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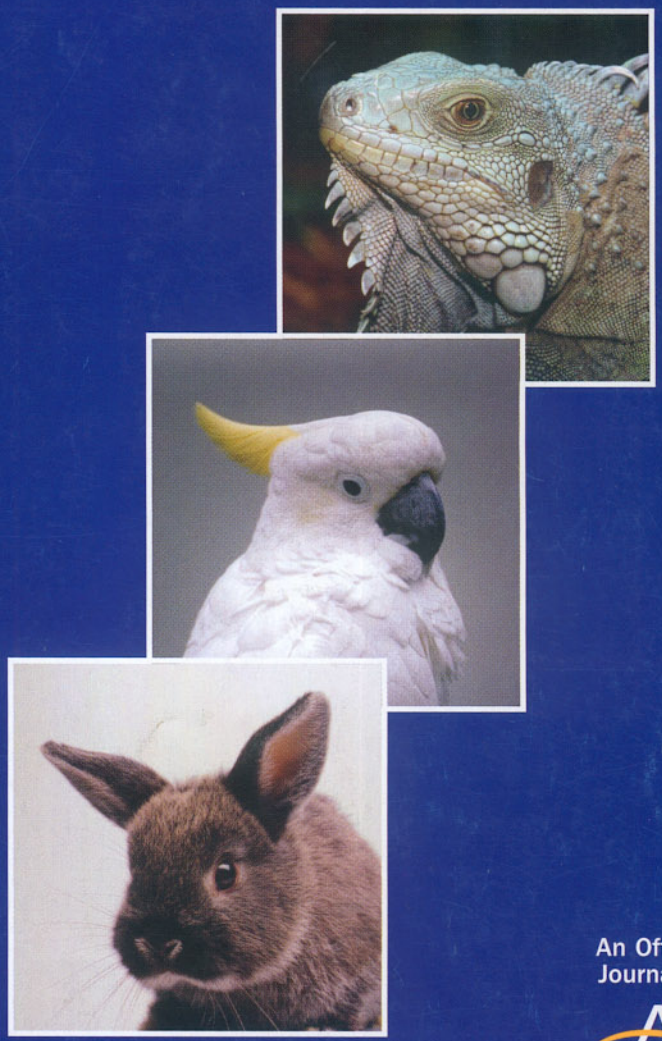

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Guest Editor

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The Dental Suite: Equipment Needed for Handling Small Exotic Mammals

Vittorio Capello, DVM

Abstract

Dentistry is a very important branch of medicine and surgery for exotic pet mammals. Because of their anatomical and physiological differences, many health problems in pet rabbits and herbivorous rodent species are primarily or secondarily related to dental diseases, making this discipline even more important for this group of mammals. Special equipment and other materials are available for diagnosis and treatment of dental diseases in these species. Among them, the most important are mouth gags, cheek dilators, specially designed luxators and extraction forceps, and straight hand pieces for high-speed dental units for cutting and polishing. The small exotic mammal dental suite should also include radiographic and endoscopic equipment.

Key words: **cheek teeth; dental disease; ferret; incisor teeth; rabbit; rodent; teeth**

Medical and surgical knowledge of exotic and nontraditional pet species continues to dramatically increase. Advanced special topics like laboratory medicine, diagnostic imaging, microsurgery, endoscopic surgery, orthopedics, and emergency medicine are described for species that veterinarians commonly treat. Because of this increasing popularity, many special instruments dedicated to exotic animal medicine and surgery are commercially available from veterinary product companies.

Recently, dentistry for exotic pet mammals has received considerable attention, and has focused particularly on rabbits and rodents. These species, because of their anatomical and physiological differences, require a special treatment approach, which necessitates the use of proper instruments. Only 10 years ago, there were no dental instruments available for herbivorous species. Gauze strips were used as a mouth gag, and trimming malocclusion incisor teeth was generally the only dental procedure performed in pet rabbits and guinea pigs. Today, besides advances in diagnostics, techniques for treatment of dental disease are much improved because of specialized instruments. Every year, new instruments to perform dental procedures on exotic pets are designed to meet the needs of clinicians working with these animals.

The dental equipment required for small exotic mammals can be included in two different groups: instruments for diagnosis and instruments for treatment.

Instruments for Diagnosis

Because of the size and behavior of pet exotic mammals and the anatomical features of the mouth of some species, the dental clinical examination is primarily limited in the conscious patient. However, as part of the general clinical examination, a preliminary oral

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Figure 1. Oral inspection performed in the conscious rabbit using an otoscope and a plastic cone (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

inspection should be performed in rabbits and most rodent species while the patient is conscious.

In the conscious pet rabbit, guinea pig, chinchilla, and some calm and properly restrained golden hamsters and rats, the intraoral inspection can be performed with an otoscope. The use of a plastic cone is advisable, because a metal speculum might cause iatrogenic dental fractures (Fig 1). The otoscope is also useful for the inspection of hamster cheek pouches.

Because lesions can be missed during the intraoral inspection on the conscious patient, the dental examination should be completed while the patient is under general anesthesia. In some species, including prairie dogs, rats, pocket rodents, skunks and other uncooperative carnivorous species, hedgehogs, and sugar gliders, a proper intraoral inspection is not feasible and should always be performed on the anesthetized patient.

Aside from the intraoral inspection, other diagnostics are very important or mandatory for confirmation and staging of dental diseases. Radiology and oral endoscopy are considered the most important.[1-5]

Radiography of the skull and teeth should always be performed in rabbits and rodents, and in any other species with anelodont, brachyodont (short-crowned, nongrowing-throughout-life) teeth.

Endoscopy is a useful diagnostic tool for examining the oral cavity of exotic small mammals, with the possible exception of the ferret and other medium-sized carnivorous species. Endoscopic examination of the oral cavity is mandatory in rodents and in any other small exotic mammals (eg, sugar gliders).

Radiographic Equipment

A standard radiologic unit can be used to obtain good radiographs of exotic mammals. To obtain radiographs of small or very small animals, the technical features of the radiologic unit should range from 30 to 100 kV, adjustable with 2-kV units, and rapid exposure time (minimum 0.02 or 0.04 sec).

A specific dental radiographic unit is also an acceptable alternative. This mobile unit, with a mobile anode, allows the capture of accurate oblique projections and makes intraoral radiographs easier to perform (Fig 2).

Because of exotic mammals' very small anatomical structures, skull and dental radiographs must be from very good to excellent quality for adequate interpretation. High-resolution films and cassettes are highly recommended. Mammography x-ray films are particularly useful, especially for smaller rodents. Smaller dental films like occlusal- sized films (57 × 76 mm) and periapical-sized or bite-wing films can be used to evaluate single teeth or small groups of teeth through intraoral techniques.[1,4]

Figure 2. Mobile dental radiographic unit (Courtesy of Margherita Gracis, DVM, Dip. AVDC, EVDC. Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

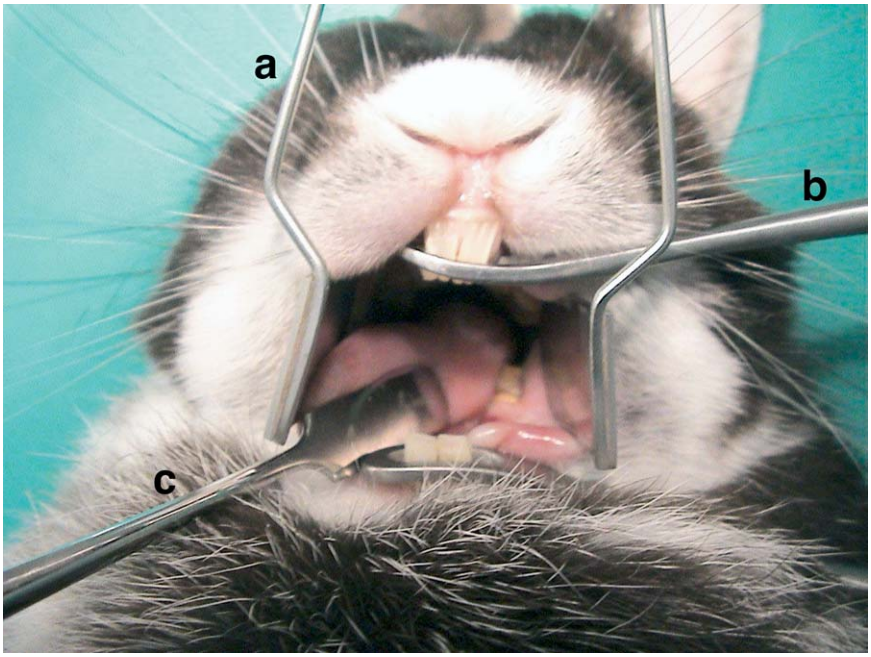

Figure 3. Mouth gag (a), cheek dilator (b), and spatula (c) positioned on a rabbit under general anesthesia induced with injectable drugs (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

Endoscopic Equipment

Oral endoscopy is a simple and noninvasive procedure, which allows for thorough inspection of the oral cavity and reduces the risk of missing subtle lesions. The magnified view of dental structures makes it very useful for small exotic mammals.

The basic endoscopic equipment required for an exam consists of a 2.7-mm, 30-degree, 18-cm rigid endoscope, a light source, and a light cable for transmission of the light to the endoscope.[2,3,5]

Additional equipment, such as an endoscopic video camera and monitor, allows the operator to work in a comfortable position without looking directly into the lens of the endoscope and allows for simultaneous visualization of the endoscopic exam by multiple observers. A recording device (a digital camera or a VCR, CD-R, or DVD-R) provides documentation of images for tracking progression of the disease and client education.

Dental Instruments

Dental instruments discussed in this article are available from several veterinary suppliers.[6] Mouth gags are essential instruments for intraoral inspection while patients in every species are under general anesthesia. They are extremely useful in rabbit and herbivorous species because of their long and narrow oral cavities. Special mouth gags are designed for rabbits and can also be used in some rodent species. The two arms have two elliptical holes, which fit with the crowns of maxillary and mandibular incisor teeth. A screw located on the opposite side of the instrument is used to extend the arms. The mouth gag must be used with extreme care to avoid excessive stretching of the masticatory muscles and temporomandibular joint ligaments. Care to avoid excessive stretching of the oral musculature is even more important when the patient is under general anesthesia. The mouth gag has to be supported by an assistant to prevent movements of the head or damage to the incisor teeth (Fig 3).

Mouth gags used in ferrets are miniature replicas of mouth gags used in dogs and cats and are applied to the tips of the canine teeth (Fig 4) (Nazzy Ferret Mouth Gag; Universal Surgical Instruments, Glen Cove, NY USA).

Aside from traditional mouth gags for rabbits, a special and very effective instrument is available. This is the "rabbit and rodent table retractor/restrainer" (also commonly called "tabletop gag"), a special platform for intraoral examination which acts as a mouth gag and positions the patient (Fig 5). This instrument is very useful, because it allows the operator to work without the need of an assistant to hold the patient in position. Apart from the anesthetist, tabletop gags allow the operator to work alone, optimizing the patient's position and the intraoral view.

Figure 4. The Nazzy Ferret Mouth Gag positioned in an anesthetized ferret before intubation (Photo courtesy of Dr. Angela Lennox. Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

The patient should be positioned in sternal recumbency. The table restrainer has two horizontal bars, where the incisor teeth are anchored, which can be moved to work as the mouth gag. Moreover, the platform can be bent and adjusted to optimize the operator's view (Fig 6). The platform should not be tilted more than 30 degrees, to minimize both stress on the neck and back musculature and excessive traction on incisor teeth.

Although carnivorous species do not usually need cheek dilators, these instruments are essential in rabbit and rodent species to widen the opening of their narrow oral cavities. At least three different size and shapes are available on the market. In the author's experience, longer blades fit better into the rabbit mouth and are more effective in dilating cheeks (Fig 3). A smaller size is specially designed for rodents and for true dwarf rabbits weighting less than 1 kg. They have open rather than flat blades, which allow for an effective grip on cheek teeth margin. This is especially helpful in guinea pigs because of their double-folded cheek openings.

After the mouth gag and cheek dilator have been applied, two other instruments are useful for managing the tongue. Small and smooth-tip anatomical forceps are useful for grasping and moving the tongue, especially the tiny and delicate tongue of rodent species. A flat or concave spatula can also be used to deflect and protect the tongue when treating the cheek teeth (Fig 3).

Other dental instruments commonly used in dog and cat dentistry may also be useful when examining the oral cavity of small exotic mammals. The function of the periodontal probe is to evaluate tooth mobility, gingival recession and hyperplasia, and to probe the depth and presence of plaque, calculus, and furcation lesions. The dental explorer is a sharp, pointed instrument used to detect irregularities of the dental surface (eg, fractures, caries, resorptive lesions). The use of a small dental mirror especially when oral endoscopy is not an option, may be used to evaluate structures and surfaces that might be inaccessible otherwise.

Miscellaneous Instruments and Materials

Even if mouth gags and cheek dilators are critical for enhancing the intraoral view of most exotic mammals, they might not be sufficient for complete examination. With the exception of the endoscopic inspection, a light source is often needed. A common penlight can be used, but requires the help of an assistant to allow the operator use of both hands. Effective light spots, together with an endoscopic light source, can be connected to magnifying loupes. These are also useful for enhancing the vision of very small anatomical structures.

A 21-gauge blunt needle can be used as a diagnostic instrument to assess the patency of the nasolacrimal duct. This same instrument can also be used to treat obstructions.

Culturettes are another important diagnostic instrument to keep on hand. Microbiological samples should be collected from any lesion where a bacterial or fungal pathogen is suspected. If anaerobes are suspected, then the appropriate sampling

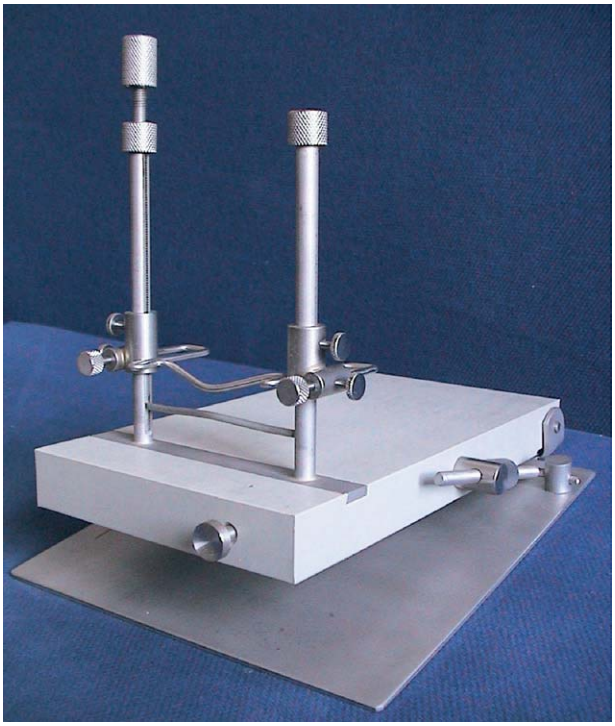

Figure 5. Rabbit and rodent table retractor/restrainer.

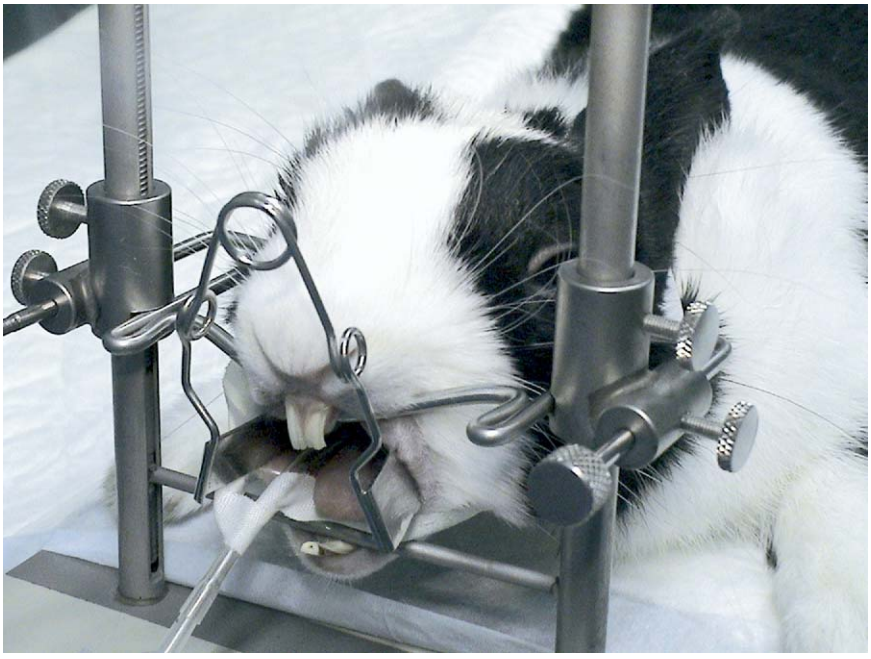

Figure 6. Positioning on the tabletop gag of a rabbit under general anesthesia induced with injectable drugs.

materials (eg, carbon dioxide packs) should be used for sample collection and transport. Antimicrobial sensitivity testing should be done on any suspected pathogens.

Instruments for Treatment

Many different intraoral and extraoral dental procedures can be performed for treatment of dental dis-

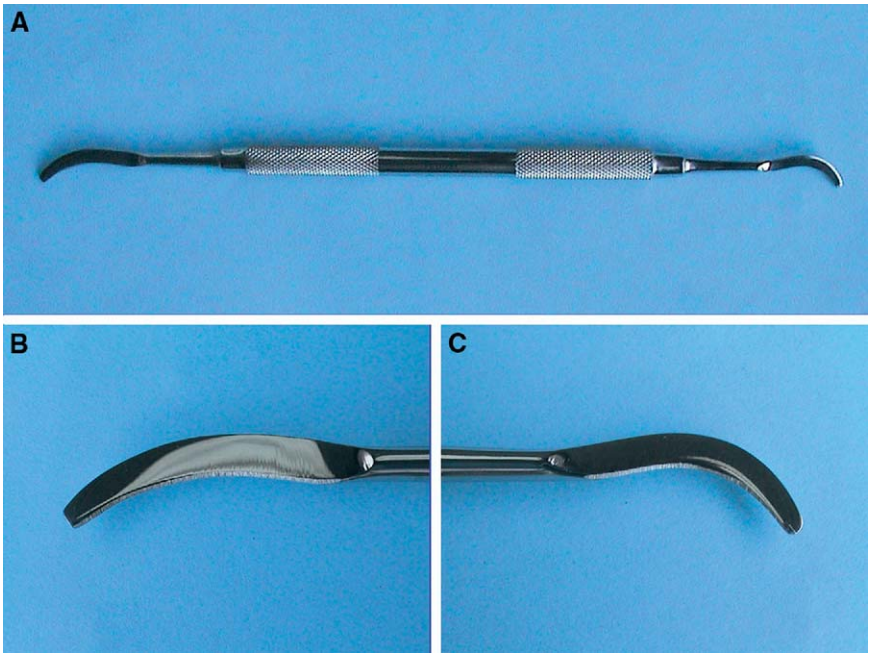

Figure 7. The Crossley luxator for rabbit incisor teeth (A), and close-up of the working tips (B,C) (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

Figure 8. Use the Crossley luxator to break down the mesial ligaments of the mandibular incisor (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

eases and related lesions in small exotic mammals. Different groups of instruments and equipment are available to facilitate extraction, mechanical trimming, scaling or endodontics, and extraoral extraction and surgical treatment of dental abscesses.[7-10]

Dental Instruments for Intraoral Extraction

Dental luxators of different sizes are commercially available for dogs and cats. Nevertheless, exotic herbi-

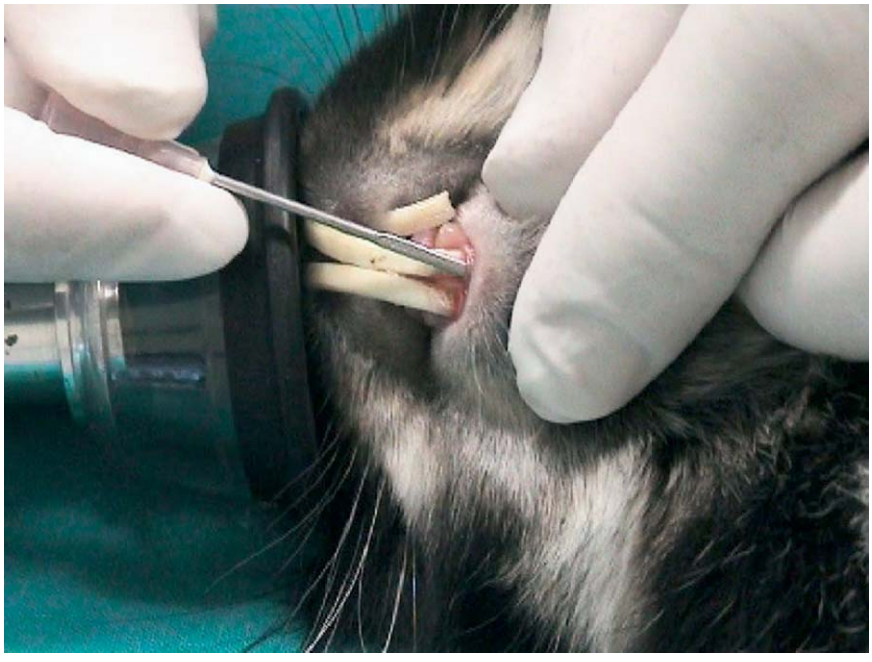

Figure 9. Use of a properly contoured hypodermic needle on the labial surface of the left mandibular incisor tooth (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

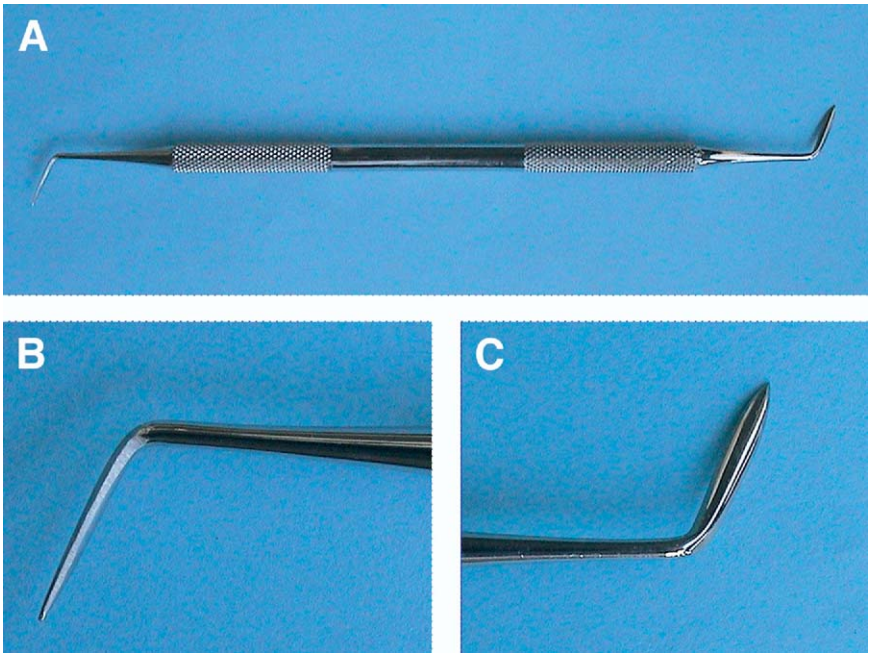

Figure 10. The Crossley luxator for rabbit cheek teeth (A), and close-up of the working tips (B,C) (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

vores often require smaller specialized instruments, because rabbit and rodent dental anatomy is different from that of dogs and cats.

David Crossley, a British veterinarian, has designed two elevators for rabbit incisor and cheek teeth. The working tips of Crossley's luxators for rabbit incisors are flat, sharp, and curved to match the shape of these teeth. The two ends have different curvatures that match the maxillary and mandibular incisors (Fig 7).

This instrument allows the veterinarian to break down the ligaments on the distal (lateral) and mesial (medial) sides of the teeth. The thin working tip is inserted into the periodontal space (Fig 8). However, this instrument is not designed for use in the labial

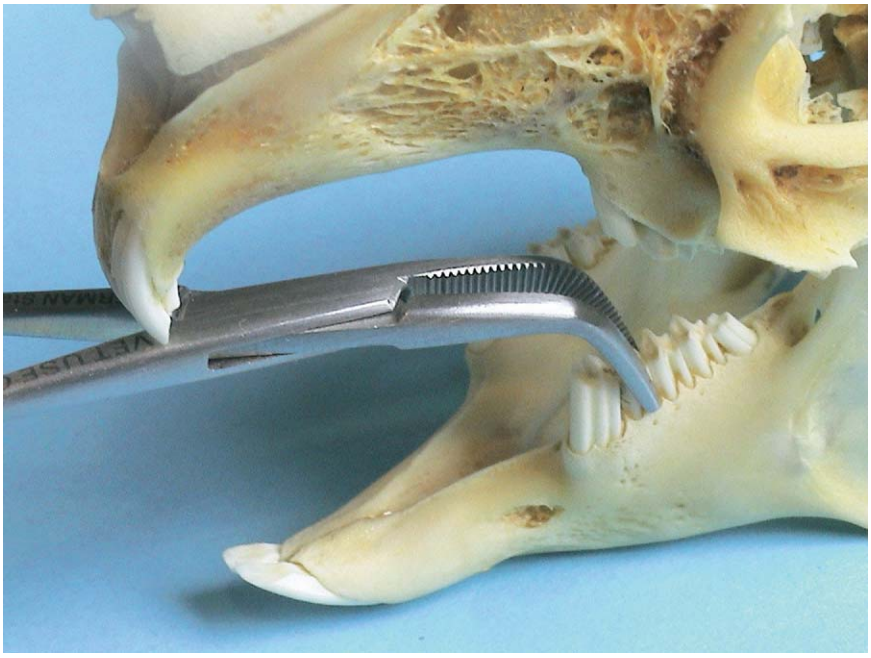

Figure 11. Small extraction forceps for cheek teeth.

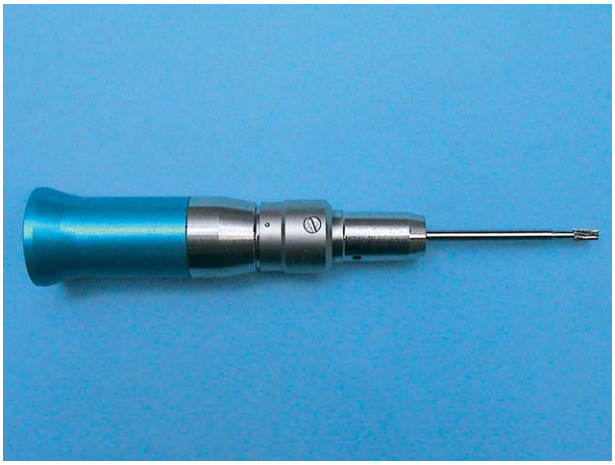

Figure 12. Straight dental handpiece (Courtesy of Margherita Gracis, DVM, Dip. AVDC, EVDC. Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

(cranial) and ligual/palatal (caudal) sides of incisor teeth. Alternatively, properly contoured hypodermic needles may be used on these sides, where a slightly different curvature is required (Fig 9). With a needle holder, the needles are flattened and shaped to follow the curvature of the incisor teeth. Larger needles, such as 18-gauge, 40-mm long needles, can be used in rabbits, and thinner, shorter needles, such as 25-gauge, 16-mm needles, can be used in rodents.

Crossley's luxators for rabbit cheek teeth are designed for extraction of premolar and molar teeth. The two sharp working ends are angled at 100 degrees to the handle and 90 degrees to each other (Fig 10). This luxator can be used to break the ligament on all sides of the cheek teeth. As described for use on incisor teeth, properly contoured needles flattened and bent at 90 to 100 degrees can also be used as a luxator for cheek teeth.

Another instrument especially designed for rabbits is the extraction forceps for cheek teeth. Because of the narrow oral cavity in herbivorous species, the tip is angled at 100 degrees to facilitate its use in the oral cavity (Fig 11). Small extraction forceps can also be used to extract incisor teeth in rabbits, even if needle holders can be alternatively used.

Dental Instruments for Mechanical Trimming and Scaling

A dental unit with high- and low-speed drill capabilities and water and/or air for irrigation and cooling is recommended for exotic mammal species. The most important instrument is the straight dental handpiece (available from Straight Dental Handpiece; Imaging Concepts, Ft. Lauderdale, FL USA) (Fig 12). The standard-angled dental handpiece used for dog and cat dentistry cannot access the mouth of rabbits and rodents, and its use is limited for coronal reduction of incisor teeth in rabbits. It can be used with success on ferrets and other carnivorous mammals.

The straight dental handpiece is mandatory to access the cheek teeth of herbivorous mammals. High speed (25,000-30,000 rpm) is required for mechanical trimming of cheek teeth. Water cooling is usually preferred when using high-speed handpieces. Slower handpieces are not recommended because of torque (wobble) and heat build-up. Many different types of burs (eg, conical, cylindrical, tungsten, and abrasive stone) can be used to trim small exotic animal dental anomalies (Fig 13). Some straight handpieces can be adapted with a protective sleeve for soft tissues, although this may impair visualization of the contact surface.

For veterinarians who have few occasions to practice rabbit and rodent dentistry, minor corrections can be performed with a high-speed option on the Dremel Mototool (Dremel; Robert Bosch Tool Corporation, Mount Prospect, IL USA). One model option of the Dremel Mototool is the heavy-duty flex shaft, which comes with a straight handpiece connected by a flexible cable and a foot lever for speed control (Fig 14).

Figure 13. Different types of burs for a straight dental handpiece (Courtesy of Margherita Gracis, DVM, Dip. AVDC, EVDC. Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

Figure 14. Heavy-duty flex shaft Dremel with straight handpiece and foot lever for speed control (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

Many stainless-steel or other abrasive burs are available for the Dremel Mototool, and the handpiece tip should be cooled with water sprayed from a syringe. The Dremel Mototool does have considerable "wobble" compared with high-speed human dental straight handpiece and drill. A diamond disc is also available for the mototool and can be used for coronal reduction of incisor teeth.

Diamond rasps and cutters for cheek teeth are available and marketed especially for rabbits. The author discourages their use. The function of diamond rasp is very limited to trimming small spikes, but they can fracture the cheek teeth. Molar cutters will likely cause vertical fractures or severely damage soft tissues (Fig 15).

The same small scalers used for cats can be used with ferrets for scaling of calculus.

Instruments and Materials for Surgical Treatment of Abscesses of Dental Origin and for Extraoral Extraction of Cheek Teeth

Facial surgery for treatment of abscesses of dental origin in rabbits and rodents requires a basic surgical set of instruments. Surgical transparent drapes are extremely useful for procedures in small exotic mammals. Adhesive drapes are even more advantageous, because they are easier to contour to irregular surfaces of the head.

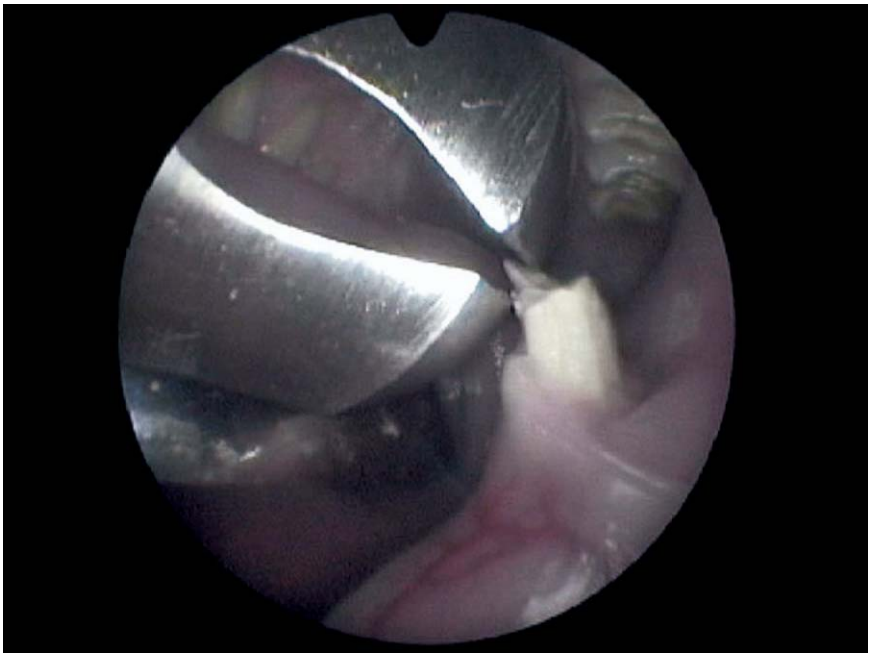

Figure 15. Endoscopic view of a molar cutter, here used to cut a thin, sharp lingual spike (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

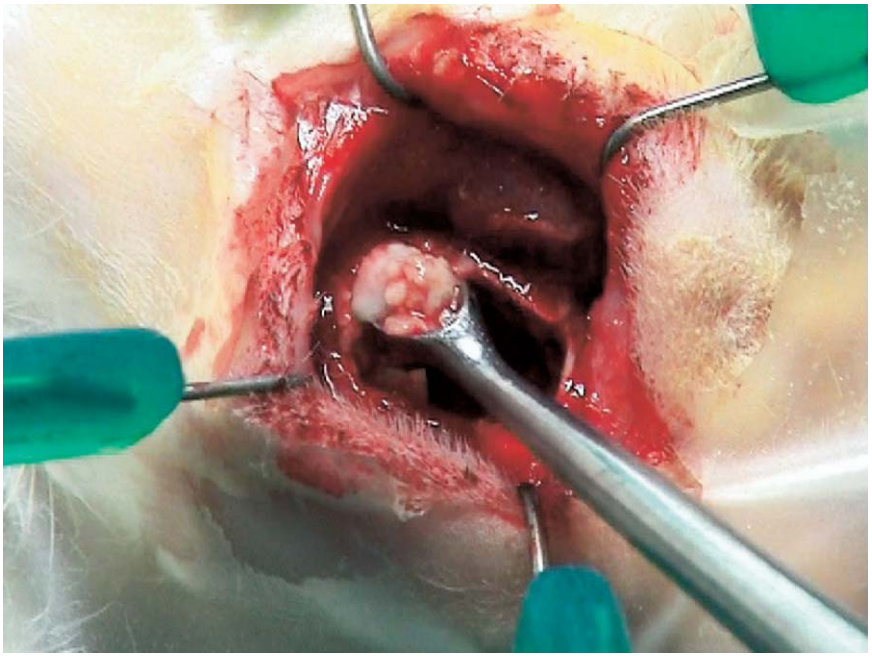

Figure 16. A Williger bone curette used to debride a mandibular abscess (Reprinted from Capello V, et al: Rabbit and Rodent Dentistry Handbook, 2005, with permission from Zoological Education Network, Lake Worth, FL).

Small and delicate retractors like blepharostats can be used in such small surgical fields. Another very effective instrument is the Lone Star Retractor System (Lone Star Medical Products, Inc., Stafford, TX USA), which consists of an outer plastic frame with elastic stay hooks and allows for delicate and adjustable retraction at the surgical site.

Small bone rongeurs and bone curettes are needed to debride necrotic bone from an abscess cavity (Fig 16). When extraoral extraction of cheek teeth or their fragments is performed, a fenestration can be made with a small round bur on a water-cooled dental handpiece.

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