Oral and maxillofacial disorders in the cat can present as an inability to close the mouth and reaching an accurate diagnosis can be challenging if all of the differentials are not systematically considered. Differential diagnoses include: luxation of the temporomandibular joint, fracture of the temporomandibular joint, caudal mandibular fracture, impingement of the coronoid process of the mandible on the zygomatic arch, mechanical obstruction, and neuropathy. A complete intraoral examination and evaluation of a patient’s occlusion often allows the clinician to identify the cause for a cat being unable to close the mouth. Periodontal disease causing tooth to tooth contact is a common and often unrecognized cause for open-mouth dental interlock and may be diagnosed without sedation or imaging.

Maxillofacial examination

Evaluation of a patient’s occlusion is an essential component of all maxillofacial examinations. With normal occlusion, the maxillary and mandibular teeth should interdigitate perfectly. The maxillary incisors should be positioned slightly rostral to the mandibular incisors and the mandibular canine teeth should be positioned in the interdental space between the opposing maxillary third incisor tooth and canine tooth. The maxillary premolars interdigitate with the mandibular premolars in a “pinking shears” fashion. The buccal surface of the mandibular molar occludes with the palatal surface of the maxillary fourth premolar.

A malocclusion describes an abnormal interdigititation between the upper and lower teeth. This may be due to malposition of one or more individual teeth, where the normal relationship between the dental arches is maintained. An example of this type of malocclusion is a linguallly displaced permanent mandibular canine tooth secondary to a persistent deciduous mandibular canine tooth. A malocclusion may also be caused by a skeletal abnormality. Skeletal malocclusions are often due to discrepancies in jaw lengths, as seen in mandibular mesioclusion in brachycephalic breeds. Skeletal malocclusions may also occur secondary to deviation of bones which support the dentition, as occurs with luxation of the temporomandibular joint. Skeletal malocclusions may be symmetrical or asymmetrical. Symmetrical skeletal malocclusions are described as either class 2 (mandibular distoclusion) or class 3 (mandibular mesioclusion). An asymmetrical skeletal malocclusion can occur in a rostro-caudal, side-to-side or dorso-ventral direction. When evaluating for normal occlusion, the teeth should interdigitate normally, the midlines of the maxillae and mandibles should align and the right and left mandibular arcades should be at the same height.

Clinical history

Cats with a history of trauma (vehicular trauma, a fight, or a fall from a height) may present with an inability to close the mouth. Differentials include luxation of the temporomandibular joint, fracture of the temporomandibular joint and mandibular fracture. Open jaw locking secondary to impingement of the coronoid process on the zygomatic arch should be considered as a differential in a cat that has a history of intermittent episodes of being unable to close the mouth without history of trauma or in a cat that acutely cannot close its mouth without previous history of any oral issues. Trigeminal neuropathy should be considered as a differential if a cat presents with a flaccid open mouth with or without history of trauma. Cats with dental interlock secondary to mechanical obstruction (secondary to neoplasia, foreign bodies, or tooth to tooth contact due to periodontal disease) do not usually have a history of trauma.

TMJ luxation

Luxation of the condylar process in a rostro-dorsal direction may occur without mandibular fracture or symphyseal separation. Physical examination of a unilateral rostro-dorsal luxation reveals an asymmetrical malocclusion with the mandibles deviated away from the side of the TMJ luxation. Bilateral rostral luxation results in slight rostral protrusion of the mandibles. Unilateral caudal luxation is rare but results in shifting of the mandibles toward the side of luxation. This often occurs with a fracture of the retroarticular process.

TMJ fractures

Fractures of the TMJ may be true intra-articular fractures of the squamous portion of the temporal bone or condylar process of the mandible, or they may be extra-articular fractures of the condylar process or retroarticular process. The degree of displacement of these fractures will often determine whether or not a malocclusion is present. One of the more common maxillofacial injuries in the cat is fracture of the condylar process. This will often cause collapse of the mandibles towards the side of the fracture, resulting in an asymmetrical malocclusion.
Mandibular fractures
Fractures of the mandibular ramus and coronoid process also frequently result in malocclusions as they are the location of insertion of the muscles of mastication. These asymmetrical malocclusions may occur in a side-to-side, dorso-ventral, and/or rostro-caudal direction. The cat’s inability to close the mouth is often secondary to tooth-to-tooth contact as a result of the asymmetrical malocclusion in a side-to-side direction. Deviation of the mandibles prevents normal interdigitation of the teeth which may cause the maxillary canine tooth to contact the mandibular canine tooth, or the mandibular canine tooth to contact the palate. Fractures of the zygomatic bone or zygomatic process of the temporal bone less commonly cause a malocclusion in cats due to the wide curvature of the zygomatic arch. Bilateral caudal mandibular body fractures may also cause a cat to not be able to close the mouth. In these cases, depending on the location of the fractures, manual closure of the jaws may be accomplished if the fractures are rostral to the insertion of the adductor muscles. There may or may not be an asymmetrical malocclusion depending on the degree of displacement of the fractured segments.

Diagnostic imaging
Dorsoventral, lateral, and right and left lateral oblique skull radiographs are the standard recommended views to diagnose maxillofacial trauma but skull radiographs may be difficult to interpret due to the presence of overlapping structures. Intraoral radiography is superior to traditional skull radiographs for evaluating the dental arches. Advanced imaging such as computed tomography (CT) should be considered with maxillofacial trauma in a cat as studies have shown that trauma often results in multiple maxillofacial injuries. Computed tomography should be considered for any cat with maxillofacial trauma to allow for more accurate diagnosis, treatment planning and prognosis.

Treatment
Treatment for TMJ luxation or mandibular fractures causing a cat to be unable to close their mouth is dependent on the type of injury. Closed reduction of a TMJ luxation following acute injury should be attempted to avoid formation of fibrous tissue within the joint space. Nonsurgical versus surgical treatment of TMJ and mandibular fractures depends on whether or not the articular surface is involved, the degree of stability and/or displacement, and the presence of ankylosis. Maxillomandibular fixation is often the treatment utilized for stabilization of caudal mandibular fractures, fractures involving the temporomandibular joint and TMJ luxations if they are unstable after reduction.

Open mouth jaw locking secondary to impingement of the coronoid process on the zygomatic arch
Impingement of the coronoid process of the mandible on the zygomatic arch is a relatively uncommon cause for a cat to be unable to close the mouth. Rotation of the mandibles and subsequent lateral flaring of the coronoid process allows the coronoid process to engage the zygomatic arch after the mouth is opened wide. The most dorsal portion of the coronoid process is then lateral to the zygomatic arch, preventing closure of the mouth.

Clinically, these patients present with intermittent episodes of being unable to close the mouth without a history of trauma. These episodes often resolve spontaneously by opening the mouth wider, allowing the coronoid process to disengage from the zygomatic arch and move medially into a normal anatomic position.

Physical examination during an open-mouth locking episode reveals an asymmetrical malocclusion in a side-to-side direction with the mandibles deviated towards the side where the coronoid process is contacting the zygomatic arch. There may also be an asymmetrical malocclusion in a dorso-ventral direction with the affected mandible displaced slightly ventral compared to the contralateral mandible due to rotation of the mandibles. A palpable and visible bulge lateral to the zygomatic arch where the coronoid process is displaced may be detected. Physical examination after the locked jaw has been reduced, either manually or spontaneously by opening the mouth wider to disengage the coronoid process, may be normal, or there may be discomfort on palpation or manipulation of the head and jaws. Manipulation of the mandibles under general anesthesia in a rotational manner can recreate the displacement of the coronoid process to engage the ventral or lateral aspect of the adjacent zygomatic arch. This should be attempted on both sides as bilateral TMJ laxity with alternating right and left locking episodes is possible. If the joints are normal, locking cannot be recreated, although it is possible that manipulation of the mandibles even in patients with TMJ laxity may not result in open-mouth jaw locking.

Diagnostic imaging
Skull radiographs during a locking episode may reveal contact between the coronoid process and zygomatic arch. Skull radiographs may also show evidence of the associated structural abnormalities possible with TMJ dysplasia or widened joint spaces of either the ipsilateral, contralateral, or bilateral joints. When radiographs are normal, CT should be considered to detect abnormalities of the TMJ as CT of the TMJ has been shown to be more sensitive than conventional radiography.

Treatment
Treatment options for lateral impingement of the coronoid process on the zygomatic arch include partial ostectomy of the ventral margin of the zygomatic arch, coronoidectomy, partial resection of the rostral portion of the zygomatic arch in combination with partial resection of the coronoid process, temporary maxillomandibular fixation, imbrication-plication of the lateral aspect of the TMJ capsule, and mandibular condylectomy. Partial coronoidectomy alone has been 100% successful in the three reported cases, is
reportedly easier to perform and less invasive. If the jaw locking is secondary to excessive laxity of the mandibular symphysis, symphysiotomy, symphysiectomy and intermandibular arthrodesis has been successful in one cat.

Trigeminal neuropathy
Animals with bilateral neurologic dysfunction of the mandibular branch of the trigeminal nerve, or trigeminal neuropathy, may present with an inability to close the mouth. To the authors’ knowledge, trigeminal neuropathy in cats has not been previously reported, although the authors have seen one such case in a six year old cat. Clinical signs reported in dogs and in the cat observed by the authors include an acute onset of a dropped jaw, difficulty prehending, messy eating and drooling. The mouth hangs down passively, can be closed by manually lifting the mandibles, and falls back into its former dropped position when released. Unlike cases of bilateral caudal mandibular fractures, animals with trigeminal neuropathy are not painful when the mouth is manipulated.

The mandibular branch of the trigeminal nerve supplies both motor and sensory innervation to all of the muscles of mastication responsible for closing the mouth. The mandibular nerve and its branches to the muscles of mastication are closely related to the joint capsule of the TMJ and stretching of the nerve during wide opening of the mouth has been postulated to be a cause of interference with nerve function. The cat treated by the authors was fed through an esophagostomy tube and continued on pain medications without other treatment. The cat regained most voluntary jaw movement after 15-20 days and full control returned after 32 days. Electromyography can be used to confirm the diagnosis, although practically, a flaccid paralysis of the mandibles without evidence of caudal mandibular fractures can be sufficient to make a presumptive diagnosis of trigeminal neuropathy. Central neurologic lesions and rabies should also be considered if there is evidence of other cranial nerve deficits or systemic weakness.

Open mouth dental interlock
Mechanical obstruction independent of the temporomandibular joint is a common cause for open-mouth jaw locking in cats. Mechanical obstruction may be caused by oral foreign bodies, soft tissue swelling, neoplasia, or tooth-to-tooth contact. Tooth-to-tooth contact may be secondary to trauma resulting in displacement of a tooth, but is often seen in cats as a result of periodontal disease associated with a maxillary canine tooth. Periodontitis is inflammation of the periodontium, or tissues that support the tooth (gingiva, periodontal ligament, alveolar bone and cementum) and results in loss of tooth attachment. Advanced periodontitis may lead to significant bone loss, deep periodontal pockets and tooth mobility. Periodontal disease affecting the canine teeth in cats may be associated with alveolar osteitis and extrusion of affected teeth. Clinically, there may be expansion of the buccal alveolar bone making the bone appear “wider” than normal and supraeruption making the tooth appear “longer” than normal. With enough attachment loss, extrusion and mobility, the maxillary canine tooth may deviate mesially and palatally to occlude lingual to the mandibular canine tooth resulting in open-mouth dental interlock secondary to the tooth-to-tooth contact.

A complete intraoral examination, including observation of the occlusion in an awake cat, allows the clinician to differentiate open-mouth dental interlock secondary to periodontal disease from lesions of the temporomandibular joint without sedation or imaging. If general anesthesia is necessary, tooth mobility is confirmed, and dental probing as part of the clinical oral examination detects deep periodontal pockets. Intraoral radiographs may reveal vertical bone loss around the tooth root and expansile buccal alveolar bone. Temporary replacement of the affected mobile maxillary canine tooth into the normal position results in a return to normal occlusion. Definitive treatment is oral surgery to extract the periodontally diseased maxillary canine tooth.

Despite the numerous differential diagnoses for a cat that is unable to close the mouth, a complete physical examination including a thorough intraoral examination and observation of the occlusion may eliminate some of the conditions prior to sedation or imaging. A combination of skull radiographs and skull CT may be necessary for accurate diagnosis and treatment planning. An understanding of the anatomical structures of the head, in combination with a complete extraoral and intraoral examination and observation of the patient’s occlusion, allows the clinician to quickly and efficiently obtain a diagnosis when presented with a cat who is unable to close the mouth.

References available upon request.
Cat Presents with Inability to Close Its Mouth

History of Trauma

TMJ Luxation  TMJ Fracture  Mandibular Fracture

No deviation or deviation toward fracture  Deviation toward side of fracture

unilateral rostro-dorsal  bilateral rostro-dorsal  unilateral caudal

mandible deviates away from luxation  rostral protrusion of mandibles  mandible deviates toward luxation

Impingement of Coronoid on Zygomatic Process  Secondary to Dental Interlock

normal occlusion  malocclusion

Periodontal Disease

Neoplasia  Foreign Body

Trigeminal Neuropathy

Manual closure of jaw with return to normal occlusion in awake cat

Jaw cannot be manually closed