

[Aust Vet J.](#) 2003 Nov;81(11):671-3.

## **Treatment of fractures of the mandible and maxilla by mini titanium plate fixation systems in dogs and cats.**

[Bilgili H, Kurum B.](#)

### **Source**

Department of Orthopaedics and Traumatology, Faculty of Veterinary Medicine, Ankara University, Diskapi, Ankara, Turkey. [bilgili@veterinary.ankara.edu.tr](mailto:bilgili@veterinary.ankara.edu.tr)

### **Abstract**

Mini titanium plates were used to repair certain fractures of the maxilla and mandible in dogs and cats, under general anaesthesia. The location of the fractures treated were: corpus mandible, one dog; corpus mandible and symphysis, two dogs; caudal mandible, two dogs; rostral mandible, one dog; maxilla, one dog; nasal bone, one dog; corpus mandible and symphysis, one cat; caudal mandible, one cat; and maxilla, one cat. The healing periods varied from 6 to 9 weeks. In seven cases, implants were removed after a period of 3.5 to 18 months. In four cases the implants were left in place. The follow up period was between 8 and 36 months. In ten cases the procedure was successful, however in one case the outcome was not satisfactory due to a broken plate. There were no instances of dental malocclusion, nonunion, malunion, osteomyelitis or soft tissue infection. Eating, playing with toys, a fast transition to solid food and a quick return to normal jaw movements were observed. In our hands, the mini titanium plate fixation system was a safe and effective method for repairing certain maxillary and mandibular fractures in dogs and cats.

[Vet Surg.](#) 1996 Jul-Aug;25(4):277-91.

## **Miniplate fixation for repair of mandibular and maxillary fractures in 15 dogs and 3 cats.**

[Boudrieau RJ, Kudisch M.](#)

### **Source**

Department of Surgery, Tufts University School of Veterinary Medicine, North Grafton, MA 01536, USA.

### **Abstract**

Maxillofacial miniplates and screws were used for skeletal fixation in 15 dogs and 3 cats that sustained a variety of mandibular and maxillary fractures. These implants were used as neutralization or buttress fixation in 11 caudal (junction of the ramus with the mandibular body) and 2 rostral mandibular fractures, 4 maxillary fractures, and 2 zygomatic arch fractures. All but one of the fractures healed with appropriate occlusion and excellent function. In one case of a rostral mandibular fracture, soft tissue dehiscence occurred accompanied by a loss of the fixation and subsequent distraction of the bone fragments; reasonable function was obtained by performing a rostral mandibulectomy. Plate contouring and application of the miniplates along the appropriate biomechanical lines of stress was easily performed and permitted the biomechanical principles of tension band fixation to be applied in most cases. Miniplate fixation, either used alone or in combination with other fracture fixation techniques, achieved sufficiently rigid skeletal fixation to provide uncomplicated healing and good to excellent functional and cosmetic results in 14 dogs and 3 cats.

## **Maxillomandibular external skeletal fixation in five cats with caudal jaw trauma.**

[Moores AP.](#)

### **Source**

Anderson Sturgess Veterinary Specialists, Bunstead Barns, Poles Lane, Hursley, Winchester, Hampshire.

### **Abstract**

Five cats with caudal jaw injuries including mandibular ramus fractures, temporomandibular luxation/subluxation and temporal bone fractures were managed with external skeletal fixation to provide open-mouth maxillomandibular fixation. Three of five cats were able to eat orally during the period of fixation, whereas two cats with jaws fixed in a suboptimal position were dependent on oesophagostomy tube nutrition. Fixation was well tolerated and was maintained for 21 to 42 days. All cats were eating normally and had good jaw function at follow-up (mean 39 months, range 7 to 71 months).

[Vet Comp Orthop Traumatol.](#) 2010;23(2):102-8. doi: 10.3415/VCOT-09-03-0034. Epub 2010 Feb 11.

## **Treatment of caudal mandibular fracture and temporomandibular joint fracture-luxation using a bi-gnathic encircling and retaining device.**

[Nicholson I](#), [Wyatt J](#), [Radke H](#), [Langley-Hobbs SJ](#).

### **Source**

Department of Veterinary Medicine, University of Cambridge Veterinary School, Madingley Road, Cambridge, CB3 0ES, United Kingdom. in229@cam.ac.uk

### **Abstract**

Fractures of the caudal portion of the mandible and temporomandibular joint (TMJ) fracture-luxation can be challenging to treat with direct fixation methods. This paper describes a simple technique for the indirect treatment of caudal mandibular fracture and TMJ fracture-luxation using a subcutaneous loop of nylon leader line tunnelled around the maxilla, incisive and nasal bones, and under the mandible, placed just caudal to the canine teeth, and crimped ventral to the mandibular skin: a bignathic encircling and retaining device (BEARD). A BEARD was used to treat two immature dogs with simple, unilateral caudal mandibular fractures, six cats with unilateral injury (two with TMJ luxation, three with TMJ fracture-luxation, one with caudal mandibular fracture), and two cats with bilateral injury (comminuted caudal mandibular fracture with contralateral TMJ luxation; bilateral condylar neck fracture). The BEARD treatment failed short-term due to poor tolerance in one cat, and concurrent injuries and poor initial reduction in another cat. One cat was lost to long-term follow-up. Rostral dental occlusion was normal in six out of seven cases, and reported jaw function was normal in seven out of seven cases. The case with poor occlusion had imperfect initial reduction. Complications included

dorsal nasal skin swelling or discharge, oesophagostomy tube dislodgement or blockage, BEARD loosening, and regurgitation. Treatment of uni- or bilateral caudal mandibular trauma using a BEARD can lead to clinical union, and normal rostral occlusion, provided that case selection is appropriate and immediate-post-surgical occlusion has been corrected.

[Vet Surg.](#) 2010 Aug;39(6):765-70. doi: 10.1111/j.1532-950X.2010.00714.x.

## **Maxillomandibular circular external skeletal fixation for repair of bilateral fractures of the caudal aspect of the mandible in a dog.**

[Marshall WG](#), [Farrell M](#), [Chase D](#), [Carmichael S](#).

### **Source**

Small Animal Hospital, Faculty of Veterinary Medicine, University of Glasgow, Glasgow, Scotland, UK.  
w.marshall@vet.gla.ac.uk

### **Abstract**

#### **OBJECTIVE:**

To describe the novel use of circular external skeletal fixation (CESF) for repair of bilateral fractures of the caudal aspect of the mandibles.

#### **STUDY DESIGN:**

Clinical report.

#### **ANIMALS:**

A 5-month-old female Newfoundland.

#### **METHODS:**

A 2-ring CESF was used to immobilize the mandible relative to the maxillae.

#### **RESULTS:**

Anatomic dental occlusion and reduction of the right hemimandible were achieved with mild malalignment of the left hemimandible. Fracture healing occurred within 20 days. Transient epistaxis and reduced temporomandibular joint range of motion occurred at the time of fixator removal but normal use of the mandible was reported 6 months postoperatively.

#### **CONCLUSIONS:**

CESF effectively immobilized the mandible permitting rapid fracture healing with minimal morbidity.

### **CLINICAL RELEVANCE:**

Maxillomandibular CESF may represent a simple, effective option for the management of challenging fractures involving the caudal aspect of the mandible.

[J Feline Med Surg](#). 2013 Feb;15(2):111-6. doi: 10.1177/1098612X12462704. Epub 2012 Sep 26.

## **Anatomy of the temporomandibular joint in the cat: a study by microdissection, cryosection and vascular injection.**

[Arredondo J](#), [Agut A](#), [Rodríguez MJ](#), [Sarriá R](#), [Latorre R](#).

### **Source**

Department of Anatomy and Physiology, Faculty of Veterinary Medicine and Zootechny, Autonomous University of the State of Mexico, Toluca, Mexico. jarredondor@uaemex.mx

### **Abstract**

The minute anatomy of the temporomandibular joint (TMJ) is of great clinical relevance in cats owing to a high number of lesions involving this articulation. However, the precise anatomy is poorly documented in textbooks and scientific articles. The aim of this study was to describe, in detail, the TMJ anatomy and its relationship with other adjacent anatomical structures in the cat. Different anatomical preparations, including vascular and articular injection, microdissection, cryosection and plastination, were performed in 12 cadaveric cats. All TMJ anatomical structures were identified and described in detail. A thorough understanding of the TMJ anatomy is essential to understand the clinical signs associated with TMJ disorders, to locate lesions precisely and to accurately interpret the results in all diagnostic imaging techniques.

[Vet Comp Orthop Traumatol](#). 2012;25(5):366-74. doi: 10.3415/VCOT-11-10-0146. Epub 2012 Jul 25.

## **Temporomandibular joint injuries and ankylosis in the cat.**

[Çetinkaya MA](#).

### **Source**

Ankara University, Department of Surgery, Diskapi, Ankara, Turkey. malperc@hacettepe.edu.tr

### **Abstract**

#### **OBJECTIVE:**

To evaluate cause, location, treatment, and the clinical outcome of traumatic temporomandibular joint (TMJ) lesions and TMJ ankylosis in cats.

## **METHODS:**

Cats with TMJ injuries were included in this study. Lesions were classified as luxations, fractures of the condylar process, and intra-articular temporal bone fractures. Signalment, cause and type of injuries, treatment methods, clinical outcome, complications and joint ankylosis were assessed and evaluated statistically.

## **RESULTS:**

Temporomandibular joint lesions were observed in 82 of 161 cats with maxillofacial injuries. One hundred forty-nine TMJ lesions were determined in 112 joints. Falling was the most common cause and fractures of the condylar process were the most common types of injuries. Isolated TMJ injuries and caudal TMJ luxations were mainly caused by falling. Condylectomy was used in ankylosis, chronic luxation, reluxation and in two cases with multiple TMJ lesions. Ankylosis was observed in 10.97% of cases and was generally observed in fracture combinations of condylar process and mandibular fossa ( $\chi^2 = 8.52$ ;  $p < 0.05$ ). No significant relationship between age and development of ankylosis ( $\chi^2 = 3.995$ ;  $p > 0.05$ ) was found.

## **CONCLUSION:**

In contrast to previous studies, traumatic TMJ lesions were observed in a considerable amount of cats with maxillofacial injuries, and fractures of the condylar process were the most common type. Lesions caused by falling were mostly simple, whereas vehicular trauma caused more complicated lesions. Ankylosis did not appear as a rare condition. Any cat with TMJ injury is susceptible to the development of ankylosis.

[J Small Anim Pract.](#) 1999 Jan;40(1):7-10.

## **Temporomandibular ankylosis in the cat: a review of seven cases.**

[Meomartino L](#), [Fatone G](#), [Brunetti A](#), [Lamagna F](#), [Potena A](#).

### **Source**

Dipartimento di Scienze Cliniche Veterinarie, Centro Interdipartimentale di Radiologia Veterinaria, Facoltà di Medicina Veterinaria di Napoli, Naples, Italy.

### **Abstract**

Ankylosis of the temporomandibular joint (TMJ) in the cat is an unusual complication of traumatic lesions involving articular (true ankylosis) or periarticular structures (false ankylosis). Seven cats with true ankylosis of the TMJ (four cases unilateral and three cases bilateral), of which previous trauma had been documented in five cases, were referred to the authors' clinic between September 1991 and October 1996. Radiographic assessment was performed in all cases, using dorsoventral and oblique projections. Five subjects underwent arthroplastic excision of the TMJ and, in the remaining two cases, stretching of the jaws was performed under general anaesthesia. The surgical outcome was satisfactory in all but one case, where partially decreased joint mobility was observed (follow-up time one to five years), but in the two cases where non-surgical treatment was carried out, recurrence of TMJ ankylosis was observed (follow-up time two to five months). In the authors' experience, surgery represents the treatment of choice for TMJ ankylosis in cats. Additional mandibular symphysiotomy can confirm the radiological findings in unilateral cases.

[J Vet Dent.](#) 2000 Dec;17(4):168-72.

## **Oral and maxillofacial reconstruction in a cat using wire and acrylic.**

[Barbudo GR](#), [Selmi AL](#), [Canola JC](#).

### **Source**

Universidade Estadual Paulista-Campus de Jaboticabal.

### **Abstract**

A 15-month-old DSH cat was presented with facial deformity secondary to multiple oral and maxillofacial fractures after being struck by an automobile. Multiple wires and dental acrylics were used for fracture repair.

[J Vet Dent](#). 2009 Summer;26(2):97-105.

## **Imaging and management of a caudal mandibular fracture in an immature dog.**

[Snyder CJ](#), [Soukup JW](#), [Gengler WR](#).

### **Source**

University of Wisconsin-Madison, School of Veterinary Medicine, Madison, WI 53706, USA.  
CSnyderDVM@gmail.com

### **Abstract**

Interfragmentary wire surgical technique was used to repair a caudal mandibular fracture in a 15-week-old Labrador Retriever dog. Computed tomographic imaging aided the diagnosis and treatment planning for the application of this method. Abnormal tooth development of caudal molar teeth was related to the traumatic event and/or surgical technique. The strategically important mandibular first molar tooth was maintained. The fracture fixation method used in this case provided early return to function and radiographic evidence of expected fracture healing during a 10-month period despite wire displacement secondary to tooth eruption.

[Vet Surg](#). 1996 Jul-Aug;25(4):277-91.

## **Miniplate fixation for repair of mandibular and maxillary fractures in 15 dogs and 3 cats.**

[Boudrieau RJ](#), [Kudisch M](#).

### **Source**

Department of Surgery, Tufts University School of Veterinary Medicine, North Grafton, MA 01536, USA.

## Abstract

Maxillofacial miniplates and screws were used for skeletal fixation in 15 dogs and 3 cats that sustained a variety of mandibular and maxillary fractures. These implants were used as neutralization or buttress fixation in 11 caudal (junction of the ramus with the mandibular body) and 2 rostral mandibular fractures, 4 maxillary fractures, and 2 zygomatic arch fractures. All but one of the fractures healed with appropriate occlusion and excellent function. In one case of a rostral mandibular fracture, soft tissue dehiscence occurred accompanied by a loss of the fixation and subsequent distraction of the bone fragments; reasonable function was obtained by performing a rostral mandibulectomy. Plate contouring and application of the miniplates along the appropriate biomechanical lines of stress was easily performed and permitted the biomechanical principles of tension band fixation to be applied in most cases. Miniplate fixation, either used alone or in combination with other fracture fixation techniques, achieved sufficiently rigid skeletal fixation to provide uncomplicated healing and good to excellent functional and cosmetic results in 14 dogs and 3 cats.

[Vet Comp Orthop Traumatol](#). 2013;26(1):1-5. doi: 10.3415/VCOT-12-01-0003. Epub 2012 Oct 29.

## A retrospective study of 109 dogs with mandibular fractures.

[Kitshoff AM](#), [de Rooster H](#), [Ferreira SM](#), [Steenkamp G](#).

### Source

Section Small Animal Surgery, Department of Companion Animal Clinical Studies, University of Pretoria, Onderstepoort, South Africa. [adriaan.kitshoff@ugent.be](mailto:adriaan.kitshoff@ugent.be)

### Abstract

#### OBJECTIVE:

To determine patient factors and fracture morphology of dogs presented with mandibular fractures to a small animal referral centre in South Africa.

#### METHODS:

Patient data on age, sex, breed and aetiology of dogs with mandibular fractures were recorded. The fractures were classified according to the anatomical location, displacement, fracture type, fracture line direction, periodontal pathology, and whether there were teeth in the fracture line or not by evaluation of preoperative radiographs. Clinical observations indicated whether these fractures were open or closed.

#### RESULTS:

In total, 109 dogs with 135 mandibular fractures were included in the study. Small breed dogs and dogs less than eight months of age predominated (102/109). Dog fights were the most common aetiology in this study (68/109). The molar region was the most commonly affected region (56/135). Evaluation of the radiographs revealed that transverse (73/135), relatively unstable (116/135), and displaced (112/135) fractures were the

most common. The majority of fractures involved teeth in the fracture line (100/135), with the first molar frequently involved (54/135). The majority of fractures were open (104/135).

#### **CLINICAL SIGNIFICANCE:**

The results obtained from this study may be used to guide patient and fracture morphology selection in biomechanical studies of mandibular fracture repair techniques. Screening of this patient population may inspire the search for new treatment options for mandibular fracture repair in South Africa.

[Vet Surg.](#) 1994 May-Jun;23(3):190-4.

## **Dental composite for the fixation of mandibular fractures and luxations in 11 cats and 6 dogs.**

[Bennett JW](#), [Kapatkin AS](#), [Marretta SM](#).

#### **Source**

Department of Surgery, Animal Medical Center, New York, NY 10021.

#### **Abstract**

Twenty-one mandibular fractures in 11 cats and 6 dogs were repaired during a 20-month period. A new technique using dental composite was used to stabilize the mandible. The canine teeth were pumiced, acid etched, and aligned with dental composite, leaving the mouth opened approximately 1 cm. Six weeks after surgery the composite was removed so that radiographs of the mandible could be made with the animal under general anesthesia. In 1 dog in which the fracture had not healed, the composite was replaced. The composite broke before 6 weeks in 8 animals; 2 required replacement of the dental composite. There were no other complications. The median time for fracture healing was 6 weeks. All fractures healed with anatomic dental occlusion. The advantages of this technique are that no further damage is caused to the teeth or to the blood supply of the bone, the occlusion is anatomic, dermatitis (which is seen with tape muzzles) is not a complication, and the technique is easy to use in brachycephalic breeds, cats, and animals with poor bone quality. The limiting factor of this technique is that it does require four salvageable canine teeth. This repair technique is still a viable option even if one or more of the canine teeth are fractured. Dental composite stabilization is fast, easy, inexpensive, and, in our series, it was 100% effective for the repair of mandibular fractures.

[J Vet Dent.](#) 2005 Sep;22(3):170-5.

## **Acrylic splint and circumferential mandibular wire for mandibular fracture repair in a dog.**

[Hall BP](#), [Wiggs RB](#).

[Vet Med Small Anim Clin.](#) 1981 Apr;76(4):517-9.

## **Tape muzzle for mandibular fractures.**

[Howard PE.](#)

[Vet Surg.](#) 2011 Jun;40(4):457-63. doi: 10.1111/j.1532-950X.2011.00809.x. Epub 2011 Mar 11.

## **Lingual arch bar application for treatment of rostral mandibular body fractures in cats.**

[Cetinkaya MA](#), [Yardimci C](#), [Kaya U](#).

### **Source**

Medical and Surgical Research Laboratory, Faculty of Medicine, Hacettepe University, Ankara, Turkey.  
malperc@hacettepe.edu.tr

### **Abstract**

#### **OBJECTIVE:**

To describe a lingual arch bar technique for fixation of rostral mandibular body fractures and report outcome in 16 cats.

#### **STUDY DESIGN:**

Original study.

#### **ANIMALS:**

Cats (n=16) with rostral mandibular body fracture (10 bilateral, 6 unilateral) just caudal to the canine teeth.

#### **METHODS:**

Orthodontic wire (Dentaurum® ; 0.9 mm) was used as a lingual arch bar by contouring it to the shape of the lingual side of the alveolar margin, and secured by circum-mandibular wires passed interproximal to teeth. Stability of fixation, occlusion, tolerance to the lingual arch bar, degree of secondary gingivitis/periodontitis, and ability to eat were evaluated clinically, and fracture union was assessed radiographically.

#### **RESULTS:**

The lingual arch bar was well tolerated. Eleven cats without a feeding tube were able to eat within 24 hours. Time to fracture union and appliance removal ranged from 28 to 64 days (mean, 42.5 days). Malocclusion of the rostral part of the fracture occurred in 5 cats; however only 1 required correction.

#### **CONCLUSIONS:**

Intraoral stabilization of rostral mandibular fractures using a lingual arch bar is a simple and effective method for the treatment of rostral mandibular fractures just caudal to the canine teeth.

## **Mandibular fracture in single-humped camels.**

[Ahmed AF.](#)

### **Source**

Department of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Veterinary Teaching Hospital, Qassim University, Buraydah, Qassim, Kingdom of Saudi Arabia.

### **Abstract**

#### **OBJECTIVE:**

To report the causes and classification of mandibular fractures in dromedary camels and outcome after treatment.

#### **ANIMALS:**

Single-humped camels (n = 116) with mandibular fracture.

#### **METHODS:**

At admission, cause, site, classification, and radiography of mandibular fractures were recorded. Factors affecting fracture healing were analyzed.

#### **RESULTS:**

Biting was the main cause of mandibular fractures in camels, which occurred more commonly in older males (P = .001) than in females. Open fractures were more common than closed ones (92.2% versus 7.8%, P = .0001) and single fractures were more frequent (82%) than multiple and comminuted fractures (18%; P = .001). Fractures were treated by interdental wiring (91.2%) or U-shaped aluminum bar (8.8%) and healing occurred in most (83.2%) fractures.

#### **CONCLUSIONS:**

In dromedary camels, mandibular fracture is most commonly caused by bites and can be successfully repaired by interdental wiring or a U-bar technique with good outcome.

Owen MR, Langley Hobbs SJ, Moores AP, Bennett D, Carmichael S. Mandibular fracture repair in dogs and cats using epoxy resin and acrylic external skeletal fixation. *Vet Comp Orthop Traumatol* 2004;4: 189–197.

Hoelzler MG, Holmberg DL. Partial mandibulectomy as the treatment of a comminuted mandibular fracture in a dog. *Can Vet J* 2001;42: 143–144.

[Vet Surg.](#) 1990 Jul-Aug;19(4):272-5.

## **Mandibular fractures in the dog. A retrospective study of 157 cases.**

[Umphlet RC, Johnson AL.](#)

### **Source**

Department of Veterinary Clinical Medicine, University of Illinois, Urbana.

### **Abstract**

One hundred fifty-seven mandibular fractures in 105 dogs occurred most frequently in male dogs less than 1 year of age. Automobile trauma was the most common cause. Fractures in the premolar region were significantly more frequent than fractures in other regions, and 113 fractures (72%) were open. One hundred forty-two fractures were stabilized, with tape muzzles being the most common method. Postoperative complications, the most common being dental malocclusion, occurred in 53 fractures (34%). Acceptable cosmetic and functional results were achieved in 89 dogs (85%). Fractures in the rostral portion of the mandible had shorter average time to clinical union than other mandibular fractures. Average time to clinical union for fractures in the caudal portions of the mandible was longer than that currently reported.

[Vet Surg.](#) 1988 Nov-Dec;17(6):333-7.

## **Mandibular fractures in the cat. A retrospective study.**

[Umphlet RC, Johnson AL.](#)

### **Source**

Department of Veterinary Clinical Medicine, College of Veterinary Medicine, University of Illinois, Urbana.

### **Abstract**

A retrospective study was made of 75 mandibular fractures in 62 cats. Mandibular fractures comprised 14.5% of all fractures seen in 517 cats. Automobile trauma was the cause of injury in more than 50% of the cases. The mean age of patients was 29.5 months. Symphyseal fractures were most common (73.3%), followed by fractures of the body (16%), condyle (6.7%), and coronoid process (4%). Sixty-seven percent of the fractures were stabilized. Cerclage and interfragmentary wiring were the most common forms of fixation. Antibiotics were administered to 73.6% of the patients. Complications were reported in 24.5% of the cats. Malocclusion and soft tissue infections were the most frequent complications. Complications developed more commonly in cats with multiple or open fractures. Clinical union occurred by an average of 6 weeks (range, 3-12 weeks) for symphyseal fractures, 10 weeks (range, 8-16 weeks) for body fractures, 6 weeks for coronoid fractures, and 6 weeks (range, 4-8 weeks) for condylar fractures.

[J Am Vet Med Assoc.](#) 1989 Jan 1;194(1):85-7.

## **Conservative management of fractures of the mandibular condyloid process in three cats and one dog.**

[Salisbury SK](#), [Cantwell HD](#).

### **Source**

Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Purdue University, West Lafayette, IN 47907.

### **Abstract**

Three cats and 1 dog with fracture of the mandibular condyloid process and concomitant fracture(s) of the rostral portion of the mandible were treated successfully by wire fixation of the rostral mandibular fracture(s) and by conservative management of the mandibular condylar fracture. All animals regained satisfactory dental occlusion and normal, pain-free motion of the jaw. Fracture of the mandibular condyloid process is an infrequently diagnosed injury that usually occurs with other mandibular fractures. If satisfactory dental occlusion can be achieved by surgical stabilization of the noncondylar fractures, surgical repair of the mandibular condyloid fracture may not be necessary.

[J Am Vet Med Assoc](#). 1987 Jul 15;191(2):243-5.

## **Partial mandibulectomy for treatment of mandibular fractures in dogs: eight cases (1981-1984).**

[Lantz GC](#), [Salisbury SK](#).

### **Abstract**

Partial mandibulectomy was performed in 8 dogs with open or infected mandibular fractures (3 second degree and 5 third degree) because of economic restriction, osteomyelitis, or severe bone and soft tissue injury. Six dogs ate voluntarily by the second day after surgery, and 2 dogs required pharyngostomy tube feeding for 2 to 6 days. Complications included oral wound dehiscence (3 dogs), shifting of the mandible toward the operated side (6 dogs), and drooping of the tongue (2 dogs). Slight malocclusion was of no consequence, and all dogs were eating normally at follow-up evaluations (10 days to 24 months; median, 13 months). Mandibular function was maintained in all dogs.

[Vet Radiol Ultrasound](#). 2002 Mar-Apr;43(2):85-97.

## **Imaging of the canine and feline temporomandibular joint: a review.**

[Schwarz T](#), [Weller R](#), [Dickie AM](#), [Konar M](#), [Sullivan M](#).

### **Source**

Department of Clinical Studies, School of Veterinary Medicine, University of Pennsylvania, Philadelphia 19104, USA.

## Abstract

The radiographic anatomy of the temporomandibular joint in the dog and cat is described in dorsoventral and oblique projections. The positioning for different oblique views in conventional radiography and technical details of computed tomography are reviewed. Typical radiographic features of craniomandibular osteopathy, dysplasia, luxation, subluxation, fractures, ankylosis, degenerative joint disease, infection, and neoplasia involving the temporomandibular joint are discussed.

[Vet Radiol Ultrasound](#). 2012 Sep-Oct;53(5):501-6. doi: 10.1111/j.1740-8261.2012.01956.x. Epub 2012 Jun 15.

## Assessment of five oblique radiographic projections of the canine temporomandibular joint.

[Hammond G](#), [King A](#), [Lapaglia J](#).

### Source

College of Medical Veterinary and Life Sciences, University of Glasgow, Glasgow G61 1QH, Scotland.  
Gawain.Hammond@glasgow.ac.uk

## Abstract

Investigation of temporomandibular joint (TMJ) disease requires a clear diagnostic image, which can be challenging to obtain using conventional radiography. The aim of this study was to compare five different oblique radiographic views with the head in lateral recumbency, assessing the clarity of visualization of the normal TMJ anatomy. The views under investigation were the laterorostral-laterocaudal oblique at a 10° and 20° rotation of the head ("nose-up" view), laterorostral-laterocaudal oblique with a rostrocaudal X-ray beam angulation of 10° and 20°, and a parallax view with the beam centered over C2 and collimated to include the TMJ region, using the divergence of the X-ray beam to project the TMJs separately on the radiograph. The views were performed on both TMJs of thirty canine cadavers and were graded independently by experienced and inexperienced observers. Grading was performed on the mandibular fossa, condylar process, joint space, retroarticular process, and the overall TMJ, and was based on a four-point scale. Mean grades for each component and for the overall joint were compared for each observer and each projection. Mean grades were significantly ( $P < 0.05$ ) higher for the "Nose-up" projections than the angled beam or parallax projections, as was interobserver agreement, and both observers showed significantly higher ( $P < 0.05$ ) mean grades for the 20(o) "Nose-up" angulation than the 10(o) "Nose-up" angulation. These results suggest that a latero 20(o) rostral-laterocaudal oblique gives the best representation of the anatomy of the TMJ of the dog of the projections assessed, and should be considered when investigating clinical cases of TMJ disease.

[Vet Radiol Ultrasound](#). 2001 May-Jun;42(3):205-17.

## The effect of obliquity on the radiographic appearance of the temporomandibular joint in dogs.

[Dickie AM](#), [Sullivan M](#).

### Source

Department of Veterinary Preclinical Studies and Small Animal Clinical Studies, University of Glasgow  
Veterinary School, Scotland, UK.

### **Abstract**

The temporomandibular joint is formed between the condyloid process of the mandible and the mandibular fossa of the temporal bone. The basic anatomy of this joint was assessed and described in a series of skulls including dolichocephalic, mesaticephalic and brachycephalic breeds. The facial index and rotational angles were measured with the facial index providing a useful method of classifying skull types but the rotational angle being of limited use in assessment of the temporomandibular joint until normal breed values are established. Equipment was designed to allow repeatable positioning of the temporomandibular joint for radiography at a variety of lateral and long axis rotational angles relative to the central x-ray beam. The regions of the joint and anatomic features visualized in each view are demonstrated. 10 degrees rotation was required in either axis to project the joints independently of each other. Lateral rotational angles of 10 to 30 degrees in mesaticephalic and dolichocephalic breeds and 20 to 30 degrees in brachycephalics and long axis rotational views of 10 to 30 degrees depending on the region of interest were considered to be the most useful.

[J Vet Dent.](#) 1995 Mar;12(1):23-6.

## **Bilateral mandibular condylectomy in a cat.**

[Eisner ER.](#)

### **Source**

Denver Veterinary Dental Service, CO 80222, USA.

### **Abstract**

A six year old cat with a chronically luxating jaw was treated by bilateral condylectomy. The etiology of the chronic luxation was unilateral temporomandibular joint dysplasia.

[J Vet Dent.](#) 2012 Spring;29(1):10-8.

## **Orofacial manifestations of high-rise syndrome in cats: a retrospective study of 84 cases.**

[Bonner SE](#), [Reiter AM](#), [Lewis JR](#).

### **Source**

Matthew J. Ryan Veterinary Hospital of the University of Pennsylvania, Philadelphia, PA 19104-6010, USA.  
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### **Abstract**

Medical records of cats with high-rise trauma were reviewed to document the prevalence and clinical manifestations of orofacial injury. Cats were presented over a 10-year period from January 2000 to December

2009. Signalment, weight, number of stories fallen, and survival data were recorded in 84 cats and physical examination findings were obtained from 83 cats. Fourteen of these cats were examined by veterinarians of the Dentistry and Oral Surgery Service. Mean age was 37-months. Mean distance fallen was 2.65 stories, and in the majority of cases the substrate the cat fell on was not recorded. Overall, survival was 94.0% when including euthanasia as a cause of death and 98.8% when excluding euthanized patients. Orofacial findings included bilateral epistaxis, hard palate fracture +/- tear of palatal soft tissue, palatal soft tissue bruising, mandibular fracture, mandibular symphyseal separation, tongue injury, facial soft tissue injury, dental trauma, and other oral soft tissue injury. Sixty-six percent of cats suffered some degree of orofacial injury. The population was analyzed for the prevalence of each type of injury. An oronasal fistula was seen in one cat as a complication of an untreated hard palate fracture. Possible etiology of the injuries and treatment options are discussed.

[J Feline Med Surg](#). 2004 Oct;6(5):305-12.

## **Feline high-rise syndrome: 119 cases (1998-2001).**

[Vnuk D](#), [Pirkić B](#), [Maticić D](#), [Radisić B](#), [Stejskal M](#), [Babić T](#), [Kreszinger M](#), [Lemo N](#).

### **Source**

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### **Abstract**

High-rise syndrome was diagnosed in 119 cats over a 4-year period. 59.6% of cats were younger than one year, and the average height of the fall was four stories. High-rise syndrome was more frequent during the warmer period of the year. 96.5% of the presented cats, survived after the fall. 46.2% of cats had fractured limbs; 38.5% of fractures were of the forelimb, 61.5% of the hindlimb. The tibia was fractured most often (36.4%), followed by the femur (23.6%). 78.6% of femoral fractures were distal. The mean age of patients with femoral fractures was 9.1 months, and with tibial fractures 29.2 months. Thoracic trauma was diagnosed in 33.6% of cats. Pneumothorax was diagnosed in 20% of cats, and pulmonary contusions in 13.4%. Falls from the seventh or higher stories, are associated with more severe injuries and with a higher incidence of thoracic trauma.

[Vet Surg](#). 2008 Apr;37(3):294-9. doi: 10.1111/j.1532-950X.2008.00380.x.

## **The diagnostic yield of conventional radiographs and computed tomography in dogs and cats with maxillofacial trauma.**

[Bar-Am Y](#), [Pollard RE](#), [Kass PH](#), [Verstraete FJ](#).

### **Source**

Veterinary Medical Teaching Hospital, Department of Surgical & Radiological Sciences, School of Veterinary Medicine, University of California, Davis, CA 95616, USA.

### **Abstract**

### **OBJECTIVE:**

To compare the diagnostic yield of conventional radiographs and computed tomography (CT) images of the skulls of dogs and cats with maxillofacial trauma (MFT).

### **STUDY DESIGN:**

Prospective study.

### **ANIMALS:**

Dogs (n=9) and 15 cats with MFT.

### **METHODS:**

CT-scans and skull radiographs (4 standard projections) for each animal were evaluated using a semi-quantitative scoring system for the ability to identify 26 predefined, clinically relevant anatomic features (Part 1), and 27 predetermined potential traumatic injuries (Part 2). For Part 1, mean scores for each anatomic feature were recorded for every view and imaging modality. For Part 2, studies were evaluated for the frequency of cases where each predetermined traumatic injury was identified.

### **RESULTS:**

Part 1: On radiographs it was easy to identify 17 of 26 anatomic features whereas 6 features were very difficult or impossible to identify on any view. All structures were considered easy or very easy to identify on CT. Scores for CT were lower than radiographs for evaluating dental occlusion and the integrity of the mandibular body. Part 2: CT scans demonstrated 1.6 times more maxillofacial injuries for dogs and 2.0 times more for cats than conventional radiographs. The average number of MFT injuries per animal by radiographs and CT-scan was 4.8 and 7.6 in dogs, and 3.8 and 7.7 in cats, respectively.

### **CONCLUSION:**

CT is superior to conventional skull radiography for identification of anatomic structures and traumatic injuries in dogs and cats. Skull radiography is useful for visualizing the mandibular body and dental occlusion.

### **CLINICAL RELEVANCE:**

CT allows for accurate assessment, diagnosis and treatment planning of MFT in dogs and cats.

## **withrow - taping of the mandible. JAAHA 1981 17:27-31**

[Probl Vet Med.](#) 1990 Mar;2(1):220-47.

## **Problems associated with the management and treatment of jaw fractures.**

[Manfra Marretta S](#), [Schrader SC](#), [Matthiesen DT](#).

**Source**

Animal Medical Center, New York, NY 10021.

### **Abstract**

Fractures of the mandible and maxilla occur frequently in the dog and cat. Appropriate preoperative, intraoperative, and postoperative management of jaw fractures is imperative for successful results. Various techniques of jaw fracture management, including tape muzzles, circumferential wiring, interarcade wiring, interosseous wiring, interdental wiring, acrylic splints, percutaneous skeletal fixation, intramedullary pinning, bone plating, and partial mandibulectomy, have unique advantages and disadvantages. Selection of the appropriate method of fixation depends on the signalment of the animal, type of fracture, and the veterinarian's experience and expertise with the various types of fixation. Careful postoperative evaluation will result in the early detection of problems and ensure proper postoperative care.