



## Mandibular Fractures

Associated Terms:

Jaw Fractures, Symphyseal Separation, Broken Jaw



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Your ACVS board-certified veterinary surgeon completed a three-year residency program, met specific training and caseload requirements, performed research and had research published. This process was supervised by ACVS Diplomates, ensuring consistency in training and adherence to high standards. After completing the residency program, the individual passed a rigorous examination. Only then did your veterinary surgeon earn the title of ACVS Diplomate.

### Overview:

In healthy cats and dogs, a large force (trauma) is required to fracture the mandible (lower jaw). A fracture is a break in the bone and can range in severity from a greenstick (incomplete crack) fracture to severe comminution (many pieces). Vehicular trauma is the most common cause of mandibular fractures. Due to the intensity of trauma associated with mandibular (lower jaw), maxillary (upper jaw), or skull fractures, the injuries may not be limited to the facial region and pets often require treatment for other injuries before the fracture is definitively addressed. **Your primary care veterinarian may recommend radiographs of other parts of the body before focusing on the mandible.** Thoracic (chest) injuries often occur concomitantly and may manifest as pulmonary contusions (bruising of the lungs), pneumothorax (punctured lung), [diaphragmatic hernia](#), and traumatic myocarditis (bruising of the heart causing arrhythmias). It is very important to assess the whole body first as these other injuries could be life threatening.

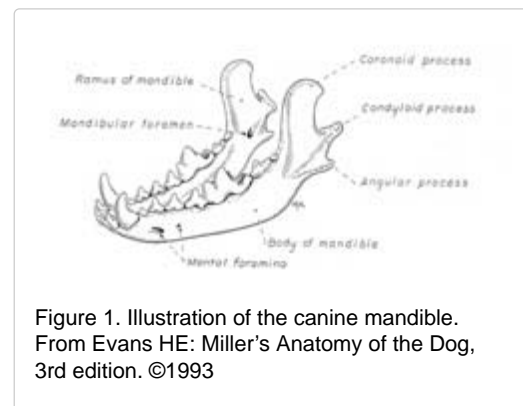


Figure 1. Illustration of the canine mandible. From Evans HE: Miller's Anatomy of the Dog, 3rd edition. ©1993

Occasionally, there is no history of trauma. In these cases a pathologic fracture (fracture caused by disease) must be considered. Disease such as severe tooth/jaw bone decay, and cancer, can weaken the bone and predispose it to fracture. Pathologic fractures tend to affect older animals more commonly than younger animals.

The mandible and maxilla have unique features compared to the rest of the skeleton that complicate fracture management. The mandible is comprised of two bones joined on midline by a symphysis (non-moveable joint) (Figure 1). The tooth roots, nerves, blood vessels, and salivary ducts are located within and adjacent to the mandible. These structures are frequently traumatized along with a mandibular fracture.

### Signs and Symptoms:

Symptoms of mandibular fractures include:

- reluctance to eat
- bleeding from the mouth
- malalignment of the jaw
- wounds around the mouth, pain and swelling in the region, a persistently open mouth,
- excessive salivation that may be blood-tinged (Figure 2)



Figure 2. Dog that presented for treatment of a mandibular fracture after interacting with a bull. The fracture occurred just caudal to the canine teeth. Note the blood in the mouth, open mouth posture, and exposed roots of the canine teeth.

### Diagnostics:

Your veterinarian can usually make a diagnosis of a mandibular fracture on initial physical examination. Because of the discomfort associated with this injury your veterinarian may recommend sedation or anesthesia for your pet prior to palpating the injured area and performing further testing. Due to the minimal amount of soft tissue that covers the mandible, it is common for these fractures to be open. An open fracture is a fracture that has resulted in loss of integrity of the protective layer of soft tissue around the bone, exposing the disrupted bone edges to the external environment (Figure 2). **Risks of infection and complications are**



Figure 3. Pre-operative radiographs of a dog with concurrent symphyseal separation (A) and mandibular body fracture (B).

**greater with open fractures.** For this reason, antibiotics may be prescribed.

After your veterinarian determines that your **pet is stable enough to focus on tests for and treatment** of the mandibular injury, **X-rays of the mandible will be recommended** to confirm the presence of a fracture and to guide treatment recommendations (Figure 3). Due to the complex anatomy of the mandible, teeth, and skull, radiographs are usually performed under heavy sedation or general anesthesia. This will decrease stress on your pet and allow for optimal positioning to interpret the complicated images. In some cases, a CT (computed tomography or “CAT”) scan may be recommended to gain more information regarding the complex anatomy to allow for an optimal surgical plan.

### Treatment:

After imaging has been performed, and while your pet is still under the sedation or general anesthesia, the mandibular fracture may be reduced and some form of external immobilization may be placed. Reduction entails manipulating the bone fragments into alignment to minimize discomfort. External immobilization is usually some form of a muzzle, either custom made from medical tape or a commercial muzzle. In some cases, external immobilization is all that is required for treatment.

Due to the complex anatomy of the injured tissues and the equipment that is often utilized for mandibular fracture treatment, referral to an ACVS board-certified veterinary surgeon for evaluation and treatment is generally recommended. **Surgical treatment of mandibular fractures is recommended when the fracture is unstable, multiple fractures/ pieces are present, and/or both sides of the mandible are affected.** Surgery is performed to restore proper occlusion (normal scissor-like interaction of the teeth), improve comfort and cosmetic appearance, and provide early return to function.

Multiple methods of treating mandibular fractures are available and your surgeon will determine which method is most appropriate for your pet. Internal reduction and stabilization with bone plates and screws is a widely utilized surgical treatment (Figure 4). This entails making an incision in the region of the fracture, reducing (re-aligning) the fracture segments and then stabilizing the fragments with a surgical bone plate and screws. Advantages include early return to function and the minimal postoperative care required compared to other techniques.

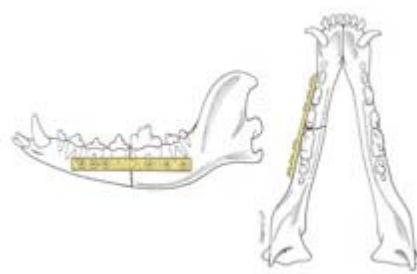


Figure 4. Internal reduction and stabilization with a bone plate and screws. From Fossum TW, et al: Small Animal Surgery, 3rd edition. ©2007

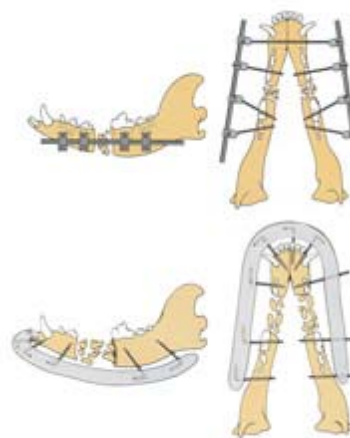


Figure 5. Use of an ESF for multiple piece mandibular fractures. The top illustrations utilized linear ESF while the bottom illustrations show the use of pins with acrylic connecting material. From Fossum TW, et al: Small Animal Surgery, 3rd edition. ©2007

Another common surgical treatment involves the use of external skeletal fixation (ESF) (Figure 5). ESF involves placing pins through the skin into the bone fragments and then connecting these pins to a connecting rod that provides stability so that proper healing can occur. The majority of the ESF construct is on the outside of the animal and some postoperative care is required. Advantages of ESF are that the construct may be placed in a less invasive fashion and once the fracture is healed, the implants are completely removed. Other accepted surgical treatments include use of intraoral splints, interosseous or interfragmentary wiring, interdental wiring, or interarcade wiring (Figure 6a, 6b, 6c). In some cases, placement of a feeding tube may be recommended for nutritional support while the fracture is healing.



Figure 6a  
Interosseous/interfragmentary wiring utilized for treatment of less complicated mandibular fractures. From Fossum TW, et al: *Small Animal Surgery*, 3rd edition. ©2007

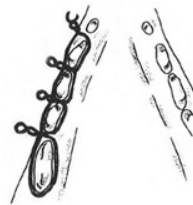


Figure 6b Interdental wiring can be utilized for less complicated fractures in which the teeth have not been traumatized. From Holmstrom SE, et al: *Veterinary Dental Techniques for the Small Animal Practitioner*, 2nd ed. ©1998

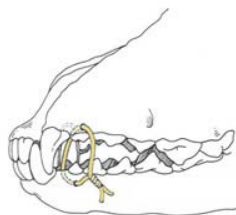


Figure 6c. Interarcade wiring utilizes wire loops on each side of the jaw, passing through both the maxilla and mandible to limit motion yet allow for eating of gruel and drinking liquids. From Slatter

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Animal Surgery, 2nd ed.  
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### Aftercare and Outcome:

Due to the complicated anatomy of the mandible, the open nature of most mandibular fractures, and the mobility and forces exerted on the region, tooth malocclusion, infection, delayed/incomplete bone healing, and failure of bone healing are potential complications. **Malocclusion of teeth is the most commonly reported complication** and can lead to jaw joint dysfunction, excessive wear of teeth, injury to the surrounding oral tissues, periodontal disease, pain, and difficulty eating. Once malocclusion occurs, it is challenging to treat.

Pain medications are routinely prescribed following treatment of a mandibular fracture. Many veterinary surgeons will also recommend a non-steroidal anti-inflammatory (NSAID) that has been formulated specifically for dogs or cats. In most cases antibiotics will be prescribed due to the high incidence of open mandibular fractures.

Pets should be discouraged from playing with toys or other animals, chewing on bones, or engaging in any activity that may place stress on the fracture site and compromise healing of the fracture. If external immobilization is utilized, it may be recommended to inspect the site of the muzzle for irritation or accumulation of food debris, as dermatitis is common. In pets treated by immobilization or with fixation that limits opening or closing of the mouth, care must be taken to avoid excessive activity and to restrict outdoor activity to the cooler parts of the day. Dogs regulate body temperature by panting, and if panting is impeded by the muzzle or a closed mouth surgery technique, body temperature can rise rapidly.

Many pets that sustain mandibular fractures will require some form of **diet change during their recovery**. If your pet eats a dry kibble diet, switching to a soft diet or soaking the dry diet in warm water to soften the kibble prior to serving may be recommended. This will minimize stress on the healing bones and minimize trauma to the healing soft tissues within the mouth. In cases that have had feeding tubes placed, instructions on how to care for the tube and how to feed through the tube will be provided.

Food debris may accumulate if intraoral splints, interdental wires, or interarcade wires are utilized. You may be instructed to gently flush the mouth on a regular basis to keep the site free of debris. If external skeletal fixators are used to stabilize the fracture, the apparatus may need to be cleaned regularly and in some cases the fixators are bandaged and may require regular bandage changes.

This Animal Health Topic was written by and reviewed by Diplomates of the American College of Veterinary Surgeons. Any opinions stated in this article are not necessarily the official position of the American College of Veterinary Surgeons.

The American College of Veterinary Surgeons recommends contacting an ACVS board-certified veterinary surgeon or your general veterinarian for more information about this topic.

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For questions about your animal's specific condition, please contact an [ACVS board-certified surgeon in your area](#).

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- No

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