severely oblique fractures of the caudal mandible we have used bone plates for fracture stabilization. If jaw fractures are left untreated or not repaired correctly the most common complications are malocclusion and non-union. These complications can affect the animal's quality of life by creating pain during mastication and constant discomfort (Figure 7).

Unfortunately jaw fractures are a common occurrence in veterinary medicine but fortunately they are not commonly life-threatening. Once any accompanying injuries have been treated and the patient is stable, fractures should be repaired in the least invasive manner to provide stabilization, rapid return to function and proper occlusion. Proper diagnostics are important to correctly understand the extent of the fracture and to form an appropriate treatment plan. In most cases, referral to a veterinary dentist is recommended to provide optimal treatment.

...continued from page 2

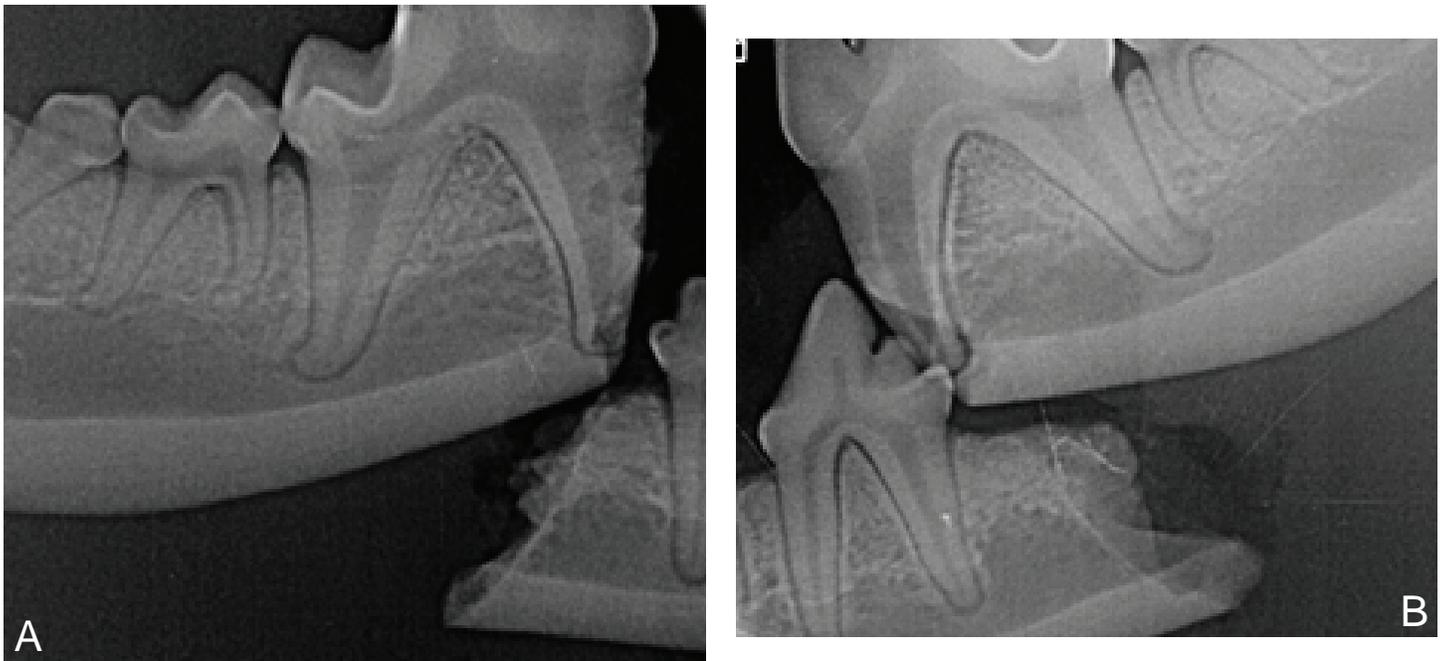


Figure 1. Intraoral radiographs of bilateral mandibular fractures between the right (A) and left (B) fourth premolars and first molars in a young mixed breed dog.



Figure 2. Photograph of bilateral mandibular fractures in a young mixed breed dog.

...continued on page 4

...continued from page 3

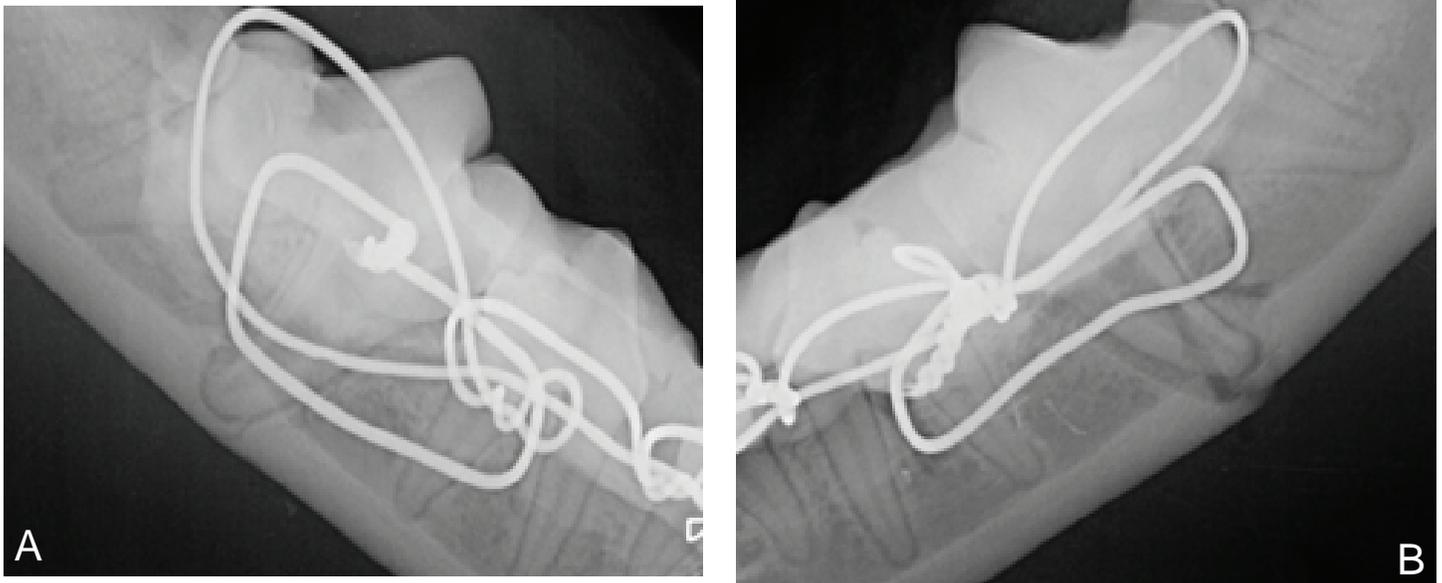


Figure 3. Intraoral radiographs of right (A) and left (B) mandibular fractures following intraoral splint application in a young mixed breed dog.



Figure 4. Photograph after intraoral splint application in a young mixed breed dog.

...continued from page 4



Figure 5. Photograph of a mandibular symphyseal injury in a cat.



Figure 6. Photograph of the cat in figure 5 following intraoral splint application to treat a symphyseal injury.



Figure 7. Photographs of a malocclusion in a cat following three unsuccessful mandibular fracture repair procedures. The cat eventually presented to us because of oral pain caused by the left mandibular canine contacting the palate (A). Crown reduction and vital pulp therapy was performed on the right maxillary and left mandibular canine teeth to relieve the traumatic malocclusion (B).

Soukup JW, Snyder CJ. Traumatic dentoalveolar and maxillofacial injuries in cats: overview of diagnosis and management. *J Feline Med and Surg* 2014; 16:915-927.

Verstraete FJM, Lommer MJ. *Textbook of oral and maxillofacial surgery in dogs and cats*, 2012.

Mulherin BL, Snyder CJ, Soukup JW, et al. Retrospective evaluation of canine and feline maxillomandibular trauma cases; a comparison of signalment with non-maxillomandibular traumatic injuries (2003-2012). *Vet Comp Orthop Traumatol* 2014; 27(3):192-197.

Kitshoff AM, Rooster HD, Ferreira SM, et al. A retrospective study 109 dogs with mandibular fractures. *Vet Comp Orthop Traumatol* 2013; 26(1):1-5.



LEADERS IN SPECIALTY CARE

February 2017

Arizona Veterinary Specialists, LLC
86 West Juniper Avenue
Gilbert, Arizona 85233

Phone: 480.635.1110
Fax: 480.892.0540

Our mission is to enhance the quality of our patients' lives, to strengthen the human-animal bond, and to provide a safe and stimulating work environment for all of our team members.

AVS CORE VALUES

INNOVATION

We will strive to discover and share knowledge that will continuously improve the veterinary profession.

EXCELLENCE

At Arizona Veterinary Specialists, our standard is excellence in all that we do and the way in which we do it.

COMPASSION

The spirit of all our relationships will be driven by compassion.

PATIENT CARE

We are committed to providing compassionate, ethical, and quality care to our patients. We treat them as if they are members of our own families.

INTEGRITY

We will conduct ourselves in a manner that will instill confidence and trust in all of our interactions.



Services Offered at Arizona Veterinary Specialists, LLC

Arizona Veterinary Dental Specialists, PLLC

Dentistry

- ◆ Periodontics
- ◆ Dental digital radiography
- ◆ Root canals
- ◆ Nasal disease treatment
- ◆ Oral disease treatment
- ◆ Oral surgery
- ◆ Orthodontics
- ◆ Restoration
- ◆ Professional teeth cleaning
- ◆ Maxillofacial surgery
- ◆ Oral fractures
- ◆ Fractured teeth treatment
- ◆ Malocclusion treatment
- ◆ Crown therapy
- ◆ In house lectures
- ◆ Telephone radiographic consultation
- ◆ Bite evaluation

Arizona Veterinary Oncology, PLLC

Radiation Oncology

- ◆ Conventional Radiation Therapy
- ◆ Stereotactic Radiosurgery
- ◆ I-131 radioactive iodine treatment

Medical Oncology

- ◆ Chemotherapy
- ◆ Immunotherapy
- ◆ Cryotherapy
- ◆ Oncologic surgery
- ◆ Clinical trials

Desert Veterinary Medical Specialists

Internal Medicine

- ◆ Endoscopy
 - Bronchoscopy
 - Bronchoalveolar lavage
 - Colonoscopy
 - Cystoscopy
 - Foreign body retrieval
 - Gastroduodenoscopy
 - PEG tube placement
 - Rhinoscopy
- ◆ Endocrine disorders
- ◆ Emergency consultations
- ◆ Blood and plasma transfusions
- ◆ Gastrointestinal diseases
- ◆ Genitourinary disorders
- ◆ Hepatic diseases
- ◆ Infectious diseases
- ◆ Intensive care treatment
- ◆ Immune-mediated diseases
- ◆ Nutrition consultations
- ◆ Oxygen therapy
- ◆ Pancreatic diseases
- ◆ Pulmonary diseases
- ◆ Renal disease
- ◆ Respiratory diseases
- ◆ Second opinion examinations
- ◆ Ultrasonography
- ◆ Tracheal and urethral stenting

Cardiology

- ◆ Echocardiography
- ◆ Electrocardiogram (ECG)
- ◆ Chest radiographs
- ◆ Blood pressure
- ◆ Pericardiocentesis
- ◆ Cardiology breed certification
- ◆ Holter monitoring
- ◆ Event monitoring
- ◆ Non-surgical PDA repair
- ◆ Balloon valvuloplasty
- ◆ Pacemaker implantation
- ◆ Invasive blood pressure measurements
- ◆ Angiography

- ◆ Implantable ECG Loop Recording

Radiology

- ◆ Outpatient and inpatient ultrasound
- ◆ Radiology Rounds
- ◆ Digital radiography
- ◆ Helical CT scanning
- ◆ Fluoroscopic urinary, GI, and tracheal studies
- ◆ Nuclear imaging
 - GFR scans
 - Bone scans
 - Thyroid scans
 - Splenic scintigraphy
- ◆ Radiographic interpretation
- ◆ CT and MRI interpretation

Dermatology for Animals, PC

Dermatology

- ◆ Allergy testing (skin testing) and immunotherapy
- ◆ CO₂ laser for ablation of skin tumors
- ◆ Testing for food allergies and hypoallergenic diets
- ◆ Ear disease diagnosis and treatment
- ◆ Bacterial and fungal skin disease diagnosis and treatment
- ◆ Cytological smears and microbiologic examinations
- ◆ Ectoparasite identification and treatment
- ◆ Immune-mediated and hormonal skin disease diagnosis and treatment
- ◆ Treatments of nail and nail bed disorders
- ◆ Skin biopsy sampling and histopathology interpretation

...continued on page 8

...continued from page 7

Southwest Veterinary Surgical Service, PC Surgery

- ◆ Abdominal surgery
- ◆ Airway surgery
- ◆ Angular limb deformity surgery
- ◆ Arthroscopy
- ◆ CT Scans
- ◆ External skeletal fixation
- ◆ Fracture repair
- ◆ Laparoscopy and Thoracoscopy
- ◆ Neurologic surgery
- ◆ Oncologic surgery
- ◆ Oral surgery, such as maxillofacial surgery and oral fractures
- ◆ Orthopedic surgery
- ◆ Otolgic surgery
- ◆ Perineal surgery
- ◆ Reconstructive surgery
- ◆ Ring fixators
- ◆ Soft Tissue surgery
- ◆ Thoracic surgery
- ◆ Tibial Plateau Leveling Osteotomy (TPLO)
- ◆ Triple Pelvic Osteotomy (TPO)
- ◆ Total Hip Replacement (THR) both cemented and cementless procedures available
- ◆ Tracheal Stenting
- ◆ Tibial Tuberosity Advancement (TTA)

Anesthesia and Pain Management

- ◆ Anesthetic management of high risk and critical care patients
- ◆ Extensive anesthesia monitoring
 - Blood pressure, both direct and indirect
 - Pulse oximetry
 - Electrocardiogram
 - Capnography
 - Body temperature
 - Ventilator therapy
- ◆ Pain patches
- ◆ Chronic pain management consultations

BluePearl Veterinary Partners, PLC Emergency and Critical Care

- ◆ In house diagnostic tests
 - STAT laboratory blood tests
 - * Complete Blood Count (CBC)
 - * Serum biochemical analysis
 - * Blood gas analysis
 - * Urinalysis
 - * Blood lactate measurement
 - * Coagulation testing
 - * Ethylene glycol (Antifreeze) testing
 - * Parvovirus testing
 - Digital x-rays
 - * Radiologist interpretation
 - Scanning ultrasound
 - Gastrointestinal endoscopy
- ◆ Specialized Therapies
 - Intravascular volume expansion/shock therapy
 - Blood component therapy
 - Rattlesnake antivenom therapy
 - Oxygen
 - Short and long term ventilator therapy
 - Anesthetic ventilator
 - Pain medication delivery via constant rate infusion
 - Nutritional support
 - Feeding tube placement
 - Peritoneal dialysis
 - Continuous suction for chest and other drains
 - Central and peripheral IV catheter placement
 - CPR with advanced life support
 - Electrical defibrillation & emergency cardioversion
 - Anesthesia for high-risk critical patients

- ◆ Soft tissue emergency surgical procedures performed by our emergency veterinarians (included, but not limited to):
 - Wound repair
 - Emergency tracheostomy
 - Chest tube placement
 - Abdominal surgeries
 - Gastric Dilatation Volvulus (GDV) or bloat surgery
 - GI foreign body removal
 - C-section
 - Splenectomy
 - Bladder stone removal
- ◆ Intensive monitoring
 - Electrocardiogram (EKG)
 - Blood pressure (direct arterial and indirect)
 - Urinary catheter placement and measurement of urine output
 - Pulse oximetry (Oxygen saturation)
 - Capnography (End Tidal CO₂)
 - Central venous pressure
 - Arterial and venous blood gas measurement

Eye Care for Animals, dba Ophthalmology

- ◆ Biomicroscopy
- ◆ Indirect ophthalmoscopy
- ◆ Electroretinography
- ◆ Ultrasonography
- ◆ Applanation tonometry
- ◆ Fluorescein angiography
- ◆ Glaucoma treatment
- ◆ Cataract surgery
- ◆ Corneal reconstructive surgery
- ◆ Treatment of eyelid abnormalities

AVS Specialty Practices

Southwest Veterinary Surgical Service, PC

- ◆ Bradford C. Dixon, DVM, MS
Diplomate, American College of Veterinary Surgeons
- ◆ Jeffrey A. Steurer, DVM, MS
Diplomate, American College of Veterinary Surgeons
- ◆ Kathleen M. Rowe-Guthrie DVM, MS
Diplomate, American College of Veterinary Surgeons
- ◆ Rachel Seibert, DVM, CCRP
Diplomate, American College of Veterinary Surgeons
- ◆ Megan Schaible, DVM
(Practice Limited to Surgery)

Arizona Veterinary Dental Specialists, PLLC

- ◆ Chris Visser, DVM
*Diplomate, American Veterinary Dental College
Diplomate, European Veterinary Dental College*
- ◆ Curt Coffman, DVM
Diplomate, American Veterinary Dental College
- ◆ Michael Balke, DVM
(Practice Limited to Dentistry and Oral Surgery)

Arizona Veterinary Oncology, PLLC

- ◆ Eric Boshoven, DVM
Diplomate, American College of Veterinary Radiology (Radiation Oncology)
- ◆ Lynda Beaver, DVM
Diplomate, American College of Internal Medicine (Medical Oncology)
- ◆ Rachel Venable, DVM, MS
Diplomate, American College of Internal Medicine (Medical Oncology)

BluePearl Veterinary Partners, PLC

- ◆ Brandi Mattison, DVM
Diplomate, American College of Veterinary Emergency and Critical Care
- ◆ Raegan Wells, DVM, MS
Diplomate, American College of Veterinary Emergency and Critical Care
- ◆ Katherine Smith, DVM
Diplomate, American College of Veterinary Emergency and Critical Care

Dermatology for Animals, PC

- ◆ Thomas P. Lewis II, DVM
Diplomate, American College of Veterinary Dermatology
- ◆ Anthea E. Schick, DVM
Diplomate, American College of Veterinary Dermatology
- ◆ Rebecca Mount, DVM
Diplomate, American College of Veterinary Dermatology
- ◆ Carine Laporte, VMD
(Practice Limited to Dermatology)
- ◆ Samantha Lockwood, DVM
(Practice Limited to Dermatology)
- ◆ Stephanie Schwartz, DVM
(Practice Limited to Dermatology)

Eye Care for Animals, dba

- ◆ Lisa M. Felchle, DVM
Diplomate, American College of Veterinary Ophthalmology
- ◆ Paul M. Barrett, DVM
Diplomate, American College of Veterinary Ophthalmology

Desert Veterinary Medical Specialists

- ◆ Victoria Heffelman, DVM
Diplomate, American College of Veterinary Radiology
- ◆ Whit M. Church, DVM
Diplomate, American College of Veterinary Internal Medicine (Cardiology)
- ◆ Melissa Riensche, DVM
Diplomate, American College of Veterinary Internal Medicine

