BVDA

CONGRESS 2025

Promoting high standards in Veterinary Dentistry through practical teaching and research since 1988

https://bvda.co.uk

🦷 Welcome to BVDA congress 2025!

The British Veterinary Dental association is delighted to welcome you to RIBA for an action packed two days of dentistry and oral surgery. This is the first year we have run a two-day program with two streams running concurrently. The incisor stream (RIBA gallery) is aimed at nurses and general practitioner vets and the carnassial stream (Jarvis Hall) is aimed at advanced practitioners, resident and specialists. Feel free to move between rooms.

Congress highlights this year:

📢 Our Annual General Meeting: **13:40 on 5th April 2025 – All BVDA members are welcome**

📢 Keynote lectures from 9:00-10:40 each day are held in the **Jarvis Hall**

📢 **Extraction dry labs are being run by Dentanomics** Friday 4th: 11:45-12:30 and Saturday 5th: 11:00-11:50 in the Wornum room. Booking required (only 12 spaces per session) at the Dentanomics/Eickemeyer stand.

🥂 The evening party will be held at the Wellcome collection, NW1 2BE on 4th April. For those who haven't registered, a limited number of party night tickets are still available at a cost of £50, please contact a member of the BVDA committee or email secretary@bvda.co.uk There will be free food and drink throughout the evening.

We thank IM3, Mars Petcare, Youlan, Dentanomic, Eickemeyer, Fusion implants, Improve Veterinary Education, Hills, Midmark, Cresilon (Vetigel) and Veterinary Tissue Bank for their generous sponsorship of this event.

Upcoming events (details at www.bvda.co.uk):

🗓️ 21st-22nd November 2025: BVDA Feline Extraction course @ Improve International, 📍 Delta Business Park, Swindon, UK. Booking will open soon.

Throughout 2025: talking teeth evening webinars bvda.co.uk/education

👉 'Talking Teeth' will continue this year as a series of monthly online meetings for both vets and nurses. We thank IM3 for kindly supporting this meeting series. These meetings are free for members. Places need to be booked via our website by both members and non-members.

📢 A reminder that membership renewals can be made on-line on our website for 2025 thanks to our treasurer. The president wishes to record her thanks, on behalf of the members, to all the committee members for their continued service to the BVDA. Advantages of being a BVDA member include

- 35% discount when purchasing the BSAVA manual of small animal dentistry,
- 20% BSAVA congress discount
- FREE catalogue of over 80 hours' of dentistry CPD on the BVDA website.
- Discounts on BVDA CPD courses and annual congress

Our facebook page 'BVDA veterinary dentistry discussion' now has over 4600 members. It is a fantastic resource for participants to post questions, interesting cases, discussions, and breaking news in dentistry.

BVDA Annual General Meeting 13:40 on 5th April 2025 at the Royal Institute of British Architects, 66 Portland Place, London

Please note that the 2024 AGM Minutes, Officers reports and 2024 Accounts are all published on our website www.bvda.co.uk under the members area.

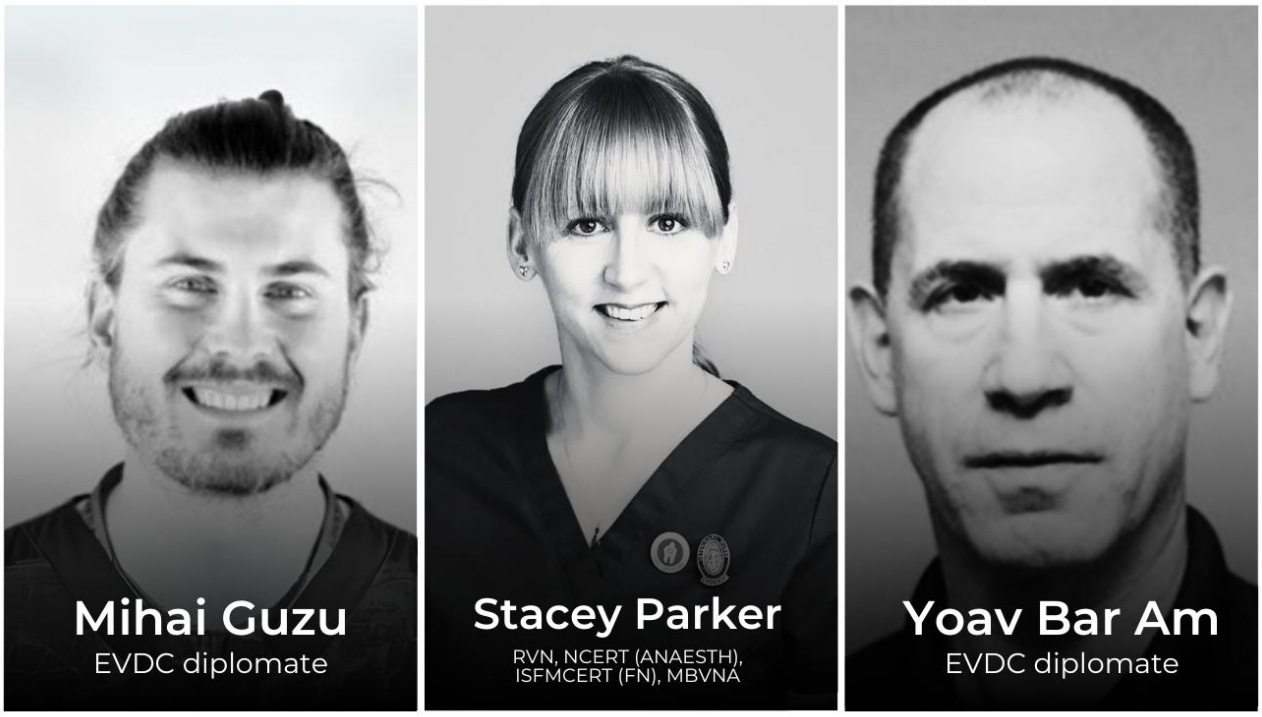
1) Apologies for Absence
2) Approval of the Minutes of the 2024 AGM (as available on the BVDA website)
3) Matters arising from the 2024 AGM minutes
4) Election of Committee Positions – We are currently seeking a President-Elect.
5) Approval of Accounts (as available on the BVDA website one month before the AGM)
6) Any Other Business (if possible please submit items before the AGM to the Secretary or President so that the Board can be properly briefed)
7) Date and Time of next AGM

We hope you enjoy congress 2025!

Alix Freeman BA MA BVSc Cert VetEd FHEA Dipl.EVDC MRCVS

President British Veterinary Dental Association

EBVS® and RCVS Specialist in Veterinary Dentistry



MEET OUR EXPERT LECTURERS

Mihai Guzu, diplEVDC
Mihai graduated in Veterinary Medicine in 2013 and became an EVDC Diplomate in 2021. With advanced training in Microsurgery and Head & Neck Surgical Oncology, he specialises in Dentistry and Maxillofacial Surgery, sharing his expertise through international publications and lectures.

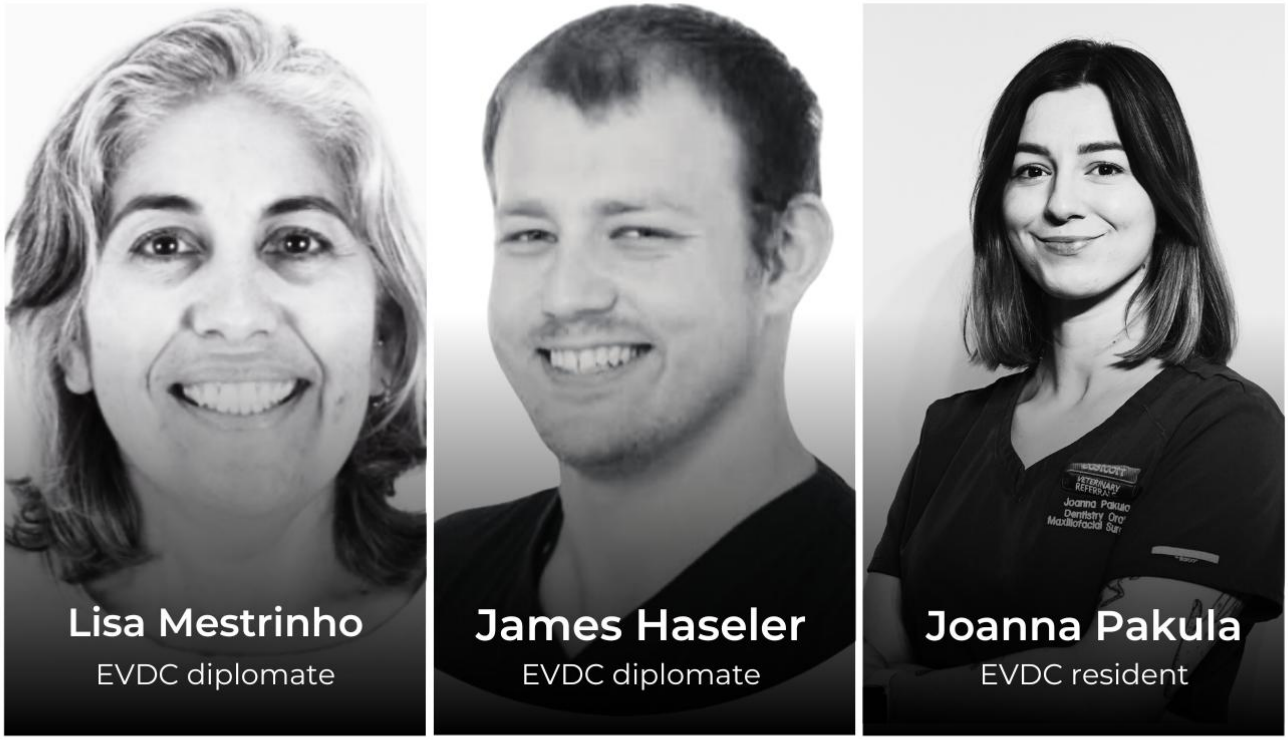
Stacey Parker, RVN, NCERT (ANAESTH), ISFMCERT (FN), MBVNA
An experienced Registered Veterinary Nurse, Stacey has a passion for anaesthesia and analgesia. With numerous qualifications in anaesthesia, oral care, feline nursing, and emergency care, she focuses on advanced anaesthesia for complex cases and is currently expanding her skills in dentistry.

Yoav Bar-Am, diplEVDC, diplAVDC
Yoav brings decades of experience in veterinary dentistry and oral surgery. A Diplomate of both the American and European Veterinary Dental Colleges, he has trained and taught globally, including leading programs at UC Davis and Colorado State University. He now heads the Dentistry and Oral Surgery department at the Koret Veterinary Teaching Hospital.

Ana Rejec-Jenček, diplEVDC, Ph.D.
Specialist in veterinary dentistry and maxillofacial surgery, Ana earned her EVDC diploma in 2022. A key member of Animal Hospital Postojna's oncology team, she also holds a Ph.D. in Molecular Genetics and is the current President of the EVDS.

Rob Davis, President-Elect of the BVDA, MANZCVS
With 25 years in veterinary practice, Rob specialises in dentistry and oral surgery, earning membership in the MANZCVS in 2021. Now focused entirely on dentistry, he works at Davies Veterinary Specialists and The London Cat Clinic.

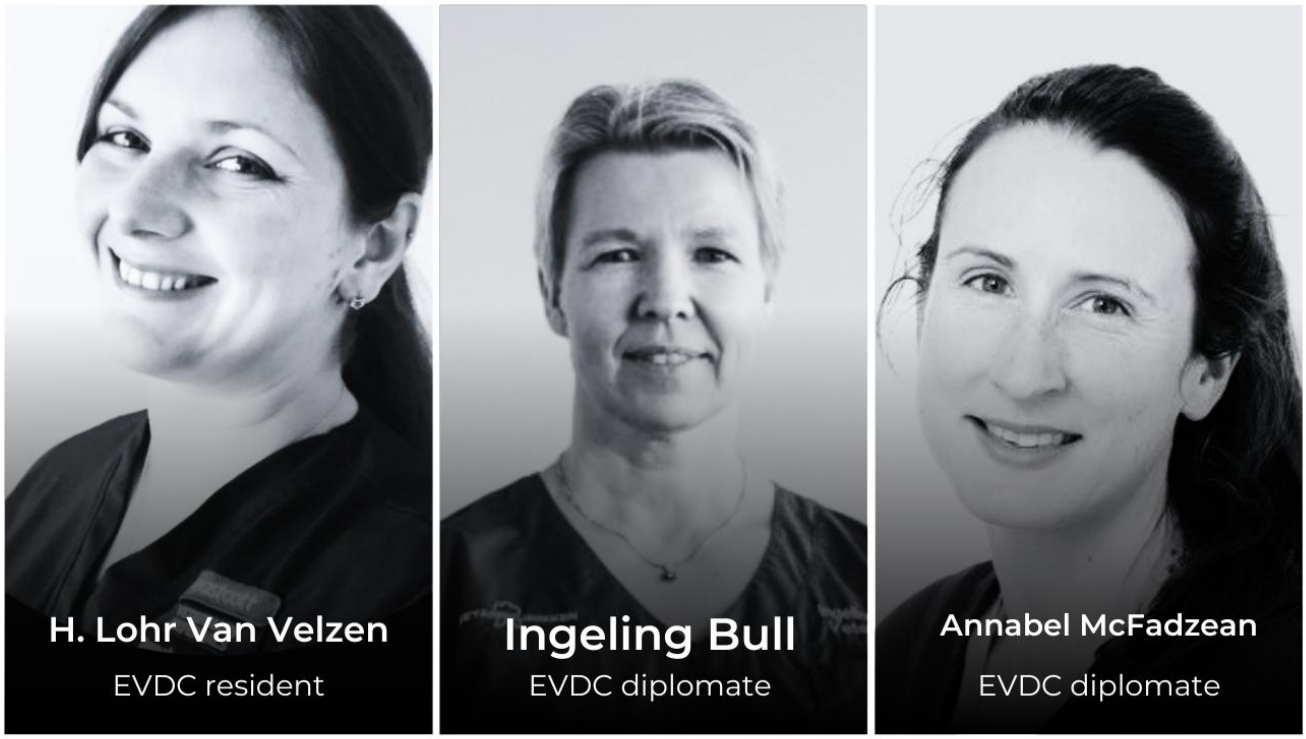
Andrew Perry, diplEVDC
A Diplomate of the EVDC since 2018, Andrew is an expert in oral surgery and reconstruction techniques. Based at Eastcott Referrals, he publishes and teaches widely, co-supervising residents in a dynamic referral team.



James Haseler, diplEVDC
James qualified from the University of Liverpool in 2017 and completed his residency in veterinary dentistry, oral and maxillofacial surgery in 2023. Now heading a new dentistry service at Willow Referrals, he specialises in endodontics and maxillofacial surgery. Outside of work, James enjoys walking with his Labrador, Dylan, and Pug, Morka.

Lisa Mestrinho, diplAVDC, diplEVDC, Ph.D.
Graduating in 2003, Lisa holds two master's degrees, a PhD, and multiple qualifications in veterinary and human health sciences. A diplomate of both AVDC and EVDC, she leads the dentistry service at Lisbon University's teaching hospital. Lisa is a prolific researcher and consultant, passionate about improving oral health across all species.

Joanna Pakula, resident EVDC
Joanna graduated in 2018 and began her EVDC residency in 2023 under the supervision of diplEVDC Andrew Perry. With experience from externships at the Royal Veterinary College, UC Davis, and the University of Ljubljana, she is passionate about facial trauma repair, serves at the British Veterinary Dental Association and is an associate teacher at the European School for Advanced Veterinary Studies (ESAVS).



Hannah van Velzen, Residency trained EVDC
Hannah graduated from the University of Utrecht in 2016 and worked in UK general practice for six years before focusing on dentistry. Currently a final-year Resident at Eastcott Referrals, she holds an ESAVS Certificate in Veterinary Dentistry and serves as Secretary of the British Veterinary Dental Association.

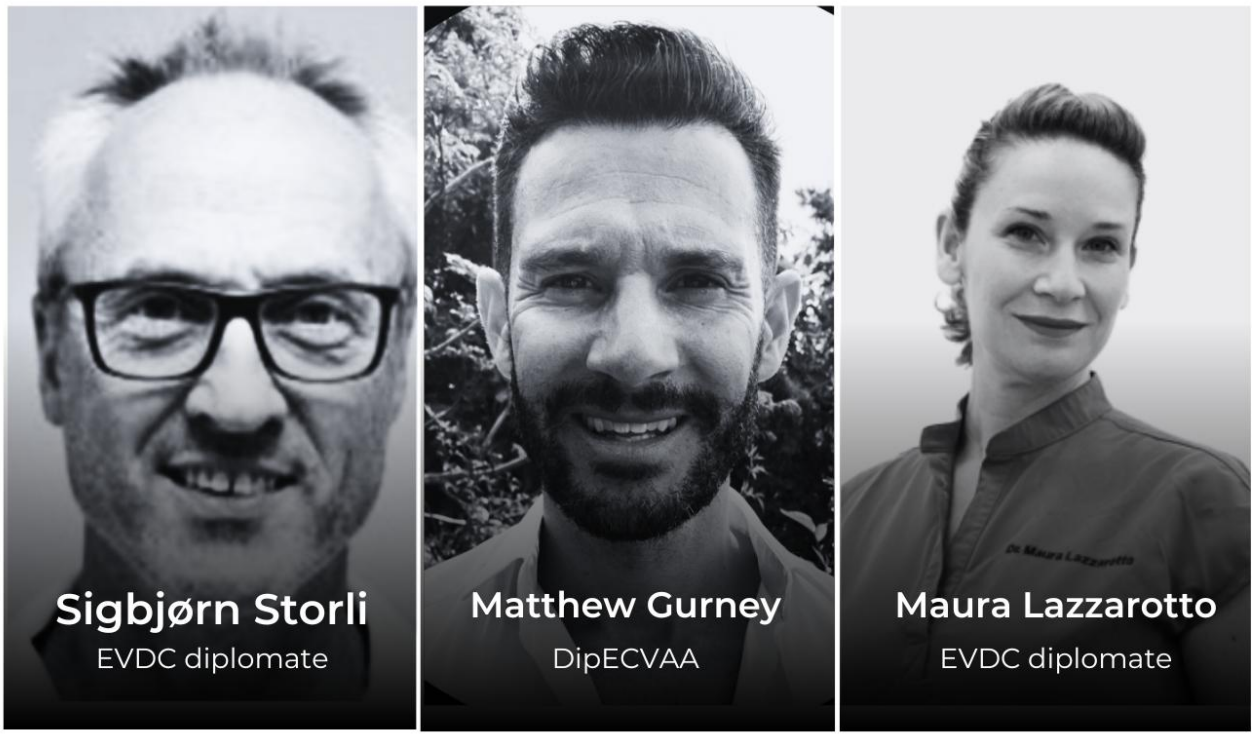
Ingeling Bull, diplEVDC
Graduating in 1998, Dr. Bull co-founded Norway's first veterinary dental clinic, Dyretannklinikken, in 2018. She completed her residency in 2019 and became an EBVS European Specialist in Veterinary Dentistry in 2022. Her clinic focuses on advanced dentistry and oral surgery.

Annabel McFadzean, diplEVDC
Annabel graduated from the Royal Veterinary College in 2010 and became an EVDC Diplomate in 2024. With a strong background in surgery, she leads the Dentistry and Oral Surgery department at Cave Veterinary Specialists.

Helen Renfrew, diplECVDI
Helen graduated from the Royal Veterinary College in 1994 and became a Diplomate of the European College of Veterinary Diagnostic Imaging in 2009. She is the Head of Diagnostic Imaging at Eastcott Veterinary Referrals, where she provides expert imaging services with access to advanced modalities like CT, MRI, and fluoroscopy.

Péter Bogár, Resident EVDC
Péter graduated from the University of Veterinary Medicine Budapest in 2016 and moved to the UK later that year. After six years in general practice and earning postgraduate dentistry qualifications, he began his EVDC residency at Eastcott in 2024, focusing on advanced dentistry and oral surgery.

Ingrid Tundo, diplEVDC
Ingrid graduated from Milan University in 2014 and began her residency at Eastcott Referrals in 2017. She now leads the Dentistry and Maxillofacial Surgery Department at the University of Edinburgh, specialising in maxillofacial surgery, endodontics, and advanced imaging.



Sigbjørn Storli, diplEVDC
Graduating from Justus Liebig University in 1990, Sigbjørn focused on small animal dentistry and oral surgery from 2009 onwards. A Diplomate of the EVDC since 2017, he co-founded Norway's first specialty clinic, Dyretannklinikken, in 2018. His interests include oncologic surgery and orthodontics, and he is a prolific lecturer and researcher.

Matthew Gurney, Anaesthesia & Pain Management Specialist
Dr. Matthew Gurney is an RCVS & European Specialist in Veterinary Anaesthesia & Analgesia. He established the anaesthesia service at Northwest Surgeons in 2009 and has held leadership roles, including President of the European College of Veterinary Anaesthesia & Analgesia (2020).
Matthew is a passionate educator, regularly lecturing on anaesthesia and pain management. He co-founded Zero Pain Philosophy in 2014, an educational resource for vets and nurses. Currently, he is the Clinical Director at Eastcott Referrals and a Fellow of the RCVS for his contributions to clinical practice.

Maura Lazzarotto, diplEVDC
A second-generation veterinarian, Maura graduated from the Western College of Veterinary Medicine and trained in dentistry and oral surgery in New Zealand and Seattle. As Department Head at Davies Vet Specialists, she specialises in endodontics and jaw-sparing oncology surgeries. She is passionate about research and training the next generation of veterinary dentists.

Ceri Owen, BVM, BVS, PgCert
Ceri graduated from the University of Nottingham in 2013 and discovered her passion for dentistry while working at Camlas Petcare Vets in Mid Wales. She completed her PgCert in Small Animal Dentistry in 2020 and now works as a CVS Regional Clinical Lead and Veterinary Surgeon.
Ceri is an active member of the British Veterinary Dental Association (BVDA) Committee and brings her expertise and enthusiasm for veterinary dentistry to every role.

Alix Freeman, BVDA president, diplEVDC, PGcertVetEd FHEA
Alix graduated from the University of Bristol in 2008 and completed her residency in dentistry and oral surgery at Eastcott Veterinary Clinic in 2019. She became an EBVS European Specialist and RCVS Specialist in Veterinary Dentistry in 2022 and continues to work at Eastcott, home to Europe's largest dentistry team.
Her main interests include endodontics, maxillofacial fracture management, and oral oncologic surgery. Alix also serves as President of the British Veterinary Dental Association (BVDA).

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Friday, 4th April 2025

	Friday 4th April 2025	
	INCISOR	CARNASSIAL
9.00-9.50	KEYNOTE: Maxillofacial trauma in dogs and cats: what can we learn from humans? (M.Guzu)	
9:50-10.40	Pressure's On: Mastering Hypotension Management Under Anaesthesia (S.Parker)	
10.40-11.00	BREAK	BREAK
11.00-11:45	How to perform an oral examination and charting: what is normal and abnormal (R.Davis)	Palatal clefts and defects (Y.Bar-Am)
11:45-12:30	Abnormal tooth development: Consequences, New developments and Treatment approaches (M.Lazzarotto)	Gingivectomy and gingivoplasty: Indications, surgical techniques, and clinical outcomes (A.Rejec)
12:30-13:30	LUNCH	LUNCH
13:30-14:20	Setting patients up for a lifetime of good oral health (C.Owen)	New insights in melanoma staging (L.Mestrinho)
14:20-15:10	Feline chronic gingivostomatitis (Y. Bar-Am)	Oral oncology from a surgical point of view (S.Storli)
15:10-15:30	BREAK	BREAK
15:30-16:15	Should I or Shouldn't I? Prescribing Antibiotics in Veterinary Dentistry (H.Lohr Van Velzen)	3D printing applications in oral health (L.Mestrinho)
16:15-17:00	Picture Perfect: Top Tips for Dental Radiography (J. Haseler)	Quality of life studies following maxillectomy and mandibulectomy (I.Bull)

Maxillofacial trauma in dogs and cats: what can we learn from humans?

Mihai Guzu
DMV, Dip EVDC

Introduction

Maxillofacial injuries can arise from various causes, including vehicular accidents, falls, physical altercations, and, in animals, bite wounds from other animals. Understanding the epidemiological patterns of these fractures is crucial for improving treatment outcomes, as it provides insights into the most frequently affected anatomical regions, the mechanisms of injury, and the potential surgical approaches required for effective stabilization. This discussion draws from established epidemiological data published by the AOCMF while integrating additional, unpublished veterinary observations regarding the most common fracture patterns seen in cats. By examining the differences in jaw fracture distribution between humans and domestic carnivores, along with their anatomical variations, this analysis highlights the key considerations for veterinary maxillofacial surgery and the unique challenges posed by treating these injuries in non-human species.

I. Jaw Fractures in Humans

In humans, facial injuries frequently occur due to high-energy trauma such as motor vehicle accidents, sports-related impacts, interpersonal violence, and accidental falls. These fractures can affect both the lowerface and the midface, with patterns varying depending on the direction and intensity of the force applied.

A classification system for craniomaxillofacial fractures was proposed by the AOCMF to standardize injury assessment, incorporating severity scales and treatment variables. This aims to improve documentation, treatment planning, and understanding of fracture patterns. The combination of fragmentation degree (i.e., single vs. multiple fracture lines), displacement, bone loss, preinjury dental state and alveolar atrophy in edentulous regions were recorded in order to assess as precisely as possible the lesions in each area. Mandibular fractures are among the most commonly encountered maxillofacial fractures due to the prominent and exposed nature of the lower jaw. The condyle, angle, body, symphysis, and parasymphysis regions may affected, with condylar fractures accounting for a substantial proportion of cases due to the transmission of force through the mandibular ramus during impact. The epidemiology of midface fractures, on the other hand, may be based on subregions involved (e.g. zygoma, naso-orbito-ethmoidal) or may follow Le Fort patterns, which describe increasing degrees of craniofacial separation. Le Fort I fractures are limited to the lower maxilla, Le Fort II fractures involve a pyramidal detachment of the midface, and Le Fort III fractures result in craniofacial dissociation, affecting the zygomaticomaxillary complex and extending to the skull base. These fractures often occur in association with severe blunt trauma and are commonly observed in high-speed collisions.

II. Jaw Fractures in Domestic Carnivores

The epidemiology of jaw fractures in domestic carnivores presents distinct differences from human populations, both in terms of causative factors and anatomical distribution. In dogs and cats, jaw fractures are often the result of vehicular trauma, falls from significant heights, and, in certain cases, bite wounds inflicted during fights. The variations in skull morphology between species probably influence how fractures occur and how they should be managed surgically. The CT evaluation of maxillofacial trauma revealed that the most likely bone or region to be fractured in dogs is the maxillary bone, followed by the premolar and molar regions of the mandible. In cats, contrary to midfacial fractures, the pattern of distribution of mandibular fractures seems less predictable. Moreover, symphyseal and parasymphyseal lesions are very likely to have further fractures at other locations.

III. Anatomical Differences and Surgical Implications

Fundamental anatomical divergence between human and domestic carnivores are associated with significant implications for surgical techniques in cases of facial trauma. One of the most striking differences lies in the structure of the dental arches and the distribution of dental roots within the jawbones. In carnivores, the roots of those teeth are long and deeply anchored within the incisive, maxillary and mandibular bones, providing strong support but also making surgical manipulations more challenging. In contrast, the human dental arch is more uniform and adapted to an omnivorous diet, with incisors, canines, premolars, and molars arranged in a continuous curve. The roots of human teeth, though firmly embedded, tend to be shorter in proportion to jaw size compared to those of carnivores. In the mandible, the roots of molars extend deep into the bone near the inferior alveolar canal, making fracture repairs in the posterior region particularly challenging due to the proximity of neurovascular structures. The mandibular symphysis is fully ossified in humans, eliminating the flexibility seen in carnivores and resulting in a greater tendency for bilateral mandibular fractures when high-impact trauma occurs. The presence of a fibrocartilaginous symphysis in carnivores allows some mobility, which may influence the type of symphyseal disjunction management.

The structure of the craniofacial skeleton also varies considerably between and within species, impacting the distribution of fractures and influencing surgical repair techniques. In humans, the facial skeleton is relatively vertical, with a well-defined separation between the upper and lower facial thirds. This structural organization dictates how forces are transmitted during trauma and explains the prevalence of the Le Fort classification system for maxillary fractures.

In contrast, domestic carnivores possess a more horizontally oriented skull, with a greater emphasis on elongated mandibles and robust zygomatic arches to support predatory and manducatory functions. Feline patients, demonstrate unique characteristics that set them apart from both humans and mesocephalic or dolichocephalic dogs. Personal data indicate that the most common midfacial fracture pattern in cats follows a Le Fort III-type distribution. This suggests that the structural integrity of the feline craniofacial skeleton predisposes them to high-

energy fractures that separate the viscerocranium from the neurocranium at the skull base level. Additionally, mandibular fractures in cats frequently occur in the symphyseal, parasymphyseal, canine, ramus, and condylar regions, with a high incidence of bilateral injuries.

Another critical distinction is the configuration of the temporomandibular joint (TMJ). In humans, the TMJ is composed by a long condylar neck and is designed for complex movements, including lateral excursions, rotation, and translation, allowing for a wide range of functional mobility. In carnivores, however, the TMJ exhibits a more constrained hinge-like motion with limited lateral displacement and a shorter even absent neck of the condyle. The anatomical and biomechanical difference influences the types of fractures seen in veterinary patients and affects the approach to surgical stabilization.

Conclusion

A comparative analysis of jaw fracture epidemiology in humans and domestic carnivores reveals significant differences in fracture distribution, causative mechanisms, and anatomical predispositions. These distinctions underscore the importance of species-specific approaches in maxillofacial trauma management. The recognition of unique fracture patterns in cats, particularly the prevalence of Le Fort III-type fractures, adds a new dimension to veterinary surgical planning. By integrating epidemiological data with anatomical insights, veterinary surgeons can optimize treatment strategies to improve outcomes in canine and feline patients suffering from jaw fractures.

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Pressure's On Mastering Hypotension Management Under Anaesthesia

Stacey Parker

Unfortunately, dentistry cannot be safely performed without general anaesthesia. Hypotension is a common side effect of general anaesthesia, and can be incredibly detrimental to our patient in both the short and long term. It can also be a cause of stress to the Veterinary team as they attempt to correct a hypotensive episode.

We may have improved their health and wellbeing through performing excellent oral surgery but this will mean nothing if they then suffer the negative and potentially life altering side effects of hypotension.

Everyone wants to know the golden answer- how do we treat hypotension? The answer, is not as easy as a one size fits all. We must understand the elements that make up blood pressure, and how the drugs we utilise and existing disease processes our patients may have will effect our patients' blood pressure.

During the session you will become very familiar with this calculation- one we need to fully understand in order to appropriately treat hypotension under general anaesthesia.

MAP= Cardiac Output (CO) x Systemic Vascular Resistance (SVR)

ALL patients should have their blood pressure monitored under general anaesthesia.

The American College of Veterinary Anaesthesiologists recommends blood pressure monitoring as a minimum standard for managing the anaesthesia care of moderate to severely ill patients.

The utmost care should be taken to prevent an episode of hypotension, however, despite best efforts, it can still occur, and we should have a plan to treat this for each patient.

Hypotension is classed as a Mean Arterial Pressure (MAP) below 60 (70) mmHg, Systolic below 100mmHg. Below these values the body cannot autoregulate blood flow to the major organs.

The blood pressure (BP) cuff selected should have the width 40% of the circumference of the limb, some BP cuffs will also have markings on showing the optimum areas.

The limb with the BP cuff on shouldn't be elevated too high above the heart, as this will not achieve a true reading.

A blood pressure reading should be obtained a minimum of every 5 minutes under anaesthesia and annotated clearly on the anaesthesia form. The VS must be made aware if the patient is suffering from hypotension, and the episode treated appropriately.

If the patients' blood pressure remains below a MAP of 60mmHG, then they are at risk of:

- Reduced tissue perfusion
- Accumulation of lactic acid leading to acidosis
- Damage to the kidneys, this may not be seen immediately
- Worsening of chronic kidney disease
- Severe hypotension will provide reduced coronary bloods flow, leading to arrythmias and cardiac arrest
- Prolonged recovery
- Death

So, I have given a fluid bolus what is next? We need to move on from expecting a fluid bolus to fix everything, quite commonly, this is not what the patients requires- and can indeed cause more harm than good.

To safely treat hypotension, we must first be aware of what may have caused it in the first place.

Causes can include:

- Incorrect cuff choice or placement
- High levels of inhalant
- Bradycardia
- Vasodilation by inhalant/drug choice
- Decreased cardiac contractility
- Hypovolaemia/fluids lost/dehydration
- Drugs administered

The session will be broken down into manageable sections, detailing us through the flowchart, that we use, to treat hypotension in our patients undergoing general anaesthesia for dentistry and oral surgery.

In summary within this session we will cover:

- Understanding the components that make up blood pressure
- Recognising hypotension
- Acknowledging why we must avoid hypotension
- How to increase your confidence in how to both **avoid** and treat hypotension including the use of vasopressors such as Ephedrine and anticholinergics such as Glycopyrronium

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THE RESULTS

Summary of the effect of **PEDIGREE® DentaStix™ Daily Oral Care** chews on plaque and calculus accumulation, relative to a control diet.

REDUCTION	PLAQUE (%)	CALCULUS (%)
AVERAGE	30.6	61.9
HIGHEST	68.1	97.3
GINGIVAL REDUCTION	25.0	ND

PLAQUE COVERAGE WITH DIET ALONE

PLAQUE COVERAGE WITH PEDIGREE® DENTASTIX™ DAILY ORAL CARE

Coloured representations of actual images. Images reproduced with permission of the WALTHAM Petcare Science Institute. Wallis C, Gill Y, Colyer A, Davis I, Allsopp J, Komarov G, Higham S, Harris S. (2016) Quantification of canine dental plaque using Quantitative Light-induced Fluorescence. Journal of Veterinary Dentistry. 33, 26-38.

*Independently tested in canine dental efficacy studies at the University of New England, Australia, 2002 & 2003. Brown W and McGenity P. (2005) Effective Periodontal Disease Control Using Dental Hygiene Chews. Journal of Veterinary Dentistry. 22, 16-19.

INCISOR stream

RIBA Gallery

How to perform an oral examination and charting: what is normal and abnormal

Rob Davis

BA VetMB MANZCVS (Small Animal Dentistry and Oral Surgery) MRCVS

Conscious examination

- Conscious examination gives very limited information about oral health
- Calculus deposition does not necessarily correspond with degree of periodontal disease
- Look at gingiva rather than teeth for clues to periodontal health status
- Palpate LNs, look for facial asymmetry.
- Remember exophthalmos, pain on opening mouth, sneezing, facial swellings may all be related to dental disease

Check occlusion before intubating

- Folding tongue dorsally and caudally into oropharynx makes closing mouth easier
- Once ETT is in place not possible to close mouth fully
- Check relative jaw lengths
    - Lower canines occlude outside palate between upper I3 and canine
    - Lower incisors occlude just palatal to upper incisors (against cingulum)
- Upper carnassial (4^{th} PM) occludes outside lower carnassial (1^{st} M)
- Premolars occlude in zigzag pattern with cusp in the middle of the opposing diastema
- Linguoverted mandibular canines and jaw length discrepancies are common in dogs and are easily missed once intubated
- Malocclusions less common in cats
    - Check caudal occlusion too

Radiography

- If doing full mouth radiographs do them first
- If only taking selective radiographs then take after charting

Instruments

- Dental probe
    - Blunt end to avoid trauma to soft tissue in sulcus
    - mm markings - NB different patterns
    - Check against ruler before starting to chart
- Sharp explorer
    - Sharp point for detecting defects in hard tissues
    - Used perpendicular to tooth surface
    - Never use on soft tissue
- Mirror
    - Make yourself use one
    - Takes practice but makes charting much quicker and easier
- Modified pen grip
    - Used for most dental instruments including scaler and high/low speed handpieces
    - Use fourth and fifth fingers to stabilize hand

Charting

- Examination of all teeth
- May require gross calculus removal before probing
- Periodontal probe used gently in sulcus
- Sharp explorer used only on hard tissue with point perpendicular to tooth surface
- Chart used in conjunction with radiographs to plan treatment
- Ensures no teeth missed out
- Provides record of current diagnosis / treatment
- Give copy to owner
- **ONLY RECORD USEFUL INFORMATION!**
- Electronic charting available
- Paper charts cheap (free pdf on BVDA website for members)

AVDC Nomenclature committee

- https://avdc.org/avdc-nomenclature/
- Generally accepted terms for oral anatomy and pathology
- Stages used in charting are defined here.
- Useful (free!) resource

Periodontal disease

- Sulcus depth – measure all around each tooth with probe
- Normal in dogs 1-3mm
- Normal in cats <1mm
- Learn to use mirror
- Furcation exposure
    - Stage 1: <50% tooth width
    - Stage 2: >50% but not fully through
    - Stage 3: “through and through”
- Mobility
    - Stage 0: physiological mobility up to 0.2mm
    - Stage 1: 0.2 – 0.5mm
    - Stage 2: 0.5-1mm
    - Stage 3: >1mm or ANY axial movement
- Stages of periodontal disease: NB relates to single tooth only – there are often multiple teeth with different stages of periodontal disease in the same mouth.
    - Stage 0: clinically normal, no visible gingival inflammation
    - Stage 1: gingivitis only
    - Stage 2: up to 25% attachment loss
    - Stage 3: 25-50% attachment loss
    - Stage 4: >50% attachment loss
- Gingival height measured from cemento-enamel junction
    - Enlargement – pseudo-pockets
    - Recession – attachment loss greater than probing depth

Missing teeth

- Missing teeth marked on chart
- If unexplained then radiograph
- Unerupted teeth should be extracted

Supernumary teeth

- May accelerate periodontal disease due to overcrowding
- Malocclusions may result
- Can be left in situ if not causing any problems

Persistent deciduous teeth

- Deciduous teeth should be exfoliated before the successional permanent tooth erupts
- Canines most common but incisors and premolars too

Fractured teeth

- Complicated = exposure of pulp tissue
    - Extraction or endodontic treatment
- Uncomplicated = no pulp exposure
    - Can be left or sealed if no evidence of endodontic disease

Abrasion

- Loss of dental tissue due to wear from external surfaces
    - Tennis balls
    - Cage biters

Attrition

- Loss of dental tissue due to contact with opposing teeth
- Avoidable if malocclusions diagnosed and treated early

Discoloured teeth

- 92% of teeth with entirely discoloured crowns had grossly necrotic pulp
- Some with partial discolouration only may survive the original insult

Tooth resorption

- Used sharp explorer perpendicular to tooth surface to feel for “catching”
- Differentiation of types requires radiography
- Differentiation essential for treatment planning

Oral Masses

- Record size, shape, position etc.
- Radiograph
- Photograph if possible
- Diagnosis will require histology

Dentigerous cysts

- Associated with unerupted teeth
- Extension of eruption cyst -> significant bone loss
- NOT neoplastic – surgery should be curative.
- Radiograph any unexplained missing teeth
- Check when neutering

Oro-nasal fistula

- Commonly seen following upper canine extractions
- Dachshunds….
- Do not “give time to heal”!
- Remember the first attempt at repair has the best chance of success

Caries

- Demineralisation of dental hard tissues by action of acid produced by plaque bacteria
- Seen mainly on occlusal surfaces of molars (and upper 4th premolar)
- Often sugar in diet (human biscuits, sugary tea etc)
- Not seen in cats (no occlusal surfaces, low CHO diet)

Feline Chronic Gingivostomatitis

- Gingivitis = inflammation up to muco-gingival junction
- Stomatitis = inflammation extending into mucosa beyond MGJ
- Caudal stomatitis = inflammation of palatoglossal folds
- Inflammation / ulceration may affect tongue and palate

Sialocoeles

- Extravasation of saliva into surrounding tissues
- Can be due to trauma or sialoliths but cause usually unknown
- Mandibular / sublingual chain most commonly affected
    - Cervical, sublingual or pharyngeal sialocoeles

Oral examination and charting – key points

- Examine ALL teeth
- Only record clinically useful information on chart (generally not useful to record calculus / gingivitis scores)
- No need to record every detail about every tooth
- Combine chart with radiographs to plan treatment
- Mark treatment as completed so none missed out
- Use chart to estimate second stage if performing staged dentistry
- Attach chart to clinical record
- Give copy to owner (and go through it with them)

Abnormal tooth development: Consequences, New developments and Treatment approaches

Maura Lazzarotto

- Abnormal Tooth Morphology
  - Embryology Review
  - AVDC Nomenclature for Common Findings
    - Supernumerary Tooth/ Hyperdontia, Hypodontia, Oligodontica, Anodontia, Macrodontia, Microdontia, Microdontia, Transposition, Fusion/Syndontia, Concrescene, Fused Roots, Gemination, Supernumerary Root, Dilaceration, Dens Invaginatus/Dens in dente, Enamel Pearl
  - Dentinogenesis Imperfecta and Primary Dentin Disorders
  - Odontodysplasia Regional and General
  - Causes
    - Iatrogenic
      - Secondary to deciduous tooth extractions
    - Trauma
      - Localized enamel defects, non-vital teeth, unerupted teeth, displaced teeth
    - Toxins/Drugs
      - Tetracycline/Doxycycline
    - Systemic Illness
      - Distemper Virus, Parvo Virus
    - Nutritional
    - Endocrine
      - Primary Hypothyroidism
    - Genetic—breed specific
      - Chinese Crested, Samoyed, Laboratory Beagles, Bull Terriers
- Abnormal Eruption
  - Steps and Timing of Eruption Review
  - AVDC Nomenclature
    - Unerupted tooth, embedded tooth, impacted tooth, dentigerous cyst, folliculitis, pericornitis
  - Unerupted Teeth
  - Partially Erupted Teeth
    - When is treatment necessary?
  - Eruption in abnormal location/ MAL 1
    - Possible causes, consequences, treatment
  - Genetic—breed specific
    - Shih Tzus, Bedlington Terriers

Setting patients up for a lifetime of good oral health

Ceri Owen

BVM BVS PgCert WBIS (Small Animal Dentistry) MRCVS, RCVS Advanced Practitioner in Small Animal Dentistry

How can we manage owner expectations and set our patients up for a lifetime of good oral health?

Ceri Owen BVM BVS PgCert WBIS (Small Animal Dentistry) MRCVS
RCVS Advanced Practitioner in Small Animal Dentistry

Why should we be concerned about dental disease in our companion animal patients?

- It's painful i.e. a welfare issue
- Poor dental health may be associated with other disease e.g. in humans, periodontitis is associated with cardiovascular disease and a high risk of heart attack/stroke

How can we prevent dental disease in our companion animal patients with no abnormal findings?

In the puppy/kitten consult, consider;

- Discussing toothbrushing
- Discussing alternatives to toothbrushing
- Discussing safe treats and chews to prevent fractures
- Setting owner expectations in terms of likelihood of dental disease
- Discuss typical costs and financing dental treatment with owners

Consider following the puppy/kitten consult with toothbrushing clinics;

For junior pets, consider;

- Routinely checking newly erupted adult dentition; check occlusion and for missing/additional teeth (e.g. for supernumerary or retained deciduous teeth)
- Check owners are still on-board with oral homecare and follow up if necessary

For adult pets undergoing routine examination with no abnormal findings notes;

- Follow up on oral homecare,
- Follow up on safe treats and chews
- Follow up on likelihood of dental disease and costs/finance

How about when something 'goes wrong'?

Be aware of the limitations of history and conscious oral exam;

- How often do owners report dental abnormalities vs. abnormalities being noted on clinical exam with no concerns in the history?
- How easy is it to establish on conscious exam that our patient does/does not have dental pain?
- Dental disease is very common; a prevalence of over 80% in dogs and 70% in cats was noted in one study (Kortegaard et al, 2018)

If in doubt, plan full examination under GA;

- Concerns on history
- Abnormalities on conscious clinical exam
- Calculus obscuring tooth/gingiva
- Conscious exam not safe/possible

An optional script;

- I have found some signs of dental disease…
- We can't rule pain out and it can predispose your pet to other diseases…
- Let's get your pet booked in for some further assessment under general anaesthetic..

COHAT: Comprehensive Oral Health Assessment and Treatment

- Conscious clinical examination
- Planning the anaesthetic
- Oral exam under anaesthesia including radiographs
- Treatment
- Follow up plan
- Discharge
- Homecare

Informed consent: discussing risks which include but are not limited to;

- General anaesthetic complications
- Surgical complications: wound breakdown, bleeding, swelling and infection
- Dentistry-specific complications
  - retained/displaced tooth roots
  - damage to surrounding structures
    – tooth, nerve, soft tissue, eye
  - fracture of tooth or bone including jaw fracture
  - communication between structures (oro-nasal fistula)

→ Managed in house or specialist referral
+/- 'Staging' – treating all in one go vs splitting into multiple GA/procedures

A CALL TO ACTION….

- Set a team meeting
- How does 'Dentistry is for life' look within your practice
- Is everyone in the team delivering the same message?
- Start by selecting one topic for puppies/kittens and one for adult patients

Topics to consider – puppies and kittens:

- Recommending toothbrushing at puppy/kitten stage
- Sending owners home with everything they need to get started
- Following this up including use of plaque disclosing solution
- Discussing pet insurance including dental cover
- Setting the expectation that our patients are going to need regular dental treatment
- Checking adult dentition when erupted (neuter/6 month check)

Topics to consider – adult patients

- Asking at every consult 'how often are you toothbrushing?'
- Sharing the message with clients that dental pain is sometimes undetectable
- Making confident recommendations when we see the early signs of dental disease – and following up on them
- Clearly setting expectations around procedure benefits, risks, staging and aftercare

Feline chronic gingivostomatitis (FCGS)

Yoav Bar Am

FCGS is a painful and debilitating feline oral condition characterized by a severe immune mediated chronic bilateral inflammation of the gingiva, alveolar, labio-buccal mucosa, and caudal oral mucosa (retromolar area lateral to the palatoglossal folds).

Cats affected by FCGS are often presented with severe dysorexia/anorexia, oral pain, weight loss, ptyalism, halitosis, and lack of grooming. The lesions are ulcerative in nature and clinically present with an ulcerative or ulcero-proliferative pattern. Lingual ulcers may also be present in some cats. In addition, FCGS has been shown to be associated with more widely distributed and severe periodontitis and with a higher prevalence of external inflammatory root resorption and retained roots than other oral diseases. Nevertheless, the presence of caudal stomatitis distinguishes FCGS from other feline oral conditions. Histologic findings show a complex, chronic and destructive inflammatory process affecting the epithelium and lamina propria with frequent extension into submucosal tissues. The number of plasma cells, neutrophils and CD3+ T lymphocytes correlate with the severity of inflammation. T cells are present in the superficial mucosa and submucosa, whereas B cells and Mott cells are restricted to the submucosa. The inflammatory response showing a predominance of CD8+ (cytotoxic) T cells over CD4+ (helpers) T cells suggest a cytotoxic cell-mediated immune response to antigenic stimulation that may be associated with viral infections.

Additionally, the CD4/CD8 ratio in the peripheral blood of FCGS cats is dysregulated due to an increasing number of CD8+ cells in circulation. A recent metagenomic study of the feline oral microbiome, has shown that Feline Calici Virus (FCV) was the only microbe strongly associated with FCGS; FCV was not identified in healthy cats and in cats with periodontitis. Additionally, FCGS cats presented an upregulation of genes promoting antiviral activity than control cats, an event which is compatible with the hypothesis of antigenic stimulation of viral origin contributing to FCGS. Environmental and stress factors may also play a role. FCGS is more prevalent in multi-cat than in single-cat environments and in cats with no access to outdoors. The risk correlates with the number of cohabiting cats. Multi-cat housing may allow chronic carriers shedding viruses to facilitate the cyclic reinfection of susceptible individuals, which immune function may be impaired by the stress of living in a multi-cat environment.

The clinical management goals for FCGS are to decrease or eliminate antigenic stimulation and modulate the abnormal immune response.

Extraction of all teeth or premolar and molar teeth is the currently accepted standard of care for the primary management of FCGS. The rational for dental extraction is the suppression of chronic antigenic stimulation caused by dental plaque and by dental inflammatory or infectious diseases. Substantial improvement or complete remission has been reported in about 70% of FCGS cats. Co-infection of FCV and puma feline foamy virus (PFFV) as well as infection with feline leukemia virus (FeLV) have been associated with a lack of response to treatment. Cats showing little or no improvement (refractory cases) require continuous medical treatments that include antibiotics, analgesics, immunosuppressives and immunomodulation, often given in combination.

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Should I or Shouldn't I? Prescribing Antibiotics in Veterinary Dentistry

Hannah Lohr van Velzen

It is commonly accepted that oral bacteria within plaque play an important role as initiators of inflammation, which if left untreated may progress to periodontal disease. Equally common is the misunderstanding that antimicrobials have a wide range of indications within veterinary dentistry. In this lecture we will investigate the true role of bacteria in oral disease, the effects of periodontal disease on systemic health according to recent literature, what true indications there are to consider antimicrobial therapy, and what treatment protocols may be appropriate in those scenarios.

Picture Perfect: Top Tips for Dental Radiography

James Haseler

Dental radiography can seem daunting to a lot of us but it is a key part of veterinary dentistry. Used correctly, dental radiography can make dental procedures easier, prevent multiple complications and overall make veterinary dentistry more enjoyable. The aim of this lecture is to walk you through the key parts of dental radiography, from set up and positioning to interpretation as well as give you some helpful tips and tricks along the way.

First of all, let us look at the set up for dental radiography. Dental radiography can be split into two types; computed radiography (CR) which uses plates with a separated developer and direct radiography (DR) which is has a CMOS censor within the plate and a cable connected directly to the computer. Each system has their benefits and disadvantages. CR dental radiography is very useful because it has a large number of plate sizes and has a much higher resolution compared to DR systems. The plates are also much cheaper than DR systems, however, the initial set up with the developer can be quite costly. DR systems are very useful when you are starting out because you don't have to remove the plate to develop an image. This makes it great for teaching and practicing your angles. This disadvantage of these plates is they only come in 2 sizes (a size 2 and size 4) compared to the CR systems. Thery are also much thicker which can make it tricky to use in smaller patients.

Now we have the system in place, let's look at positioning for radiographs. To most people this is the daunting bit and can discourage the use of dental radiography. The aim of this section is to boost your confidence in positioning for dental radiography and how to correct it to produce great and diagnostics radiographs. Dental radiography boils down to two positions; the parallel and the bisecting angle technique. The parallel technique is the easier of the two and involves positioning the x-ray plate so that the tooth/teeth are directly between the x-ray generator and the plate. This technique is commonly used in humans but is unfortunately, limited to the mandibular molar and caudal premolar teeth in dogs and cats. The reason for this is because the hard palate in dogs and cats is flat compared to the arched palate in humans. Therefore, for the remaining teeth, we must resort to the bisecting angle technique. Instead of projecting directly onto a plate like the parallel technique, the bisecting angle essentially projects a shadow of the image which has the exact proportions of the image being projected.

There are many methods and techniques which help determine the angle such as the iM3 angle guides, however, these fixed guides do not work for every dog. Also, if you use a small plate like a size 2, the angle will be different because the plate rests against the palate compared to a larger plate, such as a size 4, where it spans the two maxillary arcades (figure 1). My recommendation would be focus on positioning by eye and we will then look at how to adjust the angles based on the radiograph. Essentially, the bisecting angle technique takes into account the angle created between the plate and the axis of the tooth. The line that runs through the middle of that angle is the bisecting angle. The x-ray beam should be perpendicular to this angle. A handy tip to position the x-ray generator for this angle is to imagine a flat surface is placed along the bottom of the generator cone and the angle this creates when looking from the front of the dog should correlate to the bisecting angle (figure 2). Another tip to aid positioning is to image a line running from the x-ray generator, through the rough position of the root apex of the tooth in question and see whether the line created hits the plate. If this is the case, the radiograph should have the whole tooth on the plate. You can then adjust the angle depending on the appearance of the radiograph. Finally, make sure the generator head is pointing directly at the plate in a rostrocaudal direction. The root apices of the maxillary canine and 4th premolar teeth can be palpated on the maxilla, but the mandibular teeth can be harder to locate. If the generator head is rotated rostrally or caudally, this is called a tube shift and we will talk about this late in the article.

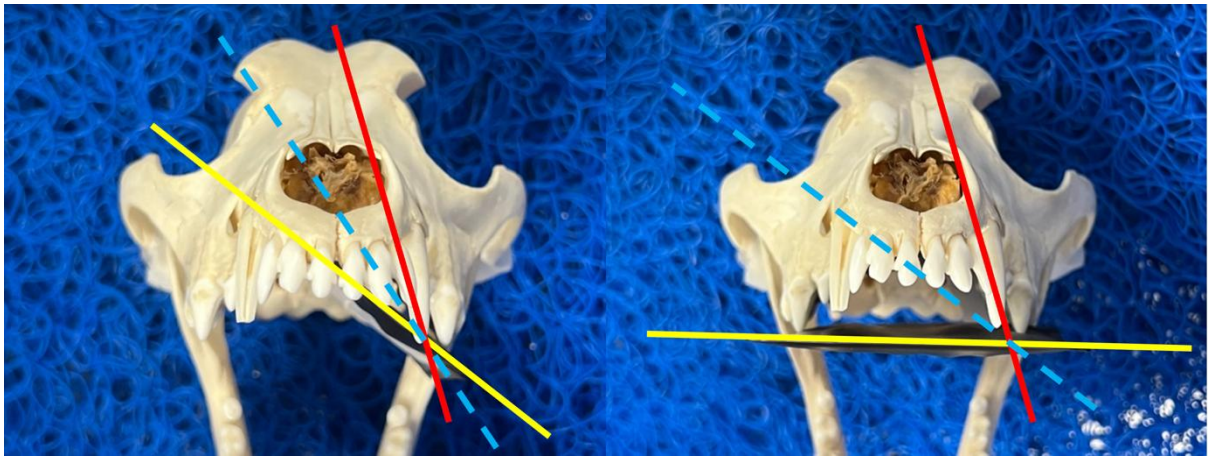

Figure 1: Difference between the bisecting angles (blue dashed line) when using a small (size 2) and large (size 4) plate.

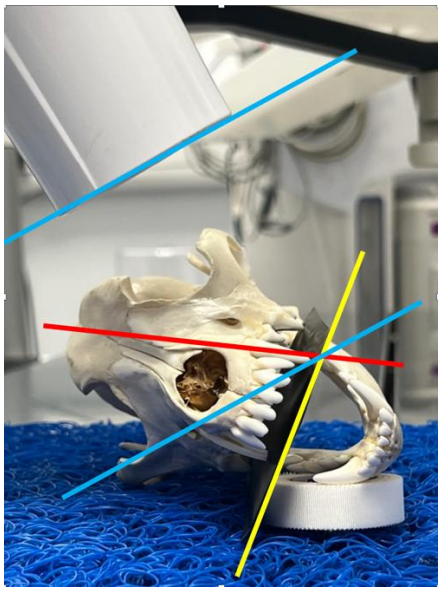

Figure 2: The bisecting angle (blue line) matches the line drawn across the bottom of the generator cone

This technique is used for taking a lateral view of the canine, premolar and molar teeth as well as an occlusal view of the incisor and canine teeth. The occlusal view is taken from the front of the dog. A tip on how to perform an occlusal view is to position the plate between the canine teeth with the incisor teeth on the edge of the plate. Point the x-ray generator directly perpendicular to the plate to line it up and then tip the generator slightly rostrally (figure 3)

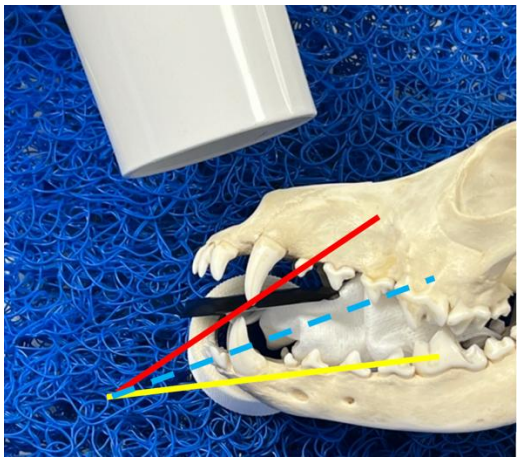

Figure 3: Bisecting angle for the incisor teeth

The position of the patient is important when taking radiographs. A lot of the positioning posters and pictures have the patient in sternal which, in reality is not how they are positioned for any treatment and involves turning the patient multiple times. My recommendation would be to learn to position the radiographs with the patient in the recumbency that you operate in. I recommend operating in lateral to avoid too much manipulation of the head and neck.

Every intraoral radiograph should have the plate positioned along the cusps of the teeth which are to be imaged. This provides the largest amount of surface area for the radiographs and limits the amount of dead space (figure 4). In dogs, especially in large brachycephalic breeds, the coronoid process of the mandible prevents placement of the plate for the maxillary molar teeth. In this case, the plate may need to be rotated so it runs medial to the process and so that the cusps of the molar teeth run along the edge of the plate (figure 5).

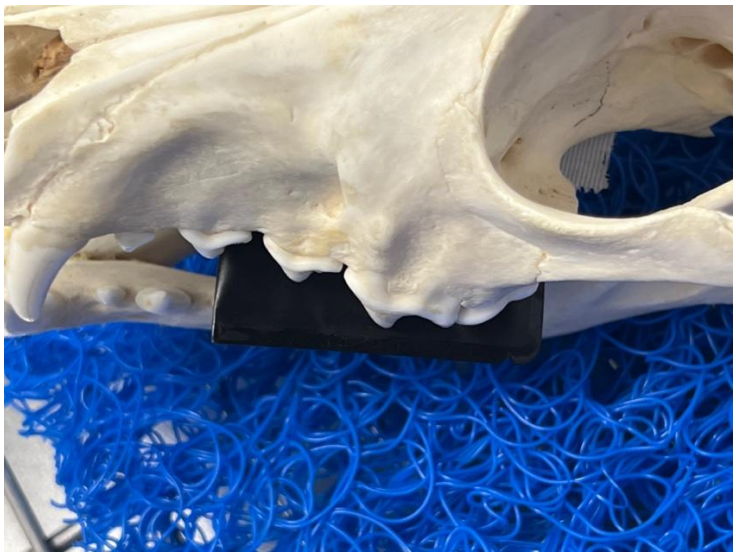

Figure 4: Showing the position of the plate to limit the amount of dead space

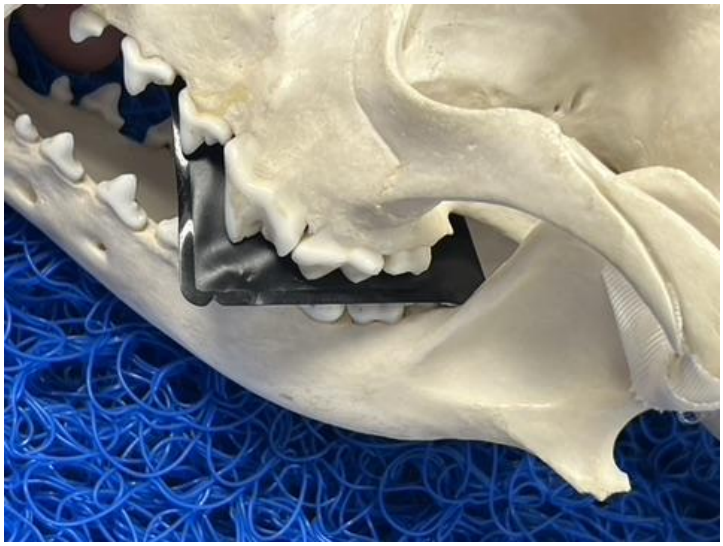

Figure 5: Showing the position of the plate to avoid the coronoid process

Once you have taken the radiograph, remove the plate but leave the x-ray generator where it is. This allows for minor adjustments to be performed. To determine which adjustment is required, look at the appearance of the tooth. If the tooth appears elongated, your x-ray beam is too low and casting a long shadow. To rectify this, move the generator more towards the apex i.e. towards the dorsal aspect of the maxilla or the ventral aspect of the mandible. The opposite is true for teeth that look too short.

If the tooth appears normal but there is a partial image, this is most likely because the plate is in the wrong position. Do not move the generator as the angle is correct. If the roots are missed off radiographs and there is a lot of black space, the plate needs moving towards the midline and further from the midline to include more of the crown. If you have a DR system and only have a size 2 plate, large canine teeth will not fit on the plate. In these cases, position the plate on the distopalatal/distolingual aspect of the tooth.

The bisecting angle technique and parallel technique will allow you to take a good set of dental radiographs, however, there are a few more techniques we will cover to aid with views of the caudal maxillary dentition where there is a lot of superimposition. Both of these techniques are extraoral views where the image of the tooth is projected externally. The first technique is the trans-orbital projection which is used to view the buccal roots of the maxillary molar teeth. This projection has been published by Ruhnau in JVD 2023 and is very useful to aid in identify root remnants. One thing to remember with this view and any other extraoral view, is that the image is flipped (figure 6).

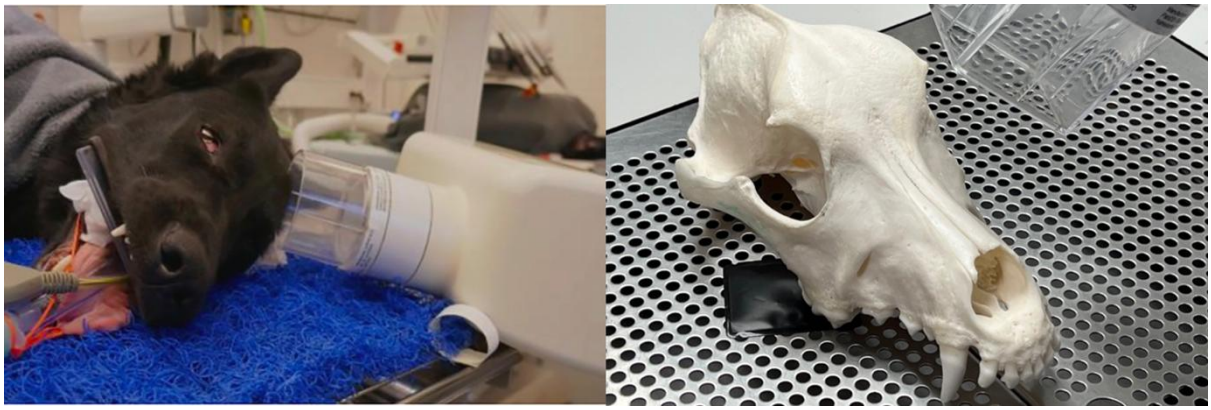

Figure 6: Photo showing the transorbital view

The other view is the extraoral lateral view for the maxillary teeth in cats. The difficulty with the standard intraoral is that the zygomatic arch can superimpose across the roots of the maxillary teeth, making it difficult to view. The extraoral view is used to move the zygomatic arch from view. To perform this, place the plate so that its edge is level with the cusps of the teeth with the cat in lateral. Open the mouth and place a swab in the mouth to keep it open. Avoid using a mouth gag in cats. Point the generator directly at the plate and then shift the beam around 30 degrees from perpendicular so the beam runs through the mouth (figure 7).

Figure 7: Extraoral view

The final view is the skyline view. This is used to remove any superimposition of the crown when looking at traumatically injured teeth. The beam of the x-ray should be lined up to pass directly across the fracture line (figure 8).

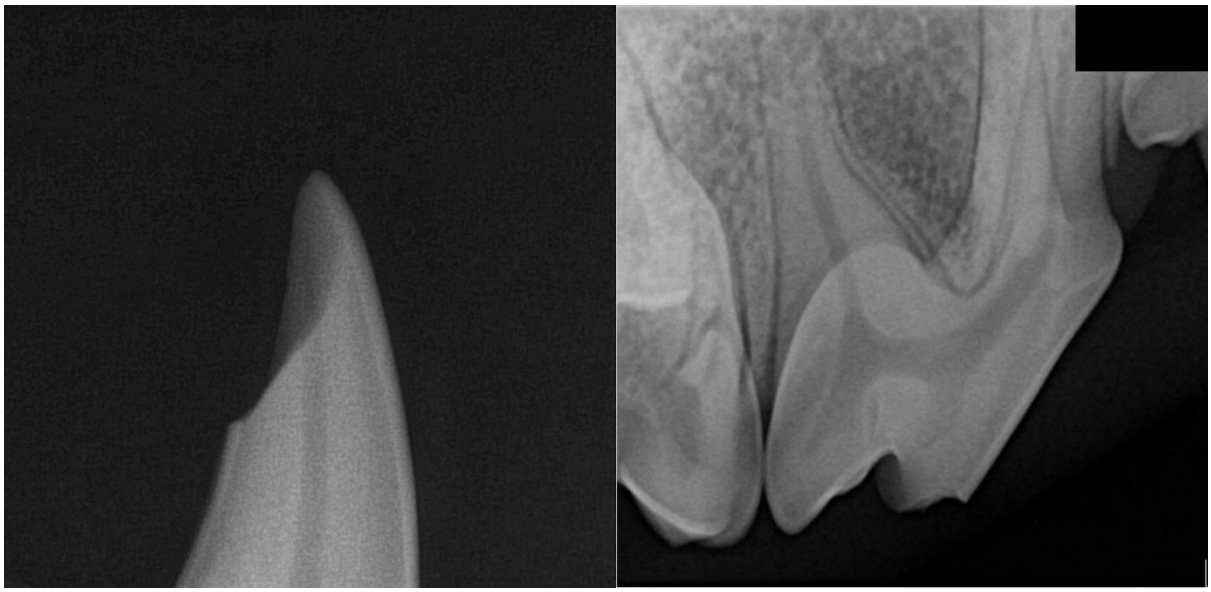

Figure 8: Examples of a skyline view. Note the lack of superimposition

A tube shift consists of moving the head of the x-ray generator either rostrally or caudally to the original position. This is especially useful to separate the roots of the maxillary 4th premolar teeth as well as the caudal mandibular teeth in small dogs if you cannot visualise the teeth with a standard lateral parallel view. Sometimes, you may have to move the plate for example move the plate rostrally when doing a caudal tube shift to avoid projection of the tooth off the plate. A tube shift is also useful to rule out apical pathology. For example, the middle mental foramen can overly the apex of the 2nd premolar tooth making it appear like an apical periodontitis. If you perform a tube shift, this lucency will not move from its original position if it is apical pathology.

It is recommended to perform full mouth radiographs for all feline dental procedures. Around 40% of cases with normal oral examination will have clinical important findings on dental radiographs (Verstraete AJVR 1998). In dogs, I recommend taking radiographs of any tooth with pathology identified on oral examination as well as areas of missing teeth to rule out root remnants and unerupted teeth. Cases for full mouth radiography would include brachycephalic dogs, dogs with generalised enamel defects such as abrasion and enamel hypoplasia and cases with severe periodontitis. Anecdotally, in my experience, brachycephalic dogs such as pugs have a large number of maxillary incisor teeth that are radiographically non-vital without any periodontal attachment loss. Also, brachycephalic dogs have a high prevalence of unerupted teeth. I would always recommend radiographing any tooth prior to extraction and the site following extraction of a tooth. Extraction cannot be confirmed without dental radiography and a radiograph act as evidence if complications occur following the procedure. Orthogonal views (lateral and occlusal views) would be recommended for the canine teeth.

Finally, we will look at a few artefacts and how to rectify them. A common artefact which appears as a smear across the radiograph is blood staining on the plates. This occurs with CR systems and can be avoided be using new sleaves for each use. Also make sure to have an assistant replace the sleaves or use clean hands. Make sure to store the CR plates in their sleeves to prevent exposure to light as well as damage to the plates such as scratches. Avoid forcing the CR plates into the developer because this can cause delamination of the plates which creates an artefact at the edge of the plate. Other opacities which can appear like tooth roots and other pathology is calculus. Make sure the mouth is rinsed thoroughly following professional dental cleaning to remove any debris and prevent artefacts. Cone cutting, is when your radiograph does not fill the entire plate and there is an evident circular artefact surrounding the radiographs. It is commonly seen when using the larger plates (size 4 and size 5) and results when the cone is left in place when taking the radiograph. Most cones can be removed from generators

and have a circular collimator within them which creates a narrow beam of radiographs. By removing the cone, the beam becomes wider and the cone cutting is rectified. I would recommend moving the generator head further away from the plate when the cone is removed to allow a good x-ray spread.

Finally, avoid using the protective plates when performing a parallel radiograph. The shape of the plate protector has a circular indent which can appear like a fracture when running across the bone (figure 9).

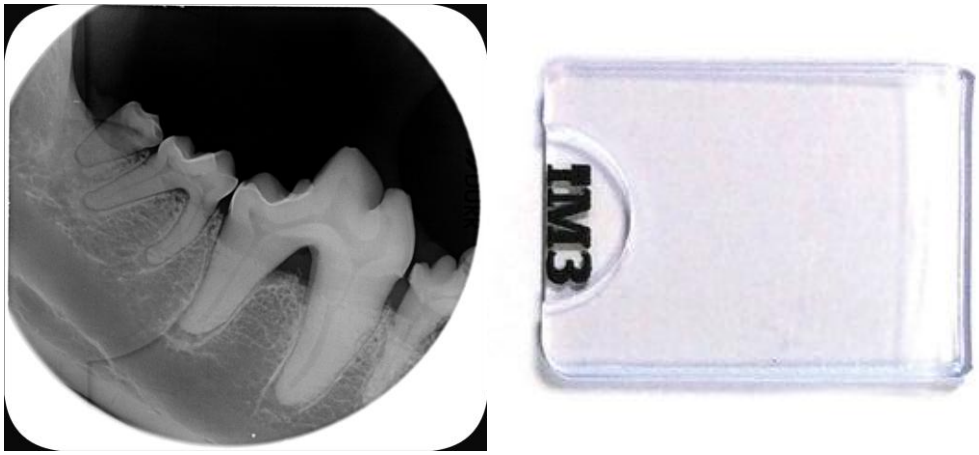

Figure 9: Example of an artefact caused by the edge of a plate protector. Also note the radiograph is within a circular structure. This is cone cutting.

Once you have your radiographs, mount the radiographs using labial mounting. This is a universal method of mounting the radiographs allows identification of teeth without labelling and prevents confusion. To mount the radiographs in this way, do not flip the radiographs and rotate the images so that the maxillary teeth point downwards (the cusps at the bottom) and the mandibular teeth pointing up (the cusps at the top). Labial mounting usually corresponds to the layout of most dental charts with the right teeth on the left hand side and visa versa.

The main tip with dental radiography is practice, practice, practice. Starting out, it can be difficult but with practice, it will become second nature. I would not aim to get a perfect radiograph straight away, instead aim to get the tooth within the margins of the radiograph so that it is a diagnostic view i.e. not overly elongated or foreshortened and with at least 2mm of bone surrounding the apices. With time it will become easier to produce a perfect radiograph and the more practice you can have, the quicker this will happen. Hopefully, this lecture has given you the tips and tricks you need to take amazing dental radiographs and appreciate that dental radiography is not as daunting as you first thought.

CARNASSIAL stream

Jarvis Hall

Palatal clefts and defects

Yoav Bar Am

Palatal defects may either be acquired or congenital. Acquired palatal defect may be caused by trauma (vehicular, high rise, bite wounds, penetrating injury), Iatrogenic (aggressive extractions), or due to advanced severe periiodontitis (oronasal fistula).

Congenital cleft of the lip and palate are deformities of the face reported in dogs and cats. An accurate epidemiologic study of this condition is very difficult due to unreported death of affected animals by their owners, however one study reports the incidence of 0.5/1000 in dogs and 0.2/1000 in cats. breed, genetic cluster and skull type are of importance in the development of orofacial clefts in dogs. Breeds in the mastiff/terrier genetic cluster and brachycephalic breeds are predisposed to orofacial clefts. Other reported breeds affected by cleft palate include the American Staffordshire Terrier, Beagle, Bernese Mountain Dog, Boston Terrier, Boxer, English Bulldog, French Bulldog, Bullmastiff, Bull Terrier, Chihuahua, Cocker Spaniel, Cavalier King Charles spaniel, Dachshund, Labrador retriever, Norwegian Elkhound, Pekingese, Poodle (Toy), Papillon and shih Tzu. In dogs the cleft is not considered syndromic although, associated congenital defects such as cryptorchidism, hydrocephallus, epidermoid cyst, septal defect, microphtalmia, entropion, malformed bulla tympanica, bifid nose and/or tongue and poly dactyly have been reported. In cats it seems that the abyssinian breed is at the highest risk. Other reported breeds include Siamese, Persian, and Domestic Shorthair

Classification

Palatal defects are classified primarily as congenital or acquired.

Congenital clefts may occur in the primary palate, secondary palate, or both. The primary palate involves the structures situated rostral to the palatine fissure while the secondary palate consists of those structures caudal to the palatine fissure.

Cleft of the primary palate may affect the soft tissue only (cheiloschisis, aka harelip) or involve the alveolar ridge and incisive bone as well. It is most commonly manifested unilaterally with prevalence to the left side; it rarely occurs bilaterally and extremely rare is the medial cleft lip. Cleft of the primary palate may be associated with cleft of the secondary palate.

Cleft of the secondary palate may involve the hard palate, the soft palate, or both. It usually affects the midline although left or right cleft of the soft palate have been reported.

Embryology

Facial development which includes the orbital, nasal and oral regions begins when neural crest cells migrate and combine with the mesoderm to form 5 facial primordia which include the single fronto-nasal prominence and the paired maxillary and mandibular prominence. The philtrum, primary palate and the lateral and medial nasal prominences are first to start forming by proliferation and differentiation of the fronto-nasal prominence. During

the late embryonic phase the maxillary prominences proliferate and increase in size ventro-medially. When the tongue moves ventrally, it clears the way for the maxillary prominences to assume horizontal position and fuse at the midline forming the secondary palate (day 30-33 of gestation in dogs and cats). The maxillary prominences fuse rostrally with the medial nasal prominences to form the incisive bones and the upper lip.

Cleft lip will result from the failure of fusion between the maxillary prominences and the medial nasal prominences.

Primary cleft palate is the result of failure or incomplete fusion of the maxillary prominences with the fronto-nasal prominence.

Secondary cleft palate will result from incomplete or failure of the lateral palatine processes (maxillary prominences) to fuse.

Cleft Palate Presentation, Diagnosis, and Treatment

Clinical signs of cleft palate are often noticed soon after birth and include drainage of milk from the nose, gagging or coughing while suckling, and failure to thrive. Repair is recommended to prevent complications including rhinitis and aspiration pneumonia.

Numerous surgical techniques are described with the most common being the Von

Langenbeck technique, bipedicle flap technique, and the overlapping flap technique.

For more complex clefts, or those that have undergone previous repair, double-layer techniques are more appropriate as they better combat the adverse local factors in the oral cavity including tongue movements, mastication, and microbial contamination. Functional success after cleft palate repair is reported at 85%. However, multiple surgeries are often required for the successful closure of the defect. Number of tissue layers used for closure, surgical technique used, stagging the procedure, and the severity of defect did not affect outcome.

CT scan is recommended before surgical intervention for surgical planning as well as to identify other maxillofacial abnormalities (syndromic clefts). CBC/chemistry and thoracic radiographs are recommended before general anesthesia.

There are varying recommendations in the literature regarding the ideal time to perform surgery, but most recommend waiting at least until 3 to 4 months of age unless highly symptomatic. Waiting until maxillofacial growth has slowed helps to minimize the adverse effects of palatoplasty on midface growth. Surprisingly, waiting longer to perform the repair does not seem to carry a benefit, with one study revealing a worse outcome when the repair was performed in patients more than 8 months of age.

To allow delay in repair, patients often require orogastric tube feeding or placement of a temporary prosthesis or specialized teat while being bottle fed. Use of a temporary prosthetic obturator can also be helpful in preventing aspiration pneumonia during staged procedures. In specific cases, obturators can also be used in place of surgical repair.

Gingivectomy and gingivoplasty: Indications, surgical techniques, and clinical outcomes

Ana Rejec Jenček

DVM, PhD, Dipl EVDC

Gingival enlargement and hyperplasia

Gingival enlargement is a clinical term that refers to the overgrowth or thickening of the gingiva in the absence of histopathologic diagnosis. This condition may be caused by inflammation, medication, genetic predisposition, or systemic conditions. It can lead to the formation of gingival pockets or pseudopockets, complicating oral hygiene and predisposing the animal to periodontal disease. Gingival hyperplasia, a subset of gingival enlargement, is a histological term referring to an abnormal increase in the number of normal cells in a normal arrangement in the gingiva.

In dogs, generalized gingival enlargement is commonly observed, whereas in cats, juvenile hyperplastic gingivitis is often seen in adolescent animals following the eruption of permanent teeth, typically around six months of age. Gingival hyperplasia represents a significant challenge in veterinary dentistry, primarily affecting dogs more frequently than cats. Certain breeds (e.g. boxers) show a predisposition to this condition. The underlying causes can range from idiopathic origins to systemic factors, including medications such as immunosuppressants, calcium-channel blockers, and anticonvulsants. These drugs alter calcium influx in gingival tissues, which inhibits apoptosis and stimulates fibroblast proliferation, leading to excessive gingival growth. Additionally, deficiencies in vitamin C and poorly understood systemic associations may contribute to hyperplasia, further complicating diagnosis and treatment.

Clinical presentation and diagnostic approach

Patients with gingival hyperplasia typically present with firm, localized, or generalized gingival enlargements that may mimic oral masses. These enlargements can trap plaque and debris, exacerbating periodontal issues, though primary hyperplasia remains noninflammatory. Bleeding upon probing may suggest secondary periodontal involvement but is not a hallmark of the hyperplastic process itself.

Definitive diagnosis requires histopathologic examination of biopsy samples to differentiate hyperplasia from other proliferative lesions (e.g. benign or malignant tumours or other lesions). Dental radiography is an indispensable in identifying bone-related pathologies that may mimic gingival hyperplasia, ensuring an accurate diagnosis.

Surgical anatomy

The gingiva surrounds the teeth and extends over the alveolar bone, forming a protective cuff. It is anatomically divided into two components, the free and attached gingiva. Free gingiva is not physically attached to the tooth but closely adapts to its surface and makes up the soft tissue wall of the gingival sulcus. Attached gingiva is apical to the gingival sulcus and is securely bound to the suprabony cementum and the underlying periosteum of the alveolar bone by means of junctional epithelium and connective tissue attachment. The mucogingival junction serves as a clear anatomical boundary separating the attached gingiva from the oral mucosa, except on the palate, where the two blend seamlessly.

The gingival epithelium is composed of multiple layers: the stratum basale, stratum spinosum, stratum granulosum, and stratum corneum, which may be either keratinized or nonkeratinized. Keratinized epithelium provides greater resilience, making healthy gingiva structurally superior to diseased tissue, which tends to lose keratinization due to irritation or disease.

The gingival sulcus is a shallow groove between the free gingiva and the tooth surface. Its depth varies by species and tooth size, with normal ranges of 0.5–1 mm in cats, 0.5–3 mm in dogs, and deeper measurements in larger teeth and breeds. The width of the attached gingiva and sulcus depth are influenced by the size and location of the tooth, with greater dimensions observed around larger teeth in larger breeds. Gingival papillae,

located in the spaces between teeth, form triangular projections that help prevent debris from entering these areas.

Beneath the sulcus, the junctional epithelium attaches to the tooth surface. This unique, nonkeratinized, highly permeable epithelium forms the epithelial attachment to the tooth surface.

Biologic width, the combined physiologic dimension of the junctional epithelium and connective tissue attachment, typically measures 2–3 mm in humans. In veterinary patients, it varies with tooth and periodontal size. It's crucial for maintaining the proper distance between the alveolar margin and restorations to preserve the dentogingival complex. During gingivectomy or gingivoplasty, respecting biologic width prevents inflammatory bone resorption and ensures proper tissue reattachment.

Techniques and tools for surgical management

The treatment of gingival hyperplasia relies heavily on surgical procedures such as gingivectomy and gingivoplasty. These procedures, performed using an array of tools, aim to remove excess tissue and reshape the gingiva to restore normal contours and function. Gingivectomy involves the surgical removal of gingival tissue, typically performed to reduce the depth of suprabony periodontal pockets by excising part of the pocket's gingival wall. In contrast, gingivoplasty reshapes the gingiva to establish physiologically and anatomically ideal contours. Gingivectomy and gingivoplasty are often combined to achieve optimal results in both functional and aesthetic aspects of periodontal therapy.

Gingivectomy and gingivoplasty are contraindicated if less than 2 mm of attached gingiva would remain after resection, in cases of moderate to severe periodontal disease requiring a periodontal flap, or in patients with bleeding complications, as these conditions pose significant risks. The choice of instrumentation, cold steel instruments, burs, lasers and electrosurgical units depends on the surgeon's expertise and the specific case requirements.

- **Cold steel instruments:** Scalpels and gingivectomy knives are cost-effective options that allow precise excisions. However, their use can result in significant bleeding, requiring careful management.
- **Diamond or carbide burs:** These are ideal for contouring gingiva with minimal bleeding but necessitate precise technique to prevent thermal injury to surrounding tissues.
- **Helical #12 fluted burs:** These burs offer an efficient solution for simplifying the gingivectomy procedure. One of their primary benefits is the ability to achieve immediate hemostasis, which minimizes bleeding and improves procedural efficiency. These burs also reduce the overall working time, whether used independently or in combination with the cold steel method. Conical burs with a rounded tip are particularly effective for shaping gingiva or addressing wide interproximal spaces. These burs are available in various sizes to accommodate different needs. Football- or egg-shaped burs are versatile tools suitable for both cats and dogs, making them ideal for a variety of applications. Flame-shaped, conical burs are specifically designed for use near enamel surfaces and in interproximal spaces. They efficiently lift loose or hanging gingiva without contacting the tooth surface, making them particularly valuable in treating conditions like juvenile gingival hyperplasia in cats.
- **Lasers and electrosurgical units:** Offering precise cutting and hemostasis, these tools reduce bleeding but carry the risk of thermal necrosis if used improperly.

Surgical techniques

Effective gingivectomy and gingivoplasty require meticulous planning and execution. The procedure begins with a thorough assessment, during which pocket depths are measured using a periodontal probe to determine the extent of tissue overgrowth. Incision lines are then marked using bleeding points or pocket-marking forceps to ensure precision. Tissue removal is performed using beveled incisions at a 45° angle to excise hyperplastic tissue while preserving natural gingival contours. Contouring follows, utilizing appropriate burs to refine the gingival shape and achieve smooth, anatomically accurate results. Scaling and polishing are then performed to remove any residual debris or calculus from exposed root surfaces, promoting optimal healing.

When employing advanced modalities such as radiosurgery or lasers, practitioners must consider tissue shrinkage during healing and adjust incision lines accordingly to achieve the desired outcome.

Postoperative care and healing

The immediate postoperative period necessitates optimal plaque control. Analgesics are used to manage discomfort in the first 5-7 days, and antimicrobial rinses can be used as alternatives to tooth brushing during the initial days. Healing progresses through epithelialization within two weeks, while complete keratinization of the gingival epithelium takes approximately one month. Although clinical healing may appear satisfactory within 13 to 15 days, full tissue maturation requires several weeks.

Potential complications and risk management

Complications can arise from improper technique or equipment misuse. Excessive bleeding may occur with cold steel instruments, while thermal injury is a concern with lasers and electrosurgery. Additionally, incorrect incision placement can compromise the biologic width, leading to tissue loss or bone resorption. These risks underscore the need for careful planning, precise execution, and diligent postoperative follow-up.

Long-term management and prognosis

While the prognosis for gingival hyperplasia is generally good, recurrence is common. Clients should be made aware of the potential for repeated surgery and the importance of regular follow-ups. Annual or biannual examinations allow for early detection and management of recurrence, ensuring long-term oral health.

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New Insights in melanoma staging

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Melanoma is one of the most common canine oral malignant tumours. Its highly aggressive and metastatic, even at the early stages of development. Surgery relies on wide excision of the primary tumor and regional lymphadenectomy, with or without adjuvant therapy. Tumor location and size are important when considering staging, which ultimately affects the curative intent of surgery.

New insights in melanoma staging have contributed to a better prognosis prediction. The TNM staging system is the oldest staging system still used for solid tumors in animals and applied to oral melanoma. This includes size interval of the primary tumor, lymph nodes and distant organs status for metastasis. A risk stratification scheme based on TNM staging system was suggested recently based on a systematic review (Song et al 2024). This includes adding new parameters to the tumor volume assessment (T): bone invasion, ki-67 index cuttof (19.5), MC cutoff (4) and nuclear atypia cutoff (30%); improvement with stratification of N stage: N1 and N2 relating with the presence of micrometastases (< or > 2mm); and improvement with stratification of M stage by adding the histological confirmation of metastasis (Song et al 2024).

Tumor value (TV) is an absolute measurement that doesn't relate to the vast phenotypic variability within canine breeds, therefore size interval (T) of the TNM staging system is limited in prognosis assessment. With regards to TV, recently published work aimed to evaluate if a relative TV, which considers the proportion of tumor volume with regards to body volume (Silva et al, 2024) could predict prognosis with regards to lymph node and distant organ metastasis. This study proposed cutoff values for TV = 6.423 cm^3 and TBR% = 0.043 which were able to predict lymph node metastasis.TV calculation include measurements of the three longest axes of the tumour using computed tomography in the axial and coronal CT sections. By using the ellipsoid formula

Volume = ($\pi \times xyz$)⁄6 (x, y and z are the three perpendicular tumour diameter measurements. Total body volume (BV, in cm3) is naturally calculated from body weight (kg) using the formula Density = weight/volume, average body density of 1000 kg/m3 .

Interestingly higher TV and TBR% values were associated with bone lysis and mitotic count (MC) (Silva et al 2024), factors also identified by others with importance in overall survival and included in the risk stratification scheme (Song et al, 2024). Ki67 index is likely to be a better prognostic tool than MC, but they are not the same. Albeit they are related to cell division, when mitotic figures are observed, they indicate increased cellular proliferation, which theoretically can be positively aligned with the concept of TV. In contrast, Ki67 labelling is related to the identification of a protein that is present in the active phases of the cell cycle, providing an estimate of the proportion of active cells and the growth portion of a tumour at a given time. This does not necessarily correlate

with a higher TV. Regardless, in theory, a high proliferation rate is associated with rapid tumor growth but host immunocompetence and local ischemia can also play an important role in determining tumor size.

The TNM staging system has historically been used for oral melanoma; however, its limitations have become increasingly recognized over the years. Recent studies on new prognostic factors, combined in systematic reviews, have led to a revised stratification scheme that incorporates important additional variables. With the recent proposal of TV and TBR cutoffs for predicting lymph node metastasis, these parameters offer valuable insights to enhance the staging of dogs with melanoma.

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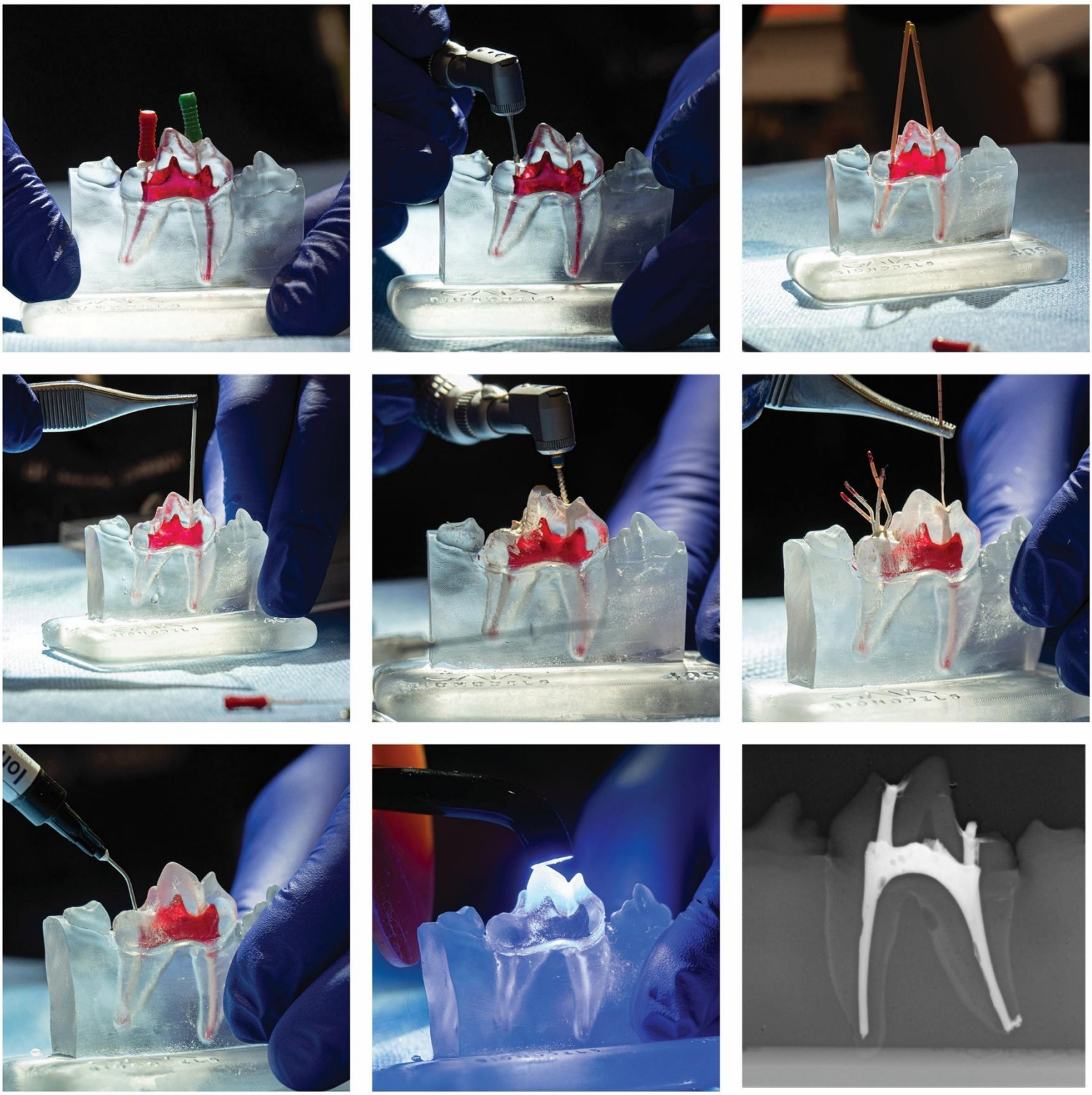

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Oral oncology from a surgical point of view

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Introduction

Oral tumors in dogs and cats are relatively common but often go undetected until they reach an advanced stage. They account for approximately 6% of all tumors in dogs and 10% of all tumors in cats. Due to their location, these tumors can significantly impact an animal's quality of life, affecting eating, drinking, and overall comfort. Early detection and accurate diagnosis are crucial for successful treatment, and enhanced prognosis.

This presentation provides an overview of oral tumors in small animals from a surgical perspective, detailing common tumor types, diagnostic methods, and treatment options.

Prevalence and Classification of Oral Tumors

Oral tumors can be classified as **benign** or **malignant**. The primary difference between these two categories is their ability to invade surrounding tissues and metastasize.

Benign Oral Tumors

- Benign tumors do not metastasize to other parts of the body but may still be locally invasive in the oral cavity, causing discomfort and functional impairment.
- Many benign tumors in the oral cavity have an odontogenic origin, meaning they arise from tissues involved in tooth development.

Malignant Oral Tumors

- Malignant tumors are more aggressive and have potential to metastasize to regional lymph nodes and/or distant organs, such as the lungs.
- They often have a mesenchymal origin, meaning they arise from connective tissue or other supporting structures in the oral cavity, nose, and jaws.

Biopsy is crucial to determine a definitive diagnosis. However, it is essential to know how to take a biopsy correctly, which helps the histopathologist to come to a correct diagnosis.

Common Types of Oral Tumors in Dogs and Cats

Malignant Tumors

1. **Squamous Cell Carcinoma (SCC)**
    - The most common malignant oral tumor in dogs and cats.

- Highly invasive but less likely to metastasize.
- Typically found on the gingiva, alveolar mucosa, tongue, and tonsils.
- Early detection improves prognosis significantly.
- Much more aggressive thus poor prognosis in the cat compared to dogs.
- Tonsillar form in dogs has less favorable prognosis.
- Papillary SCC is a subtype of SCC which tends to affect younger dogs (6 Mo – 10 Y). It is never reported to metastasize, thus provides a good prognosis if handled surgically with clean margins.

2. **Malignant Melanoma (OMM)**
    - One of the most common and aggressive oral cancers in dogs.
    - Often darkly pigmented but can also be amelanotic (lacking pigment).
    - Metastasizes early in the course to the regional lymph nodes and the lungs.
    - Requires early surgical intervention, often combined with radiation or immunotherapy.
3. **Fibrosarcoma (FSA)**
    - Arises from connective tissue and can be highly invasive.
    - Most often found in the palate and caudal maxilla.
    - "High-Low" fibrosarcoma: Appears histologically low-grade (less aggressive under the microscope) but behaves in a highly aggressive manner.
    - Metastasize late in the course.
4. **Osteosarcoma (OSA)**
    - Affects the bones of the jaw.
    - Can be highly destructive, and painful.
    - Axial osteosarcoma (flat bone) tends to have less metastatic potential compared to appendicular osteosarcoma (long bones).

Benign and Odontogenic Tumors

1. **Peripheral Odontogenic Fibroma**
    - Common in dogs, slow-growing, and non-invasive.
    - Arise from periodontal ligament tissue.

2. **Ameloblastoma**
    - Originates from dental epithelium and is locally aggressive.
    - Includes subtypes like conventional, keratinizing, and acanthomatous ameloblastoma.

Clinical Signs and Diagnosis of Oral Tumors

Symptoms Indicating Oral Tumors

Since pets cannot communicate pain directly, early signs of oral tumors can often be subtle. The following symptoms warrant further examination:

- **Swelling in the mouth** (visible masses on the gums, tongue, or palate).
- **Excessive drooling** (sometimes blood-tinged saliva).
- **Difficulty eating or chewing** (dysphagia).
- **Bad breath (halitosis)** that does not improve with dental care.
- **Loose teeth** (especially in an otherwise healthy mouth).
- **Bleeding from the mouth or nose** (without an obvious cause).
- **Weight loss and reduced appetite**.

Diagnostic Approach

A thorough oral examination should be conducted during routine check-ups, vaccinations, or dental cleanings. Early identification greatly improves prognosis.

Diagnostic tools include:

1. **Biopsy** – Essential for determining tumor type and malignant vs benign.
2. **Fine Needle Aspiration (FNA)** – Used for lymph node evaluation (NB Not conclusive when negative)!
3. **X-rays or CT scans** – To assess bone involvement and metastasis.
4. **Thoracic Imaging** – Chest X-rays or CT scans to check for distant metastases.

Treatment Options for Oral Tumors

Surgical Treatment

Surgery is the primary treatment for most oral tumors. Depending on tumor size and location, procedures may include:

- **Wide local excision** – Removal of the tumor with adequate margins to prevent recurrence.

- **Mandibulectomy** – Partial or complete removal of the mandible.
- **Maxillectomy** – Removal of part of the maxilla.

Radiation Therapy

- Used for **non-resectable tumors** or in cases where surgical margins are inadequate, or to shrink a tumor prior to surgery.
- Often combined with surgery for malignant melanoma and SCC.

Chemotherapy and Immunotherapy

- Less commonly used but may be recommended for systemic or metastatic tumors.
- Melanoma vaccine is a immunotherapy for malignant melanoma, however effect varies.

Prognosis and Importance of Early Detection

Early diagnosis leads to significantly better treatment outcomes**.** Tumors that are detected and surgically removed while still small have a higher survival rate compared to those diagnosed at a late stage.

Prognosis depends on:

- **Tumor type and location** (e.g., SCC of the tonsils, and large OMM with bone involvement and metastases have poor prognosis.
- **Skills of the veterinary surgeon**
- **Metastatic status**
- **Surgical margins**.

Take Home Message:

- **Annual oral exam** is important for early tumor detection.
- **Daily dental/oral homecare** provides an opportunity to check for abnormalities.
- **Biopsies should always be performed on suspicious lesions** before assuming a tumor is benign.
- **Early intervention improves survival rates and quality of life**

Conclusion

Oral tumors in dogs and cats can be life-threatening, but early detection and appropriate surgical treatment significantly improve outcomes. Veterinarians should prioritize routine oral examinations, imaging, and biopsies to ensure timely and effective treatment.

With advancements in oncologic surgery, radiation, and immunotherapy, many dogs diagnosed with oral tumors can achieve extended survival times and improved quality of life.

3D printing applications in oral health

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The introduction of 3D computer aided design and manufacturing (3D printing) has become rapidly accessible to small animal dentistry and oral surgery (Huang et al. 2023). This technology establishes a bridge from the virtual planning to a real model, allows surgical planning by using imaging information, with their input data used to produce a physical model of surgical sites, guiding the surgery (Godinho et al, 2024).
Nowadays it is possible to print from models to surgical drill guides, assisting the surgeon to perform a more predictable and secure surgery. Prosthetic crowns or even endodontic guides produced by this technology have also been used in veterinary medicine (Mestrinho et al, 2019; Peng et al 2024). Limitations include the need to buy a 3D printer and printing materials, to learn segmentation software and to acquire the expertise to master these resources. As this technology become available it is necessary to investigate effectful pipelines to improve the predictability of reconstructive procedures and well as improve printing possibilities with biocompatible materials.

This presentation will demonstrate a pipeline to produce a basic model using an open-source slicer to convert a dicom (.dcm or .ima) file series to a .stl file. The obtained .stl file then converted, by slicing, to be later printed.

Fused deposition modeling (FDM) printers can be the cheapest option to start, which use filaments, however the stereolithography (SL) printers use resins and provide higher precision and a wider range of biocompatible materials, including prosthodontic options such as crown and splints for permanent applications.

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Quality of life studies following maxillectomy and mandibulectomy

Ingeling Bull

Treatment for oral tumors in dogs may involve aggressive surgery, radiation therapy, and/or chemotherapy. It is of utmost importance that veterinarians can document the good quality of life (QoL) for patients during and after cancer treatment. In this retrospective study, medical records from 2 private practices during a 10-year period (2011-2020) were searched to identify dogs with confirmed histopathological diagnosis of an oral tumor. Owners of dogs who underwent surgery received a questionnaire to assess their perception of QoL before and after surgery, clinical signs from the oral tumor, pain before and after surgery, physical appearance, and drinking and eating ability after surgery. Forty-two of 45 (93%) owners answered the questionnaire. Thirty-eight owners (90%) perceived that their dog had not changed its appearance after surgery after the hair had regrown. Thirty owners (71%) reported that their dog prehended food and water normally within 4 weeks after surgery. Forty owners (95%) perceived that their dog had more “good’’ than ‘’bad’’ days after surgery. Thirty-eight owners (90%) would choose the same treatment again. Our results strongly support that dog owners perceived that their dogs had good QoL after partial mandibulectomy or maxillectomy.

Bull I, Ziener ML, Storli SH, Arendt ML. Quality of Life After Partial Mandibulectomy or Maxillectomy in 45 Dogs With Oral Tumors. *Journal of Veterinary Dentistry*. 2023;40(4):329-337. doi:10.1177/08987564231164483

Saturday 5th April, 2025

	Saturday 5th April 2025	
	INCISOR	CARNASSIAL
9.00 - 9.50	KEYNOTE: Scoring Relief: Choosing the Right Pain Scale (M.Gurney)	
9:50 - 10.40	Drilling Down on Comfort: Optimising Analgesia in Dentistry (M.Gurney)	
10.40-11.00	BREAK	BREAK
11.00-11:50	Decoding the Image: A Guide to Interpreting Head CTs (H.Renfrew)	Endodontic Surgery: Top Tricks for Flawless Results (A.Rejec)
11:50-12:40	Demystifying capnography (S.Parker)	Orthognathic surgery in severe malocclusion cases (M.Guzu)
12:40-13:40	LUNCH	LUNCH
13:40-14:10	Spotting the unseen: Identifying subtle oral lesions in dogs and cats (A.McFadzean)	**BVDA AGM**
14:10-15:00	Keeping It Sharp: The Art of Dental Equipment Maintenance (P.Bogar)	Decisional algorithm for the use of plating systems in maxillofacial traumatic surgery (M.Guzu)
15:10-15:30	BREAK	BREAK
15:30-16:15	Next-Level Numbing: Fresh Updates on Local Anaesthesia in Dentistry (A.Perry)	Outcomes of Intraoral Wire and Composite Splints for Mandibular fracture Repair in Cats (J.Pakula)
16:15-17:00	Advanced Canine Dental Extractions: A Masterclass on the Maxillary Fourth Premolar (I.Tundo)	The Art of Success in Restorative Dentistry (I.Bull)

Scoring Relief: Choosing the Right Pain Scale

Matt Gurney

In these notes we detail the pain scales that are validated in the acute setting. The focus in each of these pain scales is the presence or absence of normal behaviours, so keep that in mind as you review these notes and when you are pain scoring your patients.

Having a baseline understanding on that individual and their pain is important. In dental disease, there may be a combination of both acute and chronic pain.

If you consider an animal to be in pain, then that animal should receive analgesia. The patient can then be reassessed at a time frame appropriate to the drug used. It is best to analgese a patient than leave them in pain. If the patient improves following analgesia, then the pain hypothesis holds up. On the converse side, if animals are repeatedly medicated with drugs without being in pain, then they may suffer detrimental effects from the drugs.

Cats

Pain behaviors before and after treatment of oral disease in cats using video assessment: a prospective, blinded, randomized clinical trial (Watanabe et al 2020), was an exploratory study aimed to identify pain-induced behaviors in cats before and after treatment of oral disease using video assessment.

The researchers conducted a prospective, blinded, randomized clinical trial involving 24 cats. The cats were divided into two groups: one receiving minimal dental treatment and the other undergoing multiple dental extractions. The study utilized video assessments to observe and analyze specific pain-related behaviors before and after the dental procedures.

The findings indicated that certain behaviors, such as reduced pawing at the face, increased time spent standing or lying down, and difficulties in grasping dry food, were associated with pain in cats suffering from oral diseases. These behaviors changed following treatment, suggesting their potential use in assessing pain levels in feline patients with oral conditions.

This study provides valuable insights into feline pain behaviors related to oral diseases and highlights the importance of recognizing these behaviors for effective pain management in cats.

There are several acute pain scales validated for cats, with details here.

Feline Grimace Scale (FGS): This scale evaluates facial expressions to assess pain levels in cats. It includes five action units: ear position, orbital tightening, muzzle tension, whiskers change, and head position. The FGS has been shown to be reliable for assessing pain in cats undergoing dental extractions.

Glasgow Composite Measure Pain Scale-Feline (CMPS-F): This multidimensional scale assesses acute pain in cats by evaluating various behavioral and physiological indicators. It is widely used in clinical settings for pain assessment.

UNESP-Botucatu Multidimensional Composite Pain Scale: This scale is used to assess postoperative pain in cats. It includes both behavioral and physiological parameters, providing a comprehensive evaluation of the cat's pain status

The Feline Grimace Scale: A Tool for Assessing Pain in Cats

The Feline Grimace Scale (FGS) is a tool designed to assess acute pain in cats by evaluating changes in their facial expressions.

Development of the Feline Grimace Scale

Pain assessment in cats has historically been challenging due to their stoic nature and subtle pain behaviors. Recognizing this, researchers at the Université de Montréal developed the FGS to provide a reliable and objective method for evaluating pain in cats. The scale was validated through extensive research, demonstrating its effectiveness in clinical settings.

The FGS evaluates five specific facial action units (FAUs) that change in response to pain:

1. **Ear Position**: In a pain-free state, a cat's ears are typically forward-facing. Pain causes the ears to rotate outward or flatten against the head.
2. **Orbital Tightening**: Pain leads to partial or complete closure of the eyes, resulting in a squinting appearance.
3. **Muzzle Tension**: A relaxed muzzle is round, while pain causes it to become tense and elliptical.
4. **Whisker Position**: Whiskers in a relaxed cat are slightly curved. Pain causes them to move forward and become straighter.
5. **Head Position**: A pain-free cat holds its head above the shoulder line. Pain causes the head to drop below the shoulder line or tilt downward.

Each FAU is scored from 0 to 2, with a total possible score of 10. A score of 4 or above indicates the need for analgesic intervention - the app notifies the user of this.

The Glasgow Composite Measure Pain Scale for Cats: A Comprehensive Tool for Pain Assessment

The Glasgow Composite Measure Pain Scale for Cats (CMPS-Feline) is a validated tool designed to assess acute pain in cats.

Development of the CMPS-Feline

The CMPS-Feline was developed by researchers at the University of Glasgow to provide a reliable and objective method for assessing pain in cats. Recognizing the challenges in evaluating pain in feline patients due to their subtle pain behaviors, the researchers aimed to create a tool that could be easily applied in clinical settings. The scale has been validated through extensive research, demonstrating its effectiveness in assessing acute pain in cats.

The CMPS-Feline is a structured questionnaire that evaluates various behavioral and physiological indicators of pain. The assessment includes the following categories:

1. **Vocalization**: Observing whether the cat is silent, purring, meowing, crying, growling, or groaning.
2. **Posture**: Evaluating the cat's posture, such as being relaxed, tense, crouched, or rigid.
3. **Attention to Wound**: Noting if the cat is ignoring or paying attention to a wound or painful area.
4. **Ear Position**: Assessing the position of the cat's ears, which can indicate pain when they are flattened or rotated.
5. **Muzzle Shape**: Observing changes in the shape of the cat's muzzle, which can become tense and altered in response to pain.

6. **Response to Stroking**: Evaluating the cat's response to gentle stroking, including whether it is responsive, unresponsive, or aggressive.
7. **Response to Pressure**: Applying gentle pressure around a painful area and noting the cat's reaction, such as tail swishing, ear flattening, crying, hissing, growling, or biting.
8. **General Impression**: Providing an overall impression of the cat's condition, including whether it appears happy, content, disinterested, anxious, dull, or depressed.

Each category is scored based on the severity of the observed behaviors, with a total possible score of 20. A score of 5 or more typically indicates the need for analgesic intervention.

The Glasgow Composite Measure Pain Scale for Cats is a valuable tool in veterinary medicine, offering a reliable and objective method for assessing acute pain in cats. By focusing on specific behavioral and physiological indicators, the CMPS-Feline allows for early detection and effective management of pain, ultimately enhancing the welfare of feline patients.

The UNESP-Botucatu Multidimensional Composite Pain Scale for Cats: A Comprehensive Tool for Postoperative Pain Assessment

The UNESP-Botucatu Multidimensional Composite Pain Scale (MCPS) is a validated tool designed to assess postoperative pain in cats.

Development of the UNESP-Botucatu MCPS

Pain management in cats has historically been challenging due to their subtle pain behaviors and the difficulty in assessing pain accurately. Recognizing this, researchers at the Universidade Estadual Paulista (UNESP) in Botucatu, Brazil, developed the MCPS to provide a reliable and objective method for evaluating postoperative pain in cats. The scale has been validated in multiple languages and cultures, demonstrating its effectiveness in clinical settings.

The UNESP-Botucatu MCPS is a structured questionnaire that evaluates various behavioral and physiological indicators of pain. The assessment includes the following categories:

1. **Pain Expression**: This subscale evaluates behaviors such as vocalization, posture, attention to the wound, ear position, muzzle shape, and response to stroking and pressure.
2. **Psychomotor Change**: This subscale assesses changes in the cat's activity level, including its posture, movement, and interaction with the environment.
3. **Physiological Variables**: This subscale includes parameters such as blood pressure, appetite, and vocalization.

Each category is scored based on the severity of the observed behaviors, with a total possible score of 30. The scores are classified as mild pain (0-8 points), moderate pain (9-21 points), and severe pain (22-30 points). Analgesic intervention is recommended when the score is 8 or higher.

The UNESP-Botucatu Multidimensional Composite Pain Scale is a valuable tool in veterinary medicine, offering a reliable and objective method for assessing postoperative pain in cats. By focusing on specific behavioral and physiological indicators, the MCPS allows for early detection and effective management of pain, ultimately enhancing the welfare of feline patients.

Dogs

The Glasgow Composite Measure Pain Scale for Dogs: A Comprehensive Tool for Pain Assessment

The Glasgow Composite Measure Pain Scale (CMPS) for dogs is a validated tool designed to assess acute pain in canine patients.

Development of the CMPS

The CMPS was developed by researchers at the University of Glasgow to provide a reliable and objective method for assessing pain in dogs. Recognizing the challenges in evaluating pain due to the subjective nature of pain perception and the difficulty in interpreting canine behaviors, the researchers aimed to create a tool that could be easily applied in clinical settings. The scale has been validated through extensive research, demonstrating its effectiveness in assessing acute pain in dogs.

The CMPS is a structured questionnaire that evaluates various behavioral and physiological indicators of pain. The assessment includes the following categories:

1. **Vocalization**: Observing whether the dog is silent, whimpering, groaning, or screaming.
2. **Posture**: Evaluating the dog's posture, such as being relaxed, tense, hunched, or rigid.
3. **Attention to Wound**: Noting if the dog is ignoring or paying attention to a wound or painful area.
4. **Mobility**: Assessing the dog's ability to move, including whether it is normal, lame, or reluctant to move.
5. **Response to Touch**: Applying gentle pressure around a painful area and noting the dog's reaction, such as flinching, growling, or snapping.
6. **Overall Demeanor**: Providing an overall impression of the dog's condition, including whether it appears happy, content, indifferent, or depressed.

Each category is scored based on the severity of the observed behaviors, with a total possible score of 24 (or 20 if mobility cannot be assessed). A score of 6 or more typically indicates the need for analgesic intervention.

Conclusion

The Glasgow Composite Measure Pain Scale is a valuable tool in veterinary medicine, offering a reliable and objective method for assessing acute pain in dogs. By focusing on specific behavioral and physiological indicators, the CMPS allows for early detection and effective management of pain, ultimately enhancing the welfare of canine patients.

The Colorado State University Canine Acute Pain Scale: A Comprehensive Tool for Pain Assessment

The Colorado State University Canine Acute Pain Scale (CSU-CAPS) is a validated tool designed to assess acute pain in dogs.

Development of the CSU-CAPS

The CSU-CAPS was developed by researchers at Colorado State University to provide a reliable and objective method for assessing pain in dogs. Recognizing the challenges in evaluating pain due to the subjective nature of pain perception and the difficulty in interpreting canine behaviors, the researchers aimed to create a tool that could be easily applied in clinical settings.

The CSU-CAPS is a structured questionnaire that evaluates various behavioral and physiological indicators of pain. The assessment includes the following categories:

1. **Psychological and Behavioral Response**: Observing the dog's overall demeanor, including whether it is happy, content, unsettled, or restless. This category also assesses the dog's interest in its surroundings and its response to palpation.
2. **Body Tension**: Evaluating the dog's body tension, such as whether it is relaxed, tense, or rigid. This category also includes the dog's response to palpation of the wound or surgery site.
3. **Vocalization**: Noting any vocalizations such as whimpering, groaning, or screaming, which can indicate pain.
4. **Mobility**: Assessing the dog's ability to move, including whether it is normal, lame, or reluctant to move.

Each category is scored based on the severity of the observed behaviors, with a total possible score of 24. A higher score indicates a greater level of pain, and a score of 6 or more typically indicates the need for analgesic intervention.

The Colorado State University Canine Acute Pain Scale is a valuable tool in veterinary medicine, offering a reliable and objective method for assessing acute pain in dogs. By focusing on specific behavioral and physiological indicators, the CSU-CAPS allows for early detection and effective management of pain, ultimately enhancing the welfare of canine patients.

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Drilling Down on Comfort: Optimising Analgesia in Dentistry

Matt Gurney

Multimodal Analgesia

The mainstays of multimodal analgesia (MMA) are the opioids, NSAIDS and local anaesthetics. MMA targets the processes of transduction, transmission, modulation & perception at multiple levels of the neuraxis thereby optimizing not only the provision of analgesia in the acute phase but also minimising the likelihood that chronic pain will develop. With the focus moving towards a preventive approach to analgesia our attention must be directed to assessment and treatment of pain both before surgery and during the rehabilitation stage. Many of our dental patients may be suffering with chronic pain and we should ask ourselves this question when planning our approach.

Pre-emptive Analgesia

Pre-emptive analgesia has been defined as '*an antinociceptive treatment that prevents establishment of altered central processing of afferent input from injuries'* (Kelly and others 2001a), which practically put means that applying an analgesic technique before the incision results in better pain control after the operation than applying the same technique after the incision. In practical terms, simply administering an analgesic prior to surgery does not tick the pre-emptive analgesia box without consideration given to pharmacology of the drug. The establishment of an effective level of analgesia is paramount and an inadequate antinociceptive pre-operative intervention should not be regarded as pre-emptive analgesia (Kelly and others 2001a).

Effective pre-emptive analgesic techniques require multimodal interception of nociceptive input, increasing the threshold for nociception, and blocking or decreasing nociceptor activation (Kelly et al., 2001). Pain is best controlled using several analgesic agents, each of which acts on a specific site along the pain pathway, which lessens the reliance on one particular agent or mechanism, and the resulting synergism, whilst augmenting analgesia, may avoid side effects associated with high doses of individual agents.

An essential aspect in practicing preventive analgesia is that the analgesic intervention should be continued for as long as the sensitizing pain stimulus lasts (Dahl, 2004), highlighting the need to accurately assess pain. There is a key role here for loco regional techniques.

Pre-emptive or Preventive analgesia?

The concept of pre-emptive analgesia refers to the timing of analgesic administration – either before or after the incision. This classic pre versus post approach assumes that intra-operative factors contribute most to generation of a sensitized state. This concept has been broadened in light of increasing knowledge to consider the influence of multiple factors on the generation of central sensitization, with the aim of attenuating the impact of noxious pre, intra and post-operative stimuli and is termed preventive analgesia. Of the three broad peri-operative periods as yet it is unclear the extent to which each period contributes to central sensitization and post-operative pain although there are studies which document beneficial effects of post-operative versus intra-operative nociceptive blockade (Gordon and others 2002). Other studies have demonstrated more effective relief of post-operative pain by targeting pre-operative pain (Klasen and others 2005). With the current state of knowledge we should aim to incorporate excellent pain management at all stages of the peri-operative period based on the 'Anticipate, Assess, Alleviate' approach.

Analgesics

Non-steroidal anti-inflammatories (NSAIDS)

NSAIDs are a first line treatment for painful conditions and reduce the cardinal signs of inflammation such as heat, redness, swelling and pain. Inflammation occurs following tissue damage and disruption of cell membranes. Components of the cell membrane, such as phospholipids are degraded by certain groups of enzymes to produce inflammatory mediators. Inflammatory mediators act on the nociceptors and cause them to activate, thus initiating an action potential which conveys the pain stimulus. NSAIDS inhibit the cyclooxygenase enzyme group and therefore prevent the production of inflammatory mediators. The main inflammatory mediators of concern are prostaglandins and thromboxane A2. There is increasing evidence of a central effect through inhibition of phospholipase A2 in the spinal cord.

Lidocaine

Systemic lidocaine blocks propagation of ectopic discharge from the site of neuronal injury as well as with the dorsal root ganglion. Intravenous lidocaine reduces pain and opioid requirements following abdominal surgery in man. This use for acute pain has been adopted in veterinary anaesthesia although evidence is limited.

Opioids

Opioids are the mainstay of analgesia in veterinary practice and should be considered as first line for all animals in pain. Opioids act in the central nervous system at spinal levels and higher centres where they modulate the signal being transmitted to the brain and alter perception. This does not mean that the signal is totally blocked. The painful signal still reaches the brain but it is not perceived as pain because of the opioid altering the motivational affective component of the pain.

Paracetamol

Pacheco et al 2020, compared oral paracetamol/codeine (Pardale-V, Dechra, UK) with meloxicam given orally prior to various surgical procedures, mostly orthopaedic. Paracetamol was dosed at 33 mg/kg PO TID to 46 dogs (the licensed dose) and meloxicam at 0.2 mg/kg PO initially followed by 0.1 mg/kg SID to 24 dogs. Both drugs were given for 3 days. Outcome measures were the Short Form of the Glasgow Composite Pain Score (SFGCPS) and mechanical nociceptive thresholds (MNT) as well as requirement for rescue analgesia. Pain scores were assessed at baseline and 2, 4, 6, 8, 12, 24, 32, 36 and 48 hours after surgery.

Non-inferiority was demonstrated between Pardale V and meloxicam based on pain scores. Regarding further analgesia, 12.5% of dogs in the meloxicam group required intervention compared to 6.5% in the paracetamol group, although statistics were not presented with this data. It should be noted that all dogs received methadone as premedication and buprenorphine every 8 hours post operatively. No sample size calculation was performed due to lack of data on which to make such a calculation, which the authors defend in their manuscript.

Hernandez et al (2020) examined the serum biochemical changes and post-operative analgesic effects of either paracetamol, or meloxicam or carprofen in bitches undergoing ovariohysterectomy. Outcome measures used were the Dynamic Interactive Visual Analogue Scale (DIVAS) and the University of Melbourne pain scale (UMPS). Neither are validated pain scales, although widely used. Pain scores were assessed 1, 2, 4, 6, 8, 12, 16, 20, 24, 26 and 48 hours after surgery.

These authors concluded that paracetamol 15 mg/kg IV TID was as effective as carprofen 4 mg/kg SID and meloxicam 0.2 mg/kg IV SID (second dose 0.1 mg/kg) for post-surgical analgesia. All drugs were administered 30 minutes prior to surgery.

A sample size was determined but it was not clear what this was based on. Dogs also received a fentanyl infusion intra-operatively.

Paracetamol is useful as an alternative to NSAIDs in dogs that will not tolerate an NSAID. Paracetamol should never be used in cats.

NMDA antagonists

The most common NMDA antagonist we use in every day practice is ketamine. Ketamine is a modulator of the NMDA receptor which is located in the dorsal horn of the spinal cord and becomes activated in cases of extreme or persistent pain. With chronic pain a significant feature of dental disease, the rationale for ketamine in dental analgesia is positive.

If chronic pain is suspected, oral NMDA antagonists prior to the procedure will help to reduce central sensitisation with the aim of reducing pain in the post operative period. Options include amantadine or memantine.

Gabapentinoids

The evidence for gabapentinoids as analgesics in dogs and cats requires further work. Gabapentinoids reduce central sensitisation however adverse effects of sedation and ataxia can impair analgesic assessment.

Rescue Analgesia

In situations where a local technique has not completely worked or cannot be used, it is useful to consider rescue analgesia. Remember that simply turning up the vaporiser does nothing to prevent transmission of the painful stimulus.

By taking a baseline HR, RR, BP you can gauge the animal's response to surgery. If these parameters increase 20% above baseline in response to surgery then further analgesia is required.

Options:

Fentanyl 1-2mcg/kg IV

Ketamine 0.5mg/kg IV diluted or 1mg/kg IM

Dex/medetomidine 1-5mcg/kg IV

Repeat the opioid used in the premed.

Constant (continuous) Rate Infusions

Drug	Rationale	Dose	Caution
Fentanyl	Excellent analgesia	2-5µg/kg/hr Higher rates used during surgery 10-20µg/kg/hr) – may necessitate IPPV.	Respiratory depression at high doses (>20µg/kg/hr)
Lidocaine	Analgesia, anti-inflammatory, anti-oxidant, pro-motility	25-50µg/kg/min 2mg/kg IV loading dose in dogs.	Highly protein bound. Caution w cats. ? anorexia?
Methadone	Excellent analgesia	0.1mg/kg/hr	Cumulative after ~24hrs Stop CRI if dog excessively sedated or cat dysphoric.
Ketamine	Excellent analgesia	10µg/kg/min during sx, 2µg/kg/min post op. 0.5mg/kg loading dose IV or 1mg/kg IM.	Use in combination w opioids
Dexmedetomidine	Analgesia & sedation	1-2µg/kg/hr	Only if CV system stable

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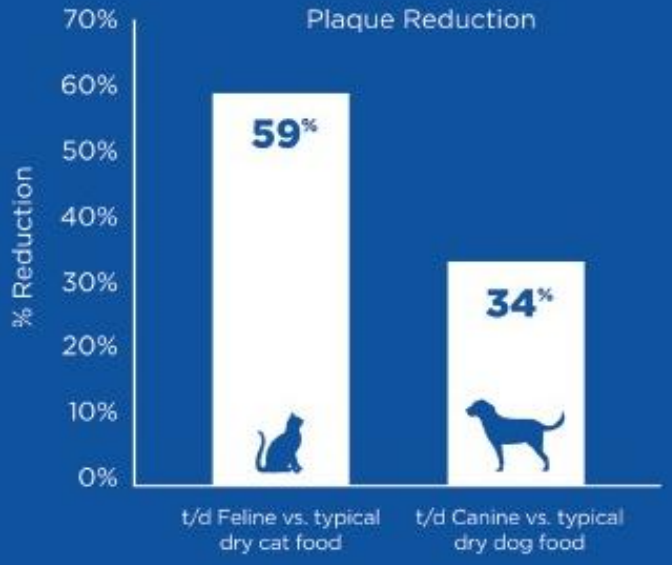

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INCISOR stream

RIBA Gallery

Decoding the Image: A Guide to Interpreting Head CTs

Helen Renfrew

CT interpretation is an enormous subject, and rests on several things including enlightened case selection, someone trained to acquire the necessary series to make a diagnostic study, anaesthetist support, and someone trained to interpret the images. The latter is best done at the time of the study to determine if any tweaks should be made to the study to improve diagnostic yield, and who can take any samples using ultrasound or CT guidance required to aid diagnosis.

This talk will look at when one might want to request a CT for a dentistry case and the factors described above, as well as the basics tools of CT interpretation, to throw light on this complex and burgeoning imaging modality, asking the questions should we do this, and if so when.

There will be a run through of some cases showing the things that come up that can challenge us, and how we respond, demonstrating the breadth of knowledge and the time needed to devote to these studies to obtain the best value for the client.

These procedures absorb much of any available insurance money on which many owners rely, and whilst a beautiful imaging study is a joy to behold, and can be invaluable, if there are inadequate funds to take the necessary steps to improve the quality of life for that animal, what then have we gained?

Demystifying capnography

Stacey Parker

Capnography can be daunting, different numbers, different traces. But what do they all mean? Let us cover this together.

ALL patients undergoing general anaesthesia for oral surgery should have capnography included as part of their monitoring. It tells us a huge amount of information on our patients, that we would not otherwise be wise to, including:

- Confirming ETT placement in the trachea
- Metabolism
- Cardiac output
- Pulmonary perfusion
- Adequacy of ventilation
- Impending cardiac arrest
- Adequacy of CPR- ETC02 exceeding 18MMHG is an indication of effective CPR

Including capnography to a general anaesthesia monitoring protocol can aid in early identification of complications, such as hypoventilation, and guide necessary interventions- the earlier we know about potential problems, the better the outcome for our patients, and the less stressful day we have ourselves!
Put incredibly simply, capnography measures the carbon dioxide concentration throughout the respiratory cycle in expired and inspired gas.
It is continuous, non-invasive and easy to use, once trained. The main results displayed to you when using capnography, alongside the waveform are:

- ETC02: End Tidal Carbon Dioxide in gas, normal range is 35-45mmHg or 4-5.7 Kpa- we will be working with mmHG.
- InspC02: Inspired Carbon Dioxide, should be 0mmHg

You will commonly encounter patients whose ETC02 is outside of the 'normal range' and may have some InspC02- it is important we realize why this may be happening, and how we may correct these- if indeed, it always needs treating.

There are 2 different types of Capnographs- Mainstream and Side stream- we will focus on side stream but it is important to understand the advantages and disadvantages of both.

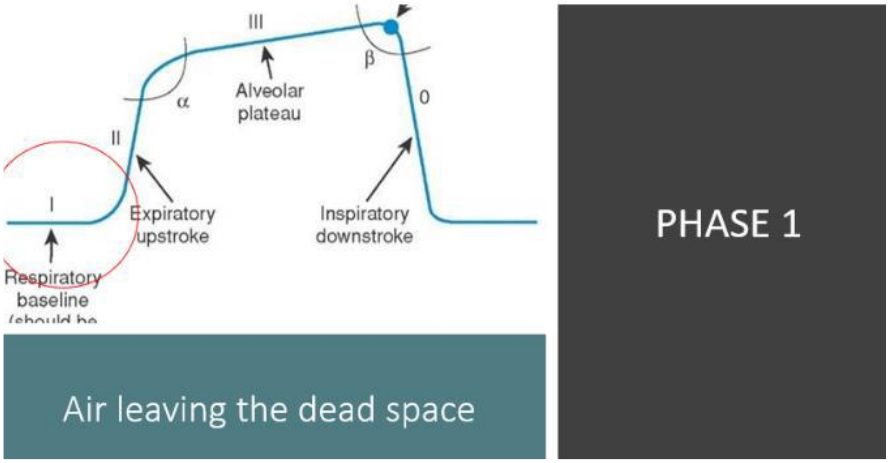
Mainstream:

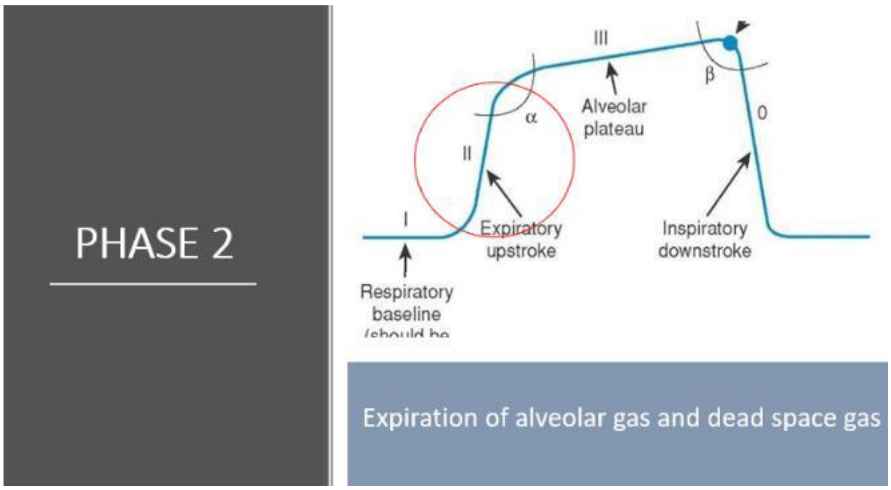
- Real time
- More accurate in smaller patients
- Infra-red
- Increase in dead space
- Expensive to replace
- Malfunction quicker
- Bulky
- Not ideal for oral surgery
- Not ideal for long term use

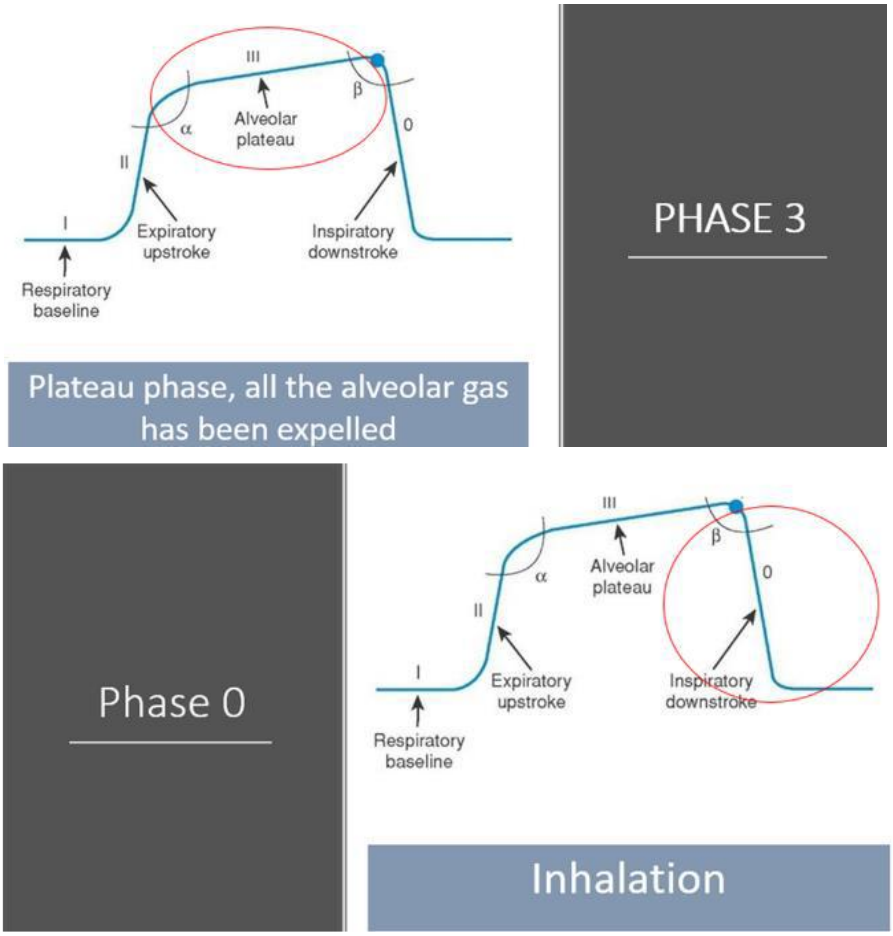
Side stream:

- Time lapse
- Less accurate in smaller patients
- Infra-red
- Less dead space then mainstream
- Less drag
- Cheap to replace lines

In order to interpret our Capnograph- we must understand what each Phase is showing us, there are 4 Phases to our capnograph- once we know what each phase relates to- we can then work out where we may be having an issue.







Using capnography, when you understand how it works, is one of the simplest ways of monitoring your patient under general anaesthesia, gaining insightful information about your patient.
Like any piece of equipment, it does not replace hands on monitoring- but works synergistically with the veterinary team to provide excellent standards of care.

The equipment also needs to be maintained properly, in order for it to have longevity and provide accurate information about your patient whilst keeping staff members safe too- this maintenance includes:

- Yearly servicing
- Connecting to the mains when in use
- Changing the water trap
- Examining sample lines and replacing when needed
- Connecting to scavenging to avoid environmental pollution

This highly pictorial session will go through the Capnography figures and traces- what is normal, and what isn't, and how to troubleshoot.

In summary within this session we will cover:

- How to recognise different waveforms
- How to set up and maintain your capnography equipment
- How to trouble shoot both hyper and hypocapnia
- The important role of Capnography within CPR
- Both the capno**meter** and capno**gram**

Keeping It Sharp: The Art of Dental Equipment Maintenance

Peter Bogar

Dental instruments and equipment are vital in providing quality oral and dental care for pets. Despite their importance, they are often neglected. The complete lack of maintenance or most frequently inadequate care of instruments can have wide-ranging negative impacts. This includes animal welfare, staff performance, time efficiency and profitability.

Performing dental and oral surgeries can be demanding both physically and mentally. Having the correct, well-maintained instruments for the intended job is essential. They are an investment worth looking after. They can make the difference between being able to perform surgeries at a high level or risking trauma to the patient, frustration, anxiety, fear, or even work-related disorders for the veterinary staff involved in the procedure.

Sharp instruments provide adequate tactile sensitivity and precision during surgeries, reducing potential operator error, surgical time and costs. Luxating dental hand instruments, dental and periosteal elevators, scissors, hand scalers, and curettes must be kept sharp for efficiency. Following use, instruments need to be cleaned, inspected for wear or damage, sharpened, cleaned, autoclaved and stored in a sterile manner.

Assessment of instrument sharpness: **Visual inspection**, ideally by a magnifying lens. A **dull blade** appears shiny and rounded as it reflects the bright light, while a **sharp blade** does not reflect the light and appears matte. **Test with an acrylic stick or plastic syringe**. The cutting edge of the instrument is placed at an approximately 70-80 degree angle against the plastic using light pressure. A sharp instrument makes a high-pitched noise when it bites into the plastic, stays in there, or shaves off a thin slice. A blunt instrument easily slides off the plastic without engagement.

Maintenance options for dull instruments include in-clinic manual sharpening (sharpening stones, diamond card) or a honing machine; using a professional sharpening company, or replacing the instrument. **Honing** is the process of straightening and realigning the metal edge of an instrument, while **sharpening** removes metal to restore a dull or damaged edge.

Sharpening equipment- While diamond cards are typically used with water, most of the sharpening stones are used with lubricant oil to reduce heat friction, avoiding clogging of the stone surface by metal particles and collecting debris. For sharpening stones, frequent changing of the contact area where the instrument touches the stone avoids groove creation. Following use, they need to be cleaned with a swab and washed with soapy water or placed in an ultrasonic cleaner. Most of them can be sterilised and kept with other dental instruments for intraoperative chairside sharpening.

Hand instruments

1. **Luxating instruments, dental elevators, and periosteal elevators**

The blades of these instruments will get blunt during normal use while engaging with the soft and hard tissues during cutting, pushing or rotational movements. The working end can also become damaged during inappropriate handling, using inadequate force or technique, or traumatising it with a dental bur, for example.

Winged elevators are usually sharpened on their concave surface by matching the angle of the working end with a flat stone and moving the stone upwards while keeping the instrument stationary. **Straight dental and periosteal elevators and luxating instruments** are sharpened on the back of the instrument's working end (convex side), holding the working end at about a 45-degree angle to a flat stone on the table and moving it in a "U" or smile shape from left to right. A conical stone is used to finish and remove any small irregularities on all of these instruments, matching the curve on the concave aspect of the working end.

2. **Sickle scaler and universal curette**

During manual sharpening, the instrument is held vertically using a palm grip with the tip facing the operator. The face of the instrument is kept parallel to the floor, the sharpening stone matching the lateral surface of the working end (tilted approximately 10-20 degrees) and moved up and down in short movements. The instrument is turned, with the tip away from the operator and the process is repeated. While the sickle scaler has a triangle-shaped cross-section and is used only supragingivally, the curette is used supra and subgingivally due to its semicircular cross-section with a rounded toe, which needs to be sharpened following its curve.

3. **Ultrasonic scaler and scaler tip**

The scaler tip is the vibrating component of the instrument, which wears away during normal use. It should be assessed regularly using a wear indicator from the manufacturer. When the scaler tip gets too short, its efficacy is reduced, hence, it should be replaced. Following each procedure, the handpiece is cleaned with a disinfectant wipe, and the scaler tip is replaced with a sterile one for each patient. Daily, the handpiece is inspected, cleaned and autoclaved following the manufacturer's recommendation.

4. **Periodontal probe**

The blunt, rounded tip of the instrument is designed to be inserted into the gingival sulcus for periodontal assessment. When it is damaged, for example, by a dental bur, while used as a tissue retractor, the probe would cause trauma to the periodontium and will need replacement.

5. **Needle holder and scissors**

Following each surgery, **needle holders** need to be cleaned, the box joint lubricated with a water-based lubricant, then autoclaved and stored in a sterile manner. At least weekly, the jaws of needle holders need to be inspected for tread wear and the ratchet tested. If the tool is not holding the needle properly, either the jaws or the whole instrument need to be replaced. **Scissors** (e.g. Metzenbaum, suture scissors) should be inspected and tested weekly using an elastic scissor testing material. Sharp scissors provide a clear, effortless, sharp cut and a smooth, sliding feel with no grinding. Dull scissors may pull or tear the material and provide jagged edges.

6. **High-speed and low-speed handpiece**

These instruments are used with various dental burs for tooth sectioning or alveolectomy, among other duties. Once the bur is removed following surgery, the handpiece needs cleaning with a disinfectant cloth or rinsed under tap or demineralized water, dried, lubricated and autoclaved. Handpieces should not be immersed in disinfectant

solution or put in the ultrasonic cleaner. An automated washer-disinfector can be utilised for ease and standardisation. Lubrication is essential to maintain the function and longevity of the equipment, hence, it is performed at least daily, after cleaning the handpiece, before autoclaving, and after 30 minutes of use during the surgery. Most often, it is performed manually using MD-30 oil or F1 MD400 oil aerosol spray or by automated systems. For **traditional handpieces**, the drive air tube is lubricated (the smaller of the two large holes) by inserting 4 drops of oil, or by applying oil aerosol spray for a few seconds. **Slow-speed and contra-angle handpieces** should be lubricated using a spray bottle with the appropriate adapter or bottle cap. The **chuck system** (where the bur is inserted in the handpiece) must be lubricated at least weekly. Before use, all handpieces should be run for 30 seconds to remove any excess lubricant and their surface wiped.

Dental unit maintenance

Dental units provide air and distilled water for various handpieces but may include other attachments like curing light or suction. After each use, the surfaces of all lines and attachments need to be wiped with disinfectant. The air tank, the reservoir of dry compressed air, must be drained completely once a week to remove the condensation that builds up inside. Releasing the condensed water must happen rapidly, hence, loudly to be effective, which will prevent corrosion. The air and water filters need to be changed based on the manufacturer's recommendation.

Water line maintenance

Maintaining the cleanliness of water lines is critically important for patient and staff safety. A special straw in the distilled water tank, releasing ionized silver nitrate can be used as an antimicrobial keeping the water clean and safe for a long period, and would typically require yearly changing. Dental units, not equipped with a straw, would need more regular maintenance, which may include daily flushing of all of the water lines with fresh distilled water for a total of 2 minutes before use and 30 seconds between patients, air purging of the water lines after each day and regular shock water treatment. Dental units with or without the straw, still require weekly cleaning of the water bottle, breaking the water cycle, using a cleaning agent, hot water and a brush or a washer-disinfector. All of these procedures will help to prevent biofilm formation. The purchase of an in-clinic water distiller is worth considering for environmental sustainability reasons.

Dental radiography equipment

Dental X-ray generators are cleaned using disinfectant wipes after each patient and can be protected additionally by single-use sleeves. If an X-ray plate becomes contaminated or scratched, this will produce artefacts. When using indirect phosphorus X-ray plates (Computed radiography), the use of a fresh plastic sheath for each image is mandatory to protect it from blood and saliva, providing a longer lifespan.

Storage

Adequate storage is essential for maintaining equipment performance and hygiene. Storing instruments loose will risk potential contamination and damage. Organised instrument trays, the use of sterilisation pouches or an autoclave box, and storage in a dedicated, clean space help to maintain sterility and keep instruments in good working order.

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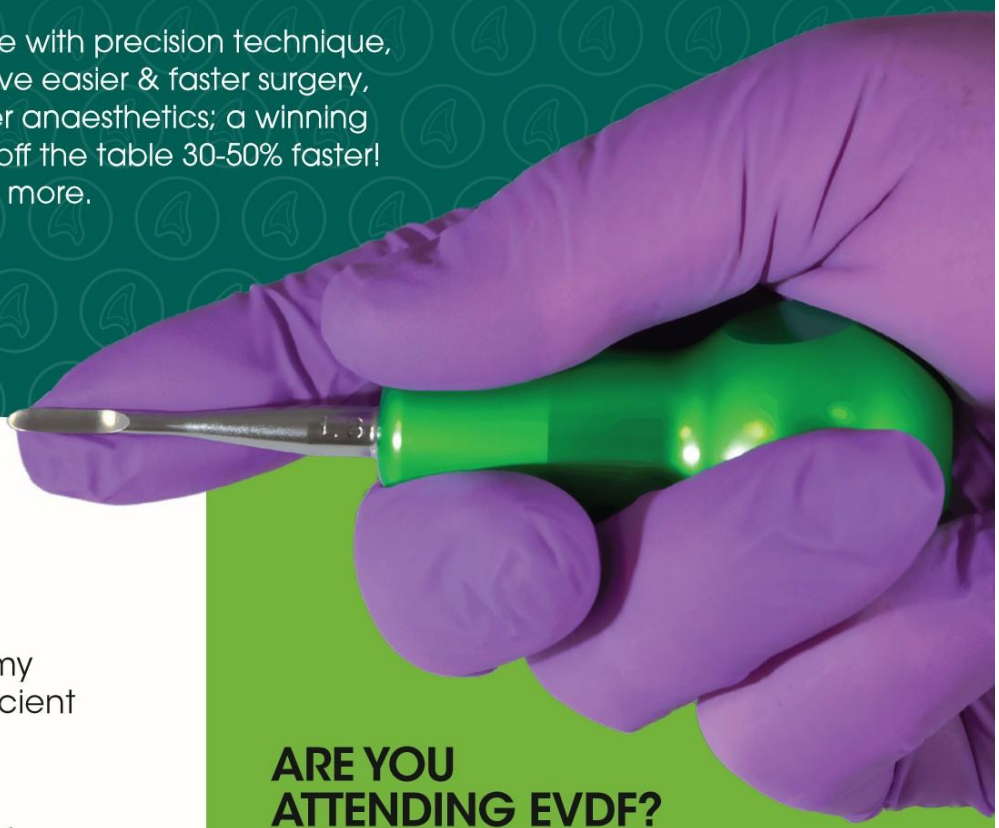

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Seeing the Unseen: Identifying subtle oral lesions in dogs and cats

Annabel McFadzean

During an oral examination there are numerous abnormalities which can be identified and recorded, however the more subtle lesions can often be overlooked. Some of these can be a sign of significant pathology, and the "tip of the iceberg". By recognising these lesions and understanding why they shouldn't be ignored, can make sure we are not leaving our patients with a potential source of oral discomfort.

ENDODONTIC DISEASE

Parulis: defined as a swelling of the gum, normally at the point where a periapical fistula reaches the surface. Can be a subtle lesion easily missed, or mistaken for an oral mass. Removal of the source of infection (root canal treatment or extraction) normally resolves the parulis. Often associated with a traumatically injured/abnormal tooth so closer insepction is warranted along with dental radiography to fully assess the endodontic status of the teeth.

Abrasion: defined as tooth wear caused by contact of a tooth with a non-dental object. Typically causes low grade chronic trauma, most commonly recognisable due to tennis balls or cage biting. The enamel eventually wears away to expose the dentin and healthy vital teeth will respond by laying down tertiary or reparative dentin to protect the exposed dentinal tubules. This appears as smooth localised brown/black discolouration on the damaged tooth surface (cannot 'catch' with a dental explorer as the pulp is not exposed). Can be subtle, and often affects much of the dentition if present. These injuries should be recorded, and evaluated for clinical or radiographic evidence of endodontic disease. Advice should be given to the owners to remove or substitue the abrasive object. Serial radiographic monitoring is recommended to ensure endodontic disease does not develop.

Discoloured tooth: concussive injuries can result in pulp haemorrhage and oedema, with blood entering the dentinal tubules causing secondary intrinsic tooth discolouration. A recent study has shown that 87.6% of teeth with intrinsic staining are non-vital, and in the same study of those with localised discolouration (affecting ½ or less of the crown) 62% were non-vital. Often found as an incidental finding on oral exam, but all these teeth require dental radiography as a minimum. Important to remember that not all teeth with necrotic pulp will show radiographic signs of disease – untreated non-vital teeth can result in abscess/granuloma/cyst, and a source of oral pain for our patients.

EXTRACTION COMPLICATIONS

Non-healing extraction site: even wound breakdown should continue to heal by second intention, but if an extraction site does not heal as expected then further investigations can be warranted. Differentials may include neoplasia, oronasal fistula, retained root remnant, and osteomyelitis. Imaging and biopsy would be required in the first instance.

Oronasal fistula: defined as a communication between the oral and nasal cavities. Can be caused by periodontal disease, trauma, surgical procedures, and congenital deformity.

An oronasal fistula should never be overlooked. Careful periodontal probing (especially on the palatal surface of the maxillary canine teeth) must be performed. Treatment requires surgical repair as will not heal by second intention. If untreated can lead to nasal infection and chronic rhinitis.

OCCLUSION

Distal malocclusion in cats: can cause a variety of lesions including the more subtle fovae (non-ulcerated indentation), gingival cleft, or a proliferative lesion (pyogenic granuloma) which is often mistaken for an oral mass. No lesion type is significantly more prevalent than others. Treatment options include odontoplasty with radiographic monitoring, or extraction of teeth resulting in the traumatic occlusion.

Attrition: defined as tooth wear caused by contact of a tooth with another tooth. Often the result of a “tight” occlusion/malocclusion seen in Brachycephalic breeds. In older dogs the contact may no longer be present as the teeth may be worn enough to accommodate the malocclusion, but in younger patients there may be treatment that can be performed to eliminate the traumatic occlusion and prevent further wear. It is also important to radiograph these damaged teeth to check for any evidence of endodontic disease as a result of the trauma.

INFLAMMATORY CONDITIONS

Canine chronic ulcerative stomatitis: a chronic and painful oral disease, with dogs presenting with halitosis and weight loss. Oral ulcerations can be evident such as on buccal mucosa, but occasionally they are more subtle or les obvious such as on the ventral tongue. Differential diagnoses would include autoimmune diseases, epitheliotrophic lymphoma and uraemic stomatitis.

Advanced Canine Dental Extractions: A Masterclass on the Maxillary Fourth Premolar

Ingrid Tundo

Introduction

The extraction of the maxillary fourth premolar teeth (108/208) in dogs is a common procedure in veterinary dentistry. This tooth is a key component of the carnassial pair, playing an essential role in mastication and oral function. Extraction is often necessary due to advanced periodontal disease, fractures, or endodontic pathology. While this procedure can be technically demanding, a systematic approach can make it more predictable, reducing complications and optimising post-operative recovery.

This masterclass aims to provide an in-depth understanding of how to perform this extraction effectively, emphasising technique, instrument selection, and procedural efficiency. By refining your approach, you can enhance surgical outcomes, minimise complications, and improve patient comfort.

Anatomy of the Maxillary Fourth Premolar

The maxillary fourth premolar is a large, three-rooted tooth located distally to the third premolar and mesial to the first molar. Key anatomical considerations include:

- **Three Distinct Roots:** Two buccal roots and one palatal root require careful sectioning to facilitate extraction.
- **Proximity to Key Structures:** The infraorbital nerve, maxillary artery, and zygomatic arch must be protected during surgery.
- **Dense Alveolar Bone:** The surrounding bone is relatively thick, necessitating controlled force application.

Understanding these anatomical features is critical for a smooth extraction process and avoidance of iatrogenic damage.

Indications for Extraction

The most common indications for extracting the maxillary fourth premolar include:

- **Advanced Periodontal Disease:** Loss of alveolar bone support leading to mobility and infection.
- **Fracture with Pulp Exposure:** Complicated crown fractures causing pulpitis or necrosis.
- **Fracture without Pulp Exposure:** Uncomplicated crown fractures causing pulpitis or necrosis.
- **Endodontic Disease:** Periapical abscesses or resorptive lesions requiring extraction.

Pre-Surgical Planning and Preparation

1. **Patient Assessment:** Conduct a thorough oral examination and review medical history. Identify systemic conditions that may impact healing (e.g., diabetes, Cushing's disease).

2. **Diagnostic Imaging:** Obtain dental radiographs to evaluate root structure, periapical pathology, and bone integrity.

3. **Pain Management:** Implement multimodal analgesia, including local nerve blocks (infraorbital or maxillary block), NSAIDs, and opioids as needed.

4. **Instrument Selection:** Ensure availability of:

    - Sharp scalpel blades (No. 15/11 or swan blade S65)
    - Periosteal elevators
    - High-speed handpiece with sterile burs (cross-cut fissure, round burs, diamond burs)
    - Luxators
    - Sutures (4-0 to 5-0 absorbable for flap closure)

Step-by-Step Extraction Technique

1. Preoperative x-rays

2. Nerve block

- Lidocaine or bupivacaine.

3. Creating a Mucogingival Flap (triangular)

- Make a gingival incision.
- Make a releasing incision (extend the incision mesial and dorsal to the tooth to improve visualisation and access).
- Use a periosteal elevator to reflect the flap carefully, avoiding excessive trauma.
- Cut the periosteum (blade or scissor).

4. Osteoectomy

- Bone removal from the surface of the roots (round bur).

5. Sectioning the Tooth

- Using a high-speed handpiece with a carbide bur, section the tooth into three parts, corresponding to each root.
- Begin at the furcation and carefully separate each root without damaging the surrounding alveolar bone.

6. Elevating the Roots

- Work on each root individually using a gentle, controlled force.

- Use elevators in a slow and steady rotational motion to break down the periodontal ligament fibers.
- If resistance is encountered, further luxation or additional sectioning may be necessary.

8. Post-operative x-rays

9. Debridement and Alveoloplasty

- Curette the alveolus to remove debris.
- Perform alveoloplasty as needed to smooth sharp bony edges, promoting soft tissue healing.

6. Flap Closure

- Ensure tension-free closure using simple interrupted with absorbable material.

Post-Operative Care

1. **Pain Control:** Continue analgesia with NSAIDs and opioids (cat) as needed.
2. **Soft Diet Recommendation:** Encourage soft food for 7-14 days to prevent trauma to the healing site.
3. **Oral Hygiene:** Instruct owners on post-op care, avoiding hard chew toys.
4. **Follow-Up:** Re-evaluate healing at 7-10 days and confirm complete recovery.

Potential Complications and How to Avoid Them

1. **Root Fracture:** Prevent by pre-operative x-rays, adequate sectioning and careful elevation.
2. **Hemorrhage:** Minimize risk by precise surgical technique and applying local pressure if needed.
3. **Oronasal Fistula:** Avoid excessive force or misdirected instrumentation.
4. **Flap Dehiscence:** Prevent by ensuring a tension-free closure and proper post-op care.
5. **Iatrogenic Damage to Adjacent Structures:** Stay aware of anatomical landmarks and use appropriate retraction.

Conclusion

Maxillary fourth premolar extraction can be a challenging but highly rewarding procedure when approached with a structured technique. By following systematic steps and utilizing proper instrumentation, veterinarians can achieve excellent surgical outcomes with minimal complications. This masterclass will equip you with the confidence and skills necessary to perform this procedure with precision and efficiency, ultimately improving patient welfare and owner satisfaction.

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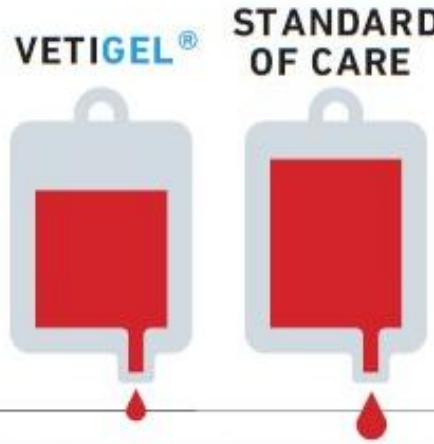

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Endodontic surgery: Top tricks for flawless results

Ana Rejec Jenček

DVM, PhD, Dipl EVDC

Apicoectomy is a surgical endodontic procedure performed when nonsurgical (re)treatment fails due to persistent apical pathology. It involves resection of the root apex, debridement of periapical tissues, and direct visualization of the resected root surface to eliminate infection, assess root integrity, and ensure proper sealing for long-term tooth preservation.

Indications:

1. Persistent periapical inflammation
    - Apical periodontitis nonresponsive to nonsurgical endodontic retreatment indicated as presence of periapical lucency requires endodontic surgery (apicoectomy).
2. Chronic apical periodontitis & external inflammatory root resorption
    - Persistent periapical radiolucency, recurrent infections, or the presence of draining sinus tracts despite previous endodontic therapy necessitate apicoectomy to achieve complete microbial eradication and retrograde sealing.
    - External root resorption due to chronic inflammation may require surgical resection and apical sealing.
3. Anatomical constraints
    - Root canal morphology, including severe root curvatures, canal calcifications, or complex anatomical variations, may preclude effective nonsurgical retreatment. Apicoectomy allows direct access to the root apex for decontamination and sealing.
4. Transverse fractures of apical third of the root with pulp necrosis
    - Root fractures confined to the apical third can compromise the integrity of the root canal system, leading to recurrent infection. Apicoectomy enables excision of the fractured segment while preserving the remaining root structure.
5. Endodontic instrument separation & procedural complications
    - Instrument separation, ledges, or other procedural errors obstructing nonsurgical retreatment can be treated with apicoectomy, facilitating effective management of the affected root apex.

Limitations:

Despite its efficacy, apicoectomy is contraindicated in specific circumstances where the risks outweigh the benefits.

1. Feasibility of nonsurgical retreatment

- If endodontic failure is due to inadequate instrumentation, insufficient disinfection, or incomplete obturation, conventional retreatment should be prioritized over apicoectomy.

2. Systemic and surgical contraindications
    - Patients with systemic conditions that impair healing, such as uncontrolled diabetes, immunosuppression, coagulopathies, or a history of radiation therapy to the head and neck, may not be suitable candidates for surgical intervention.

3. Anatomical constraints
    - The proximity of the root apex to critical anatomical structures, such as the mandibular canal, maxillary sinus, or major neurovascular bundles, increases the risk of iatrogenic injury and may contraindicate surgery.

4. Periodontally affected teeth
    - In cases where periodontal support is severely compromised, apicoectomy may not provide a favourable long-term prognosis, and extraction may be a more viable option.

Apicoectomy surgical procedure:

A full-thickness gingival flap is elevated to expose the surgical site. Common flap designs include:

- Semilunar flap: Minimally invasive with limited exposure.
- Triangle (three-cornered) flap: Offers better access, commonly used in small-breed animals or patients with restricted surgical fields.
- Pedicle (four-cornered) flap: Provides more extensive exposure for complex cases.

For a maxillary canine tooth, a pedicle flap or semilunar incision through the alveolar mucosa is preferred. For a mandibular canine tooth, access is achieved through a skin incision along the lower mandible. Triangular flaps with a vertical releasing incision are commonly used for maxillary fourth premolar tooth root exposure, with care to avoid the infraorbital nerve and vessels. For mandibular first molar tooth, a 3/8 circle semilunar incision at the apical two-thirds of the roots or triangular and semilunar flaps are utilized. Additionally, for the maxillary fourth premolar tooth, palatal root amputation is necessary and the exposed pulp chamber in the remaining portion of the tooth then carefully prepared and restored to maintain structural integrity and function.

Bone removal:

Once the flap is raised, a small section of bone is removed to expose the root apex and surrounding infection. Bone is cautiously removed using #331L pear shaped, #2 round, #701L tapered crosscut or #1558L dome crosscut bur. Although an air free surgical or high-speed handpiece is preferred to minimize tissue emphysema, a piezoelectric unit with appropriate tips may also be used. A controlled brushing motion is employed to carefully remove the buccal bone, selectively excising a portion of the bone covering the root surface. However, sufficient bone must be preserved while ensuring adequate access to the infected site. A precise osteotomy is created around the root apex, exposing 5–6 mm of the root end while preserving healthy tissue. Continuous irrigation is essential to prevent osseous necrosis. Periradicular debridement involves the removal of extruded root canal filling material and inflamed tissue present prior to apicoectomy.

Root apex resection:

During apicoectomy, the apical 3–5 mm of the root apex is surgically resected at a very minimal bevel angle to reduce dentin tubule exposure and minimize the risk of apical microleakage. This precise resection aims to eliminate infected or necrotic tissue while preserving the structural integrity of the remaining root. Ensuring an optimal bevel angle enhances the sealing ability of the retrograde filling.

Periapical curettage:

During the apicoectomy procedure, periapical tissues, including inflammatory granulation tissue and debris and any extruded root canal filling material, are meticulously curetted to eliminate potential sources of reinfection and promote optimal healing. In cases where suspicious periapical lesions are present, biopsy samples may be obtained and submitted for histopathological analysis to assess for possible pathological conditions such as periapical cysts, granulomas, or neoplastic changes.

Root-end preparation and retrograde filling:

The resected root-end is prepared using ultrasonic tips and small round or inverted-cone burs on microhead or miniature handpieces. A 3–5 mm deep retrograde apical root canal cavity is created and sealed with a biocompatible material in small increments with retro-carrier and then condensed. The marginal integrity of the root-end filling should be assessed using an explorer, as any gaps or defects may lead to leakage and potential failure.

MTA is the gold standard for retrograde filling in apicoectomy due to its superior sealing ability, antimicrobial properties, and bioactivity. It prevents bacterial recontamination, reduces apical microleakage, and promotes periapical healing by inducing osteogenesis and cementogenesis. Its high pH provides antimicrobial effects, eliminating residual bacteria, while its excellent biocompatibility minimizes inflammation, enhancing postoperative healing. MTA is moisture-tolerant, allowing it to set in the presence of fluids, which is beneficial in apical surgery where dryness is difficult to maintain. After root-end resection and retrograde cavity preparation, a 3–5 mm deep apical cavity is filled with MTA to create a hermetic seal, ensuring long-term stability, reduced reinfection risk, and periapical tissue regeneration. These properties make MTA the preferred material for root-end fillings, significantly improving treatment success and tooth preservation.

Biodentine is a bioceramic material with comparable biocompatibility and sealing efficacy to MTA. It has a high alkaline pH, providing antimicrobial properties that eliminate residual bacteria in periapical tissues. Biodentine stimulates dentin regeneration, cementogenesis, and osteogenesis, promoting periapical healing. The material offers superior mechanical strength, dimensional stability, and moisture tolerance, allowing it to set in the presence of fluids, which is beneficial in apicoectomy. With a faster setting time (~12 minutes) than MTA, it improves clinical efficiency and reduces chairside time. Highly biocompatible and radiopaque, Biodentine forms a strong apical seal, preventing bacterial microleakage and ensuring long-term success in endodontic microsurgery.

Flap repositioning and suturing:

After completing the apicoectomy procedure, the mucoperiosteal flap is carefully repositioned to its original anatomical position and secured using proper suture material. Ensuring a secure tension free flap closure also helps maintain surgical site stability, minimize postoperative complications, such as infection or dehiscence and reduce discomfort and enhancing overall healing outcomes.

Postoperative management and prognosis:

Following an apicoectomy, antibiotics are prescribed only in cases of active odontogenic infection and are not routinely indicated after surgical endodontic procedures. Pain and inflammation are managed with analgesics and anti-inflammatory medications. The prognosis of apicoectomy depends on factors such as lesion size, periodontal health, and surgical technique. Adequate bone support enhances stability and healing, while surgical precision ensures optimal apical sealing and minimal tissue trauma. When all factors are properly managed, the success rate can be high.

Regular clinical and radiographic follow-ups are essential for monitoring healing, detecting recurrence, and enabling early intervention if needed. Follow-up visits, including radiographic evaluations, are recommended first at a 3-month recheck and then annually to monitor healing, assess periapical regeneration, and detect early signs of recurrence or complications.

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Orthognathic Surgery for Severe Malocclusions in Domestic Carnivores: Indications, Techniques, and Ethical Considerations

Mihai Guzu

DMV, Dip EVDC

Introduction

Orthognathic surgery plays a crucial role in addressing severe malocclusions associated with functional and aesthetic problems in humans. Malocclusions can lead to various complications, including difficulty in food prehension, oral trauma, periodontal disease, and temporomandibular joint disorders. Similarly, orthognathic surgery techniques might constitute good therapeutic options in domestic carnivores, particularly in cases where functional impairment and chronic pain significantly affect the animal's quality of life. While minor dental misalignments may not always necessitate intervention, severe cases may require surgical correction to restore normal occlusion and alleviate discomfort. Advances in surgical techniques, particularly piezoelectric surgery and modern osteosynthesis methods, have greatly improved precision and reduced postoperative complications, making these procedures safer and more effective. However, the ethical considerations surrounding orthognathic surgery remain paramount, as these interventions should be performed strictly for medical reasons rather than for aesthetic purposes.

I. Indications

Malocclusions are classified based on the relative position of the mandible and maxilla. Class II malocclusion, or mandibular retrognathism, occurs when the lower jaw is significantly shorter than the upper jaw, leading to an exaggerated overbite. This condition is common in breeds as the German Shepherd and Bull Terrier and can result in traumatic occlusion, where the mandibular canine teeth injure the palate, leading to chronic pain, periodontitis and potential fistula formation. On the other hand, class III malocclusion, or mandibular prognathism, is characterized by an excessively long mandible relative to the maxilla. While it is considered a breed standard in brachycephalic dogs such as Bulldogs and Pugs, severe cases can cause irregular tooth wear, increased stress on the temporomandibular joint, and soft tissue trauma, which may compromise the animal's long-term oral health. Facial asymmetries, classified as class IV malocclusions, represent another significant challenge in veterinary dentistry. These asymmetries can be congenital or result from trauma, leading to unilateral occlusal imbalances that cause uneven distribution of masticatory forces, excessive joint strain, and chronic discomfort. If left uncorrected, facial asymmetries can contribute to progressive dysfunction. Trauma during the growth phase further complicates the situation, as fractures affecting the maxilla, mandibular symphysis, or temporomandibular joint can interfere with normal craniofacial development. In growing animals, early surgical intervention is often required to prevent long-term deformities and ensure that proper occlusal function is maintained.

II. Ethical Considerations in Orthognathic Surgery

The ethical considerations in veterinary orthognathic surgery cannot be overlooked. Unlike in human medicine, where cosmetic concerns may justify orthognathic procedures, veterinary interventions should be based exclusively on medical necessity. The decision to proceed with surgery must prioritize the animal's health, focusing on conditions that cause significant pain, impaired function, or progressive degenerative changes such as temporomandibular joint arthritis. Procedures performed for purely aesthetic reasons or to conform an animal to breed standards are not ethically justifiable. Veterinarians must ensure that pet owners fully understand the rationale behind the surgery, including the risks, benefits, and potential complications. When possible, less invasive alternatives such as selective extractions, orthodontic procedures, crown reduction and vital pulp therapy should be considered before opting for such surgical interventions.

III. Surgical Techniques and Osteosynthesis Methods

Orthognathic surgery in domestic carnivores, particularly those suffering from severe malocclusions, involves a careful balance of precision, advanced techniques, and a deep understanding of maxillofacial anatomy. The primary goal is to reposition the jaw structures, whether the maxilla or/and mandible, to restore functional occlusion and alleviate pain or discomfort. Several osteotomy techniques are described in humans based on the specific type and severity of the malocclusion, and the correction needed. So called **"bimaxillary osteotomies"** may also be considered in severe cases, by correcting both the lower face and the midface during the same procedure.

1. Mandibular Advancement Osteotomy for class II malocclusion

This procedure involves making a precise cut through the mandible to allow for its forward repositioning. The **mandibular bilateral sagittal split osteotomy** is the most commonly described technique. The repositioning is usually achieved by mobilizing the jaw through the osteotomy, followed by fixation of the bone in its new, corrected position using rigid internal stabilization systems. The most commonly used stabilization techniques are titanium or resorbable mini-plates and screws, which provide both rigidity and controlled bone alignment, ensuring optimal healing. Care must be taken to preserve the integrity of the mandibular vasculonervous bundle, providing both the vascularization and innervation to the tissues of the lower jaw.

2. Maxillary Repositioning Osteotomy for class II or III malocclusions

This procedure involves the removal of a bone segment or making a controlled cut through the maxilla, allowing it to be repositioned into a more harmonious alignment with the mandible. The correction can be performed as a single-step procedure or with a more complex multi-segmental osteotomy depending on the extent of misalignment. **LeFort I, II and III osteotomies** are the most employed to preserve the integrity of the maxillary vasculonervous bundle, which provides sensory innervation and vascularisation to the midface. They are also meant to avoid any damage to the surrounding tissues, especially the eyeballs and the central nervous system.

3. Segmental Osteotomy for Localized Corrections

In some cases, malocclusion may be limited to a specific area of the jaw, rather than the entire structure. A **segmental osteotomy** is employed in such cases, wherein only a particular segment of the mandible or maxilla is altered. The technique is highly advantageous for patients with complex deformities or those requiring more subtle corrections, offering better preservation of surrounding tissues and minimizing unnecessary bone removal.

4. Distraction Osteogenesis

This method is particularly beneficial in addressing mandibular deficiencies, particularly in growing animals, where the potential for skeletal growth is still present. It involves the gradual separation of bone segments, allowing new bone to form in the created gap. This process is controlled and monitored over time using an external or internal distraction device. The technique helps stimulate new bone growth and elongation of the mandible, thus gradually correcting deformities associated with mandibular underdevelopment, and presents a less invasive alternative to traditional bone grafting or extensive osteotomy.

5. Osteosynthesis and Stabilization of Osteotomies

The stabilization of the osteotomies is a crucial part of the surgical process, ensuring that the repositioned bones heal in the correct alignment. The most common fixation devices include **titanium plates and screws**, which provide stable, long-term stabilization with minimal risk of infection. Titanium is particularly favored because of its strength, biocompatibility, and resistance to corrosion. Alternatively, **resorbable materials**, such as polylactic acid (PLA) or polyglycolic acid (PGA), are used in certain cases where permanent hardware removal may not be desirable. **Wire-reinforced interdental composite splints (WRICS)** are particularly useful in dentulous areas, especially in smaller animals or when less invasive approaches are preferred. In more complex cases, **external skeletal fixation** may be employed, especially for **distraction osteogenesis** procedures or for more complicated situations.

6. Piezoelectric Surgery

The introduction of piezoelectric surgery into the veterinary field has revolutionized how surgical osteotomies are performed. It utilizes ultrasonic vibrations to selectively cut bone while sparing surrounding tissues, such as nerves, blood vessels, and muscles, reducing the risk of unintended injury. One of the significant advantages of piezoelectric surgery is its ability to minimize intraoperative bleeding, which can be a major concern in traditional bone-cutting techniques, thereby improving visibility during the surgery. Furthermore, piezoelectric surgery enhances bone healing by promoting osteogenesis and reducing postoperative inflammation and necrosis. This results in a quicker recovery time, improved functional outcomes, and a lower risk of infection or other complications following surgery. Due to these benefits, piezoelectric surgery has become an essential tool in the veterinary surgeon's armamentarium, particularly when dealing with complex maxillofacial deformities or where precision is critical.

IV. Postoperative Management and Long-Term Outcomes

Pain control is a primary concern, and multimodal analgesia, including loco-regional blocks, gabapentinoïds, NSAIDs and opioids should be implemented to minimize discomfort. Nutritional support is also critical, as a temporary switch to soft or liquid diets reduces mechanical stress on healing bone structures and facilitates recovery. Antibiotic therapy is recommended, particularly in procedures involving implants, to prevent postoperative infections. In cases involving temporomandibular joint surgery, physical therapy and jaw exercises may be necessary to restore normal mobility and function.

Long-term follow-up is essential, particularly in growing animals, as skeletal development can influence the stability of surgical corrections. In some cases, additional orthodontic adjustments may be required post-surgery to fine-tune tooth positioning and optimize functional occlusion.

Conclusion

Orthognathic surgery techniques are now well-described in humans and could constitute a highly valuable approach for managing severe malocclusions in domestic carnivores, but it must always be performed with careful ethical consideration. Ensuring that these procedures are reserved for medically justified cases helps maintain responsible veterinary practice, prioritizing the animal’s well-being over aesthetic concerns. With ongoing advancements in minimally invasive surgery, osteosynthesis technology, and piezoelectric techniques, veterinary surgeons now have access to safer and more effective methods for correcting complex maxillofacial abnormalities. By integrating ethical decision-making, advanced surgical techniques, and comprehensive postoperative care, veterinarians can provide optimal treatment outcomes while upholding the highest standards of patient welfare.

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Product Information Sheet

Canine & Feline Bone Allografts

VETERINARY TISSUE BANK
restoring mobility

PRODUCT DESCRIPTION	SIZE & VOLUME	INDICATIONS
Cancellous Chips Morselised spongy bone, processed to remove cells and bone marrow elements. Available in 1cc, 3cc & 5cc Coarse (2-4 mm), Medium (1-2 mm), Fine (<1mm) chip sizes Feline: 0.5cc, <2mm chip size		Osteoconductive bone matrix, for use in restoring bone stock such as in acute fractures, bone cysts, bone defects where filling with new bone is needed.
Cancellous Block Hard and dense spongy bone block. Various sizes.		For use in areas which require load bearing or structural support.
Cortical Segment/Shaft Cortical bone, cut cross section from long bones, available in various diameters and heights.		To restore segmental bone loss such as in tumour resection, fracture management, etc.
Cortical Strut Cortical bone from mid shaft of long bones cut along the length to split into two. 50mm & 80mm length, various lengths.		Cortical onlay graft to buttress or add to existing long bone which may have been weakened such as in revision femoral surgery.
DBM Standard Demineralised bone matrix which contains endogenous growth factors BMPs to express Osteoinductive potential, inducing new bone formation. Available in 1cc, 3cc & 5cc for canine, 0.5cc for feline.		Filling in procedures where added biological function is considered to be beneficial: delayed union, spinal fusion, arthrodesis and dental socket.
DBM Putty Injectable and mouldable Osteoinductive DBM, formulated to provide excellent handling property. 1cc & 0.5cc		Indicated for use as in DBM Standard, humeral intracondylar fissure, etc.
DBM Fibres Osteoinductive DBM fibres providing superior Osteoconductive scaffold, for easy handling. 1cc, 3cc & 5ccc		Filling bone defects where enhanced biological function is beneficial. May not be suitable for filling small gaps such as in arthrodesis.
Cancellous Sponge Demineralised spongy bone with Osteoinduction potential. The sponge like texture offers good handling property. Various sizes for 1cc volume.		For use in filling defects and bony gaps, may be used in combination with bone marrow or PRP to enhance performance.
Fascia Lata A relatively strong and stretchable connective tissue membrane which can act as biological covering. Small: 2x3 cm Large: 3x5 cm		Guided tissue regeneration (GTR) in dental surgery, reconstructive surgery and tendon augmentation.

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Decisional algorithm for the use of plating systems in maxillofacial traumatic surgery.

Mihai Guzu

DMV, Dip EVDC

Introduction

Maxillofacial trauma in domestic carnivores, particularly jaw fractures, requires careful evaluation and consideration of various factors to determine the most appropriate treatment approach. These injuries, which can occur due to traumatic events such as vehicular accidents, falls, or bites, as well as conditions like metabolic, infectious, or neoplastic diseases that impact bone density, or iatrogenic factors such as dental extractions or other surgical interventions, pose significant challenges in veterinary medicine. Successful treatment of these fractures is heavily dependent on the careful selection of osteosynthesis techniques that not only ensure optimal healing but also maintain normal mandibular function and occlusion. In this context, veterinary surgeons can draw valuable insights from the advances in human maxillofacial surgery, where fracture stabilization techniques such as miniplate fixation, intermaxillary fixation, and the use of biomaterials have been extensively studied and refined.

I. Patient considerations

The decision to surgically treat jaw fractures in domestic carnivores depends largely on the severity and type of the fracture, as well as other patient-specific factors such as age, health status, and the risk of complications. Not all jaw fractures require surgery, as some minor, non-displaced fractures can heal adequately with conservative management, such as pain control and dietary modifications to facilitate feeding. However, surgery is necessary in cases where the bone fragments have been displaced significantly, compromising the healing process and impeding the normal functioning of the mandible. Fractures that are unstable, comminuted, or show significant displacement require more aggressive treatment, including stabilization to restore the structural integrity of the jaw and to preserve its function. In such cases, rigid fixation methods are essential to re-establish occlusion and prevent long-term functional impairments, such as difficulty in chewing or malocclusion.

Open, contaminated, or infected fractures usually benefit from less invasive stabilization methods to reduce the risk of infection while ensuring the fracture is appropriately supported. Fractures in younger animals also require particular attention. These patients are still growing, so care must be taken to ensure the fracture is fixed in a way that does not interfere with normal bone development or cause growth disturbances. On the other hand, fractures in older animals may require more rigid fixation due to the slower healing process associated with aging, as well as a reduced ability to heal bone fractures. The goal in these cases is to provide sufficient stabilization to allow for healing, especially considering that older animals may experience complications such as delayed bone healing or infection.

II. Anatomical Considerations

The mandible is a dynamic structure that undergoes constant loading during manducatory movements. It is critical that the chosen device can withstand the forces exerted on the bone without compromising the integrity of the jaw. In addition, the location of the fracture and its proximity to vital structures, such as nerves, blood vessels, and teeth, must be considered when determining the surgical approach and fixation method. In the caudal mandible, where the bone is thicker and more robust, locking plates may therefore be more effective at providing the necessary stabilization. Conversely, the use of miniplates may be difficult when less bone is available, as fractures situated near to the TMJ, thin midfacial fractures with a high risk of implant exposure in the nasal cavity, or when dental structures impede screw placement. More conservative approaches, such as maxillomandibular fixation devices or orthodontic appliances may then be considered, to minimize damage to the surrounding tissues and restore function.

III. Biomechanical Principles

The fundamental goal of fracture management is to restore stability to the fracture site while minimizing trauma to surrounding tissues, which is especially important in the highly vascularized and functionally critical areas of the jaw. Jaw fractures present unique biomechanical challenges due to the dynamic forces involved during the manducatory movements, which include tensile, compressive, and shear forces. As such, the osteosynthesis technique chosen must be capable of accommodating these forces while maintaining the overall integrity of the jaw. In the midface, ideal lines for implant placement were described in the vertical plane by Sicher, and in the horizontal plane by Omberdanne. Similarly, Champy's tension and compression lines were described in the mandible.

Another key principle in osteosynthesis is the distinction between load-sharing and load-bearing techniques. Load-sharing techniques are suitable for fractures where the bone fragments are in good contact and the fracture site can bear some physiological stress. In such cases, techniques like interfragmentary miniplates can be used to support the bone fragments while allowing some degree of physiological movement. This type of fixation distributes the stress across the fracture site, which can promote healing by encouraging natural bone remodeling.

In contrast, load-bearing techniques are necessary for more unstable fractures, such as comminuted fractures, where the bone fragments cannot withstand functional loads without additional reinforcement. For these cases, more rigid internal fixation techniques, such as the use of locking reconstruction plates, are preferred. These plates provide enhanced stability by using screws that lock into the plate, preventing movement of the bone fragments and reducing the risk of implant failure or bone resorption around the screws. The use of bicortical screws, where screws are placed through both cortices of the bone, further enhances the mechanical stability of the fixation and provides better force distribution across the fracture site.

1. Wire-reinforced interdental composite splints

For symphyseal separations or simple non-comminuted fractures, wire-reinforced interdental composite splints are usually indicated. These devices provide a minimally invasive option for stabilization, where the wires are placed around the teeth and used to hold the fractured bone in place. This method is effective for small fractures where minimal hardware is needed and relatively stable situations. However, it is not suitable for highly comminuted or unstable fractures. In human maxillofacial surgery, interdental wiring may be used in combination with plate fixation to increase the stability of the mandible, especially in the load-bearing regions. This approach is particularly effective in small animals or juvenile patients, where a less invasive and more flexible solution is preferred.

2. Plating systems

Bone plates and screws are commonly used for more complex fractures, particularly those that involve unilateral or bilateral, mid-body, or caudal mandibular fractures. These fractures require stronger stabilization, and titanium plates are often the material of choice due to their strength, biocompatibility, and resistance to corrosion. Titanium plates also have the advantage of being lightweight, making them ideal for use in smaller animals. The development of locking plate systems has further revolutionized fracture management in both human and veterinary medicine. These systems provide improved stability by reducing the risk of screw loosening and minimizing bone resorption around the screws, ultimately leading to better long-term outcomes for the patient. In addition, locking plates facilitate a more precise and stable fixation, which is crucial in the management of complex or unstable fractures.

3. External skeletal fixation

External skeletal fixation (ESF) has been described in domestic carnivores, though its use is generally limited. ESF involves the application of an external frame with pins that are inserted into the bone to stabilize the fracture. While ESF can provide dynamic stabilization and allow for some micromotion at the fracture site, it requires diligent care to prevent complications such as pin tract infections. In human patients, ESF is typically reserved for cases where internal fixation is contraindicated due to infection or significant bone loss. While ESF offers biomechanical advantages in terms of dynamic stabilization, its application in small animals requires careful monitoring and management to avoid secondary complications, such as infection or delayed healing due to radicular trauma during the placement.

4. Resorbable materials

Polylactic acid (PLA) and polyglycolic acid (PGA) resorbable miniplates and mesh plates have been studied extensively in human pediatric patients and show promising results in terms of providing temporary stability while allowing the material to gradually degrade as the bone heals. Its use in veterinary maxillofacial surgery has recently gained in popularity. These materials are particularly advantageous in pediatric patients, as they eliminate the need for a second surgical intervention to remove the implant once the fracture has healed. However, resorbable materials are generally less rigid than titanium plates, which makes them less suitable for highly unstable fractures.

Conclusion

The management of jaw fractures in domestic carnivores is a multifaceted challenge that requires careful consideration of various factors, including the fracture type, patient age and health, and anatomical considerations. The principles of human maxillofacial surgery can be effectively applied to veterinary patients, with numerous advances in osteosynthesis techniques, materials, and postoperative care. By selecting the appropriate fixation method and carefully considering the biomechanics and anatomical features of the mandible, veterinarians can optimize treatment outcomes and restore normal function to affected animals. The continued development of biomaterials, minimally invasive techniques, and refined postoperative care protocols will undoubtedly improve the prognosis for patients with jaw fractures, ensuring better long-term quality of life.

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RAP

RAMUS ANATOMICAL PLATE COURSE

In-person lectures, dry lab & wet lab

4 June 2025

University of Liverpool,
Veterinary Teaching School,
Dansie Street, Liverpool, L35RS

Agenda

Time	Title
08.00 - 08.30	Registration & welcome
08.45 - 09.00	Equipment & getting setup
09.00 - 09.30	Overview of anatomy
09.30 - 10.00	Anaesthetic considerations & patient management
10.00 - 10.20	Tea & coffee
10.20 - 10.45	RAP design / custom mandible 3D printing service
10.45 - 11.30	General procedure & case study discussions
11.30 - 12.30	Planning & templating
12.30 - 13.00	Lunch
13.00 - 14.00	**Practical 1:** RAP dry lab (CT scanned heads & 3D printed mandibles)
14.00 - 14.30	**Practical 2:** Wet lab transmylohyoid intubation
14.30 - 16.30	**Practical 3:** Wet lab (CT scanned heads) fracture reduction & RAP implant placement
16.30 - 17.30	Complications & discussion

Course Preparation

1 **Cadavers with fractured mandibles are CT scanned**

2 **Ramus fractures are digitally reconstructed**

3 **Cadaver specific models are 3D printed**

Course Practical

4 **Implants are applied to plastic models**

5 **Transmylohyoid intubation practical**

6 **Cadaver practical aided by reconstructed model**

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Outcomes of Intraoral Wire and Composite Splints for Mandibular Fracture Repair in Cats

Joanna Pakula, resident EVDC

Maxillofacial fractures are common complications of head injuries in cats resulting from road traffic accidents, fights or falls from a height (High-Rise Syndrome).

The maxillofacial and oral anatomy of cats presents unique challenges compared to dogs. Often, techniques and equipment designed for other body parts or for different species have been adapted for feline maxillofacial surgery. This practice has typically led to high rates of complications. (1)

The complexity of the anatomy of the oro-maxillofacial structures, the inaccessibility of deeper elements within the skull to physical examination, and the frequent presence of soft tissue swelling, diagnostic imaging is necessary to visualise fracture sites and identify dentoalveolar injuries. (2)

A study conducted on a group of 45 cats found that 72% of patients presenting with maxillofacial fractures had at least one dentoalveolar injury, underscoring the need for a thorough diagnostic workup in these patients (3).

This presentation provides an overview of the diagnosis and decision-making processes for mandibular body fractures in cats. It delineates the challenges associated with managing these injuries, discusses the application of non-invasive management techniques, and emphasizes the underutilized approach of using composite dental materials for mandibular body fracture repair in feline patients. To the author's knowledge, no study has been published yet on the use of Wire Reinforced Composite Splints for repairing mandibular body fractures in cats.

When repairing mandibular body fractures in cats, various difficulties may be encountered:

- Tooth roots occupy a substantial volume of bone in their region, significantly reducing the available bone volume for implant placement. Moreover, neurovascular structures in the mandibular canals limit screw placement.
- Occlusion may be difficult to monitor when a patient is routinely intubated (via orotracheal intubation). Even slight occlusal misalignment may result in trauma to adjacent tissues or inability to close the mouth. (1)

Transmylohyoid intubation is a useful and straightforward technique that permits normal mouth opening and closing during fracture repair, based on our experience. Its incorporation can enhance operator comfort, improve visibility, and optimise the outcome of occlusal adjustment when using the WRICS technique. This technique has not been officially described in cats yet.

Equipment and tools used in WRICS techniques in cats may include:

- 26 G orthopaedic wire
- Etch (37% phosphoric acid)
- Bond
- Micro brushes
- LED light
- Flow composite
- Low-Speed acrylic burrs
- Unfilled resin
- Wire forceps

The most common wire configurations are the modified Risdon technique, modified stout loop technique and crossover technique. Modified stout loop and crossover have been shown to be biomechanically similar. (3)

Lingual and buccal wires are woven around the crowns of the teeth in the oral cavity, and then reinforced with composite material. This combination creates a construct that is stronger than using either wire or composite alone. (4)

According to the preliminary results of our study, the application of Wire Reinforced Composite Splints (WRICS) for mandibular body fractures proves to be a favourable treatment method. Despite the need for specialised equipment and training for intraoral wire and composite splint application, the required tools and materials are readily available and affordable. The fundamental techniques are uncomplicated to acquire and can be proficiently executed by skilled general practitioners. (6)

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The art of success in restorative dentistry

Ingeling Bull

Restorative dentistry focuses on repairing or replacing damaged or missing teeth to help improve oral health and function.

Advanced dental treatment involving the use of filling materials is becoming more and more common in small animal practice and it is important that veterinarians who offer advanced dentistry, have the necessary knowledge and experience to be able to choose the best materials for each treatment.
Dental biomaterials are constantly changing, and new products appear all the time, but not necessarily with better properties. Polymer-based dental filling materials are dominant in restorative treatment in human dental practice. It has great significance that veterinarians doing dentistry have necessary knowledge and experience with dental materials to be able to choose the best suited materials for each treatment.
70 % of all restorations in human dentistry are replacements for failed restorations.
The understanding of the mechanism of bonding dental materials to tooth structure is fundamental in matter to achieve good results in restorative dentistry.
Choice of restorative materials should be based on the functional needs. One need to maximize the desirable properties and minimize the undesirable properties. The ideal restorative material does not exist yet.

Every dental restoration require retention. Undercut regions in the cavity preparations retain dental amalgam. All indirect restorative materials require an adhesive to bind to tooth structure.
Considering the goal of minimal-invasive dentistry, this new approach promotes a more conservative cavity design, which relies on the effectiveness of current enamel-dentine adhesives instead of mechanic retention.
Formation of an optimally bonded interface requires that certain criteria are met:

1) A clean surface on the substrate.
2) The adhesive must have good wettability.
3) The adhesive should intimately contact the substrate to produce physical, chemical, or mechanical bonding.
4) The final practical consideration is the method for curing the adhesive. Most modern bonding agents harden by chemical reactions initiated by visible light, although self-cured and dual-cured systems are also available.

When all criteria are fulfilled, the bonding will provide physical, chemical, and micromechanical strength that can withstand intraoral forces and prevent debonding. Bonding in dentistry usually involve adhesion to enamel and dentin. Challenges for adhesive procedures are directly related to the structure of these tissues. The key challenge for new dental adhesives is to be simultaneously effective on two dental substrates of conflicting nature.

The mineralized part of the tooth is a complex structure made of different hard tissues. Enamel is composed of approximately 90% (weight) hydroxyapatite besides water and organic material. Enamel has a high energy surface. The enamel prisms are essentially parallel to each other and run from the dentoenamel junction outward in a radial pattern. Near the cementoenamel junction, the prisms are highly tipped. It is crucial to avoid undermining enamel rods during cavity preparations, to avoid that bonding dislodge the enamel prisms during mechanical loading. The photomicrographs show etched enamel.
Dentin is much richer in organic material than enamel. Only about 50% of dentin is mineralized with hydroxyapatite crystals. Dentin tubules are 1,7-3µm in diameter and are formed at a slight angle to the dentin-enamel junction and pulp chamber. There is a higher density of tubules along the inner or deep dentin than at the middle dentin or the outer/superficial dentin. Intertubular dentin comprises collagen, hydroxyapatite, and water. Never allow dentin to dry out, it must be kept humid to avoid the depleted collagen to collapse, preventing good penetration of the bonding agent
The scanning electron photomicrograph show etched dentin in a human tooth, with the round open tubules. In canine and feline teeth, the tubules are more oval.

The smear layer consists almost entirely of hydroxyapatite debris and water from highspeed cutting during cavity preparation. High surface temperature along the cutting interface pyrolyze most of the organic material.
The smear layer is typically 0,5-15 µm thick with smear plugs within the ends of the tubules.

BONDING MATERIALS

To be successful with restorative dentistry it is essential that the practitioner has basic knowledge of bonding materials, which systems exist and how they should be used.
With changing technologies, dental adhesives have evolved from no-etch to total-etch to self-etch systems. Currently, bonding to dental substrates is based on three different strategies:

1) etch-and-rinse
2) self-etch
3) resin-modified glass-ionomer approach

More recently, a new family of dentin adhesives has been introduced (universal adhesives), which may be used either as etch-and-rinse or as self-etch adhesives.

Composite restorations are accomplished with minimal loss of tooth structure, little or no discomfort, relatively short operating time, and modest expense for the client. Composites can be used in almost any tooth surface.
The primary disadvantages of composite restorations relate to their dependence on adequate adhesion and polymerization protocols and procedural difficulties.
Composite restorations are time consuming and technique sensitive because bonding usually require multiple steps and proper technique is absolutely mandatory, the operating site must be appropriately isolated, incremental placement technique must be used and insertion and finishing is more difficult than amalgam.
Because direct restorations are bonded to tooth structure, the effectiveness of generating the bond is paramount for the success and longevity of the restoration.
Failures can result from numerous causes, including trauma, improper tooth preparation, inferior materials, poor material choice, and patient-related risk factors. Most failures of restorations are directly caused by operator errors.
Unpolymerized Methacrylate may produce local and systemic reaction to personnel who have repeated contact, and protection is crucial – Hydroxy Ethyl Methacrylate (and other monomers) penetrates latex gloves. Even double gloves will cause skin contact within a few minutes after exposure with aggressive monomers. Contaminated gloves should be replaced immediately.
Bottles should always be tightly closed. Avoid evaporation of resin when materials are disposed.

If contamination occur wash hands immediately with soap and copious amounts of water. Polymerized materials are safe.

CAVITY PREPARATION AND RESTORATIONS

Indications: caries, enamel dysplasia, enamel defects, endodontic access openings.

The procedure will vary, dependent on size of cavity, number of affected teeth and eventual endodontic involvement. Intra-oral dental radiography is mandatory. Advanced lesions with extensive crown destruction are best treated by extraction.
Dentin is a sensitive structure, and any cavity preparation will irritate odontoblasts and potentially lead to sensitivity therefore a multi-modal pre-emtive analgesia protocol is recommended.
Scale and polish, no oils or fluoride as it may compromise bonding
The aim of restorative dentistry is to remove all decayed or damaged tooth structure, leaving as much healthy tooth as possible, and restoring the normal coronal anatomy
Each cavity preparation should be designed individually to repair the defect. Cavity preparation aim to remove damaged enamel and/or dentin and take care not to remove too much healthy tooth substance.

Cavity preparation should not enter the pulp chamber unless the pulp is already involved in the pathological process.
Enamel should always be supported by dentin. Enamel rods are arranged at right angles to tooth surface, and any unsupported enamel will break off leaving gaps in the restoration.
Do not create undercuts. When amalgam was the restoration material, undercuts made in the dentin was necessary for mechanical retention, but that is not true for the restorative materials in use today.
When using a composite restoration on an occlusal surface, do not bevel the enamel margin as this will cause thin layers of composite along the margins which are prone to wear and fracture. This may again lead to microleakage and subsequent failure.

Near pulp exposure or accidental pulp-exposure must be protected with a Calcium hydroxide base.
Apply composite according to manufacturer's instructions! There are flowable and packable composites.
Composite should be applied in incremental layers of <2 mm if the product is light cured. Bulk fill materials can be filled in 4 mm increments or even more. The potential disadvantages of bulk-filling are effects due to shrinkage may be more pronounced when bulk-filled than when placed in increments, since the entire mass polymerizes at one time rather than in small increments. Polymerization of resin in deep preparation locations may be inadequate.
Use finishing stones and disks to finish the restoration.
Add a final layer of unfilled resin on top of the composite.

Remember to check the occlusion when the restoration is on occlusal surfaces. Draw with a pencil on the antagonist to the restored tooth and close the mouth. If you don't get any pencil-marks on the restoration means the occlusion is good. If there are pencil-marks you need to remove the pencil-marks with finishing stone or polishing disks and repeat the test until there are no marks. Excessive restorative material preventing proper occlusion is extremely uncomfortable.

THM's

- Good restorative materials cannot make up for a poor cavity prep
- Avoid contamination
- Lightcuring units must be maintained
- Keep the light source 1-2mm from the material to be cured and keep it still
- Each restorative material used in dentistry has its own technical instruction

READ MANUFACTURER'S INSTRUCTIONS!

	Friday 4th April 2025	
	INCISOR **-RIBA Gallery**	CARNASSIAL **-Jarvis Hall**
9.00-9.50	KEYNOTE: Maxillofacial trauma in dogs and cats: what can we learn from humans? (M.Guzu)	
9:50-10.40	Pressure's On: Mastering Hypotension Management Under Anaesthesia (S.Parker)	
10.40-11.00	BREAK	BREAK
11.00-11:45	How to perform an oral examination and charting: what is normal and abnormal (R.Davis)	Palatal clefts and defects (Y.Bar-Am)
11:45-12:30	Abnormal tooth development: Consequences, New developments and Treatment approaches (M.Lazzarotto)	Gingivectomy and gingivoplasty: Indications, surgical techniques, and clinical outcomes (A.Rejec)
12:30-13:30	LUNCH	LUNCH
13:30-14:20	Setting patients up for a lifetime of good oral health (C.Owen)	New insights in melanoma staging (L.Mestrinho)
14:20-15:10	Feline chronic gingivostomatitis (Y. Bar-Am)	Oral oncology from a surgical point of view (S.Storli)
15:10-15:30	BREAK	BREAK
15:30-16:15	Should I or Shouldn't I? Prescribing Antibiotics in Veterinary Dentistry (H.Lohr Van Velzen)	3D printing applications in oral health (L.Mestrinho)
16:15-17:00	Picture Perfect: Top Tips for Dental Radiography (J. Haseler)	Quality of life studies following maxillectomy and mandibulectomy (I.Bull)

	Saturday 5th April 2025	
	INCISOR **-RIBA Gallery**	CARNASSIAL **-Jarvis Hall**
9.00 - 9.50	KEYNOTE: Scoring Relief: Choosing the Right Pain Scale (M.Gurney)	
9:50 - 10.40	Drilling Down on Comfort: Optimising Analgesia in Dentistry (M.Gurney)	
10.40-11.00	BREAK	BREAK
11.00-11:50	Decoding the Image: A Guide to Interpreting Head CTs (H.Renfrew)	Endodontic Surgery: Top Tricks for Flawless Results (A.Rejec)
11:50-12:40	Demystifying capnography (S.Parker)	Orthognathic surgery in severe malocclusion cases (M.Guzu)
12:40-13:40	LUNCH	LUNCH
13:40-14:10	Spotting the unseen: Identifying subtle oral lesions in dogs and cats (A.McFadzean)	**BVDA AGM**
14:10-15:00	Keeping It Sharp: The Art of Dental Equipment Maintenance (P.Bogar)	Decisional algorithm for the use of plating systems in maxillofacial traumatic surgery (M.Guzu)
15:10-15:30	BREAK	BREAK
15:30-16:15	Next-Level Numbing: Fresh Updates on Local Anaesthesia in Dentistry (A.Perry)	Outcomes of Intraoral Wire and Composite Splints for Mandibular fracture Repair in Cats (J.Pakula)
16:15-17:00	Advanced Canine Dental Extractions: A Masterclass on the Maxillary Fourth Premolar (I.Tundo)	The Art of Success in Restorative Dentistry (I.Bull)