Introduction

Extracting equine teeth has been a job of the veterinarian for years. While the techniques and equipment have change little over time, the ability to diagnose which teeth need extraction and the level of pain management has greatly improved.

Prior to extracting any tooth from a horse, the practitioner needs to be certain that he has the equipment and experience to perform the extraction with minimal complications. As with any disease process, the history of the patient and the management of the diseased tooth should be obtained in detail. Questions in regards to disease duration, treatment duration and response, attempted extraction, etc. should be asked.

The area for performing the procedure should be secure and away from distracting noise and movement. A complete set of radiographs should be obtained prior to most extractions to augment the clinician’s ability to determine the area of disease involvement, diseased tooth shape, size and location. An exception might be the older horse with diseased teeth that are loosely attached, as these extractions should cause few if any potential complications. Post-extraction radiographs are indicated in most cases to ensure complete extraction of the diseased tooth.

Wolf Teeth Extraction

Equipment:

Extraction of wolf teeth requires a limited number of tools. In most cases a simple elevator and a pair of extraction forceps is all that is needed. However, most practitioners, like myself, have numerous tools for the extraction of wolf teeth. I frequently use a pair of rongeurs as my extraction tool of choice after I have elevated around the tooth.

Numerous types of elevators are on the market. The most important factor for an efficient effective tool is sharpness. A sharp elevator will hasten separation of the gingiva from the tooth and the underlying periodontal ligament. The reason to use the curved rongeurs is access to the wolf tooth from the side of the mouth and if broken, the rongeur can be used to extract/cut out the remaining root.
Technique:

Anesthesia is indicated in extracting any wolf tooth except in cases where a fragment or a very small residual tooth is in place. Infiltration anesthesia of the adjacent tissue was described in Chapter 11.

All wolf teeth extraction tools perform the same basic principle of elevating the periodontal ligament away from the tooth and freeing the tooth from any attachment to the gingiva. Once the periodontal ligament is elevated away the tooth, it is grasped with a pair of forceps and oscillated to augment its movement within the alveolar socket. If the practitioner takes the time to loosen the tooth, he will be surprised at the number of wolf teeth with a significant root.

Once the tooth is loosened, slow steady pressure should be applied away from the gingiva and the tooth will come out in whole. If the tooth root fractures, the fragments should be extracted if possible. More elevation of the fragment may be necessary. If the fragment cannot be extracted, the practitioner may leave the fragment alone and recheck the horse at a later date. In some cases, the fragmented root will erupt more, due to an intact periodontal ligament. If the fragmented root is believed to cause discomfort to the horse, a pair of ronguers may be used to ‘chip’ away at the fragment and smooth out any sharp edges. Alternately, the horse can be placed under general field anesthesia for elevation and extraction.

In most cases, the remaining tooth fragments do not cause any mastication or riding problems. The vacant socket needs no special attention post extraction.

The age of the patient will determine the type and arsenal of tools required by the practitioner for extraction of incisors, premolars and molars. If the practitioner is going to limit his extraction cases to older horses, then the number of extraction tools, e.g., forceps, will not have to be as extensive as someone who’s cases include younger horses.

Exodontia of equine incisors will require a specific incisor forceps (both the short and long handles varieties), periosteal elevators and maybe a high-speed headpiece or a flex-cable rotary tool, e.g., dremel, to remove the labial surface of the alveoli plate in some cases.

As noted, the horse’s teeth are anisognathous (maxillary teeth are wider than the mandibular teeth), which will influence tool selection for the extraction process. If the practitioner is going to be performing extractions on a routine basis, then I would encourage him to purchase a complete set of upper and lower, i.e., maxillary & mandibular, extraction tools.

Few companies make a complete set of equine dental extraction forceps, and the practitioner should be discriminating in his purchase, as these tools should last a lifetime in most cases. Be mindful of the quality of metal and the coating. Good tools require careful selection. Note the length of the tool, keep in
mind that a large warmblood or draft horse may have an oral cavity that is 16-18 inches deep. The handles of the tool must reach past the speculum and give the practitioner enough working room for his hands.

The degree of movement at the forceps’s head does not correlate with the degree of movement of the handles. Depending upon the craftsmanship of the tools, the amount of play at the end of the handles where the practitioner’s hands hold the tool is important. Too much play (movement) will only give a sense of false achievement and cause the practitioner to try premature extraction of a tooth. In addition, tools with lots of play just function to tire out the practitioner.

A prerequisite to extraction of any tooth is a thorough knowledge of the exfoliation/eruption times of each tooth. Variation with breeds should be noted. Large breeds and exotics mature slower and thus may exfoliate their teeth at a later date than normal sized horses.

**Incisors:**

Extraction techniques of deciduous incisors will vary with the maturity and length of the tooth. The length is affected by the maturity of the tooth and the attrition of the deciduous tooth via eruption of the permanent tooth directly behind it. Any eruption of the permanent tooth other than the path of the deciduous is abnormal. Eruption of the permanent tooth in an aberrant pattern is a genetic defect. Horses that have one aberrant erupted tooth or a persistent deciduous tooth (i.e., cap) usually will have more than one tooth affected (incisors or premolars).

Infection of deciduous incisors is rare. Most extractions are due to trauma, aberrant eruption of a deciduous tooth or its permanent counterpart, eruption of the permanent distal tooth, delayed exfoliation or in rare cases, a supernumerary incisor tooth.

**Equipment**

Extraction of mature term deciduous incisors requires minimal equipment. A periosteal elevator and a small pair of dental forceps are all that are needed in most cases. Extraction of immature deciduous incisors will require the same tool arsenal as mature permanent incisors due to their length.

**Technique**

The first step in extraction is to determine the age of the tooth. A deciduous tooth that is at term and ready to exfoliate will have a dome shape. A deciduous tooth that does not have a permanent tooth undermining its root
structure may have the same shape as the permanent erupting/erupted tooth. In most cases the permanent tooth erupts distal to the deciduous. Radiographs may be indicated to determine the length, size and configuration of the deciduous tooth root.

A periosteal elevator is used to detach the labial gingiva from the deciduous incisor at term (ready to exfoliate) in the sedated horse. Infiltration anesthesia may be used if desired. There is minimal detachment to do and a pair of forceps is placed on the labial and palatal surfaces of the tooth. A sharp twist and pull will extract the tooth. There is no post-extraction care of the extraction site. In most cases the practitioner can either see or palpate the permanent tooth. Some cases may require post-operative pain medication.

The principium for any extraction should be adequate restraint and anesthesia. The extraction procedure is dictated by the clinical examination, radiographic findings and clinician’s experience. Extraction may be done standing or under general anesthesia. Involved (long rooted teeth) extractions should incorporate prior pain medication, systemic and infiltration anesthesia, and facial nerve blocks. In most cases, systemic antibiotics are indicated prior to the extraction procedure(s), due to the depth of the alveolus.

Extraction of deciduous incisors with an intact root involves the same techniques as permanent incisors. Radiographs are indicated in most cases prior to extraction to determine the length, size and shape (direction) of the root. Post-extraction radiographs are indicated anytime pre-extraction radiographs were taken to ensure complete removal of the tooth and any tooth fragments.

First, the mucosa is incised along the lines that the practitioner desires to elevate it (usually down the center or edges of the tooth). One incised, a sharp periosteal elevator is used to free the mucosa. When elevating the mucosa, keep in mind the type of closure you will desire (primary vs. secondary).

Once incised and elevated, a retaining suture may be placed to hold the flap out of the way. To hold the lip out of the way in the standing horse, a bungee cord can be connected to one side of the halter positioned under the lip, and connected to the other side. Alternatively, a piece of two-inch tape can be used to hold the lip up. It is imperative that a free airway is maintained if the upper lip is retracted.

Next, the labial alveolar plate needs to be removed to free the distal end of the root. This is best done with a No. 8 round burr on a high-speed dental headpiece. A small flex cable grinder with a proper head can be used also if a dental handpiece is not available. Water should be dripped on the grinding burr to minimize heat generation and dust if a flex cable grinder is used.

The tooth should be grasped with a pair of medium sized incisor forceps on the labial and palatal surfaces. The forceps should be oscillated slowly at first as the horse becomes accustomed to the pressure of the tooth movement.
The practitioner should guard against any sudden movement of the head, especially sharp upward movements that might cause the tooth to fracture.

As the tooth is oscillated, the practitioner will note progress as the periodontal ligament is broken down and the socket distorted as foamy blood is noted around the gingiva tooth junction.

As the tooth begins to move freely within the alveolus, do not attempt premature extraction. It is only when the tooth is extremely loose and little blood is seen that it is ready for extraction. Most often the extraction site is allowed to heal via secondary intention.

During the extraction process, the anatomy of the tooth should be kept in mind. Depending upon the tooth and the age of the tooth, its length and shape may vary greatly. The clinical crown will change shape from a rectangular to a triangle with age. Concurrent changes are taking place in the tooth structure below the gingiva margin. In most middle age to older horses, the tooth changes shape from being wider in an abaxial axial direction to a labial distal direction.

**Premolars and Molars: Equipment and Technique**

**Dental Mirror:**

No cheek tooth extraction can be done without the aid of a good mirror. I prefer one that has a fixed mirror head and you will need two or three. Most can be bent for various mirror angles. Make sure the mirror is about 18 inches long and has a large diameter head.

Dental picks are used to elevate the gingival away from the diseased tooth. This is important to reduce discomfort to the horse during the extraction process and to allow for proper placement of the forceps on the crown. Prior to elevating the gingiva from the diseased tooth, it is helpful to infiltrate the surrounding gingiva with mepivacaine using a butterfly catheter. This will allow painless elevation of the gingiva. Be careful when placing the forceps that they do not slip as the dental pick could lacerate the palate and/or the palatial artery.

**Three-root molar forceps:**

Three-root molar forceps, like all forceps, were adapted from human dentistry. The three-root (claw) molar forceps is designed to enclose the crown of the tooth with the roots of the forceps. The upper cheek teeth have two lateral roots and one large medial root. The single claw of the forceps is placed between the two lateral roots of the tooth and the two-clawed side of the forceps
is placed on the medial side of the tooth to fit around the single medial root of the tooth.

As you would think, the forceps are functionally best used on teeth that have short reserve crowns, i.e., old horses, but not in the case of a young horse. However, the three-root forceps often offer superior holding ability on some teeth. The practitioner is encouraged to purchase both an upper pair (left & right) and a lower pair (left & right). The upper pair of three rooted forceps is wider between the claws of the forceps than the lower pair.

**Box-jaw Molar Forceps:**

Box-jaw molar forceps are the most commonly used molar forceps. They are called box-jaw because the claws are square to one another. It is important in selecting this pair of forceps to view the serrations of the teeth on the claws. They should not be too short or worn smooth, if so, have the head of the tool re-milled or replace it.

This is the often the tool of choice in most extractions. The box-jaw is placed as far up on the clinical crown (close to the gingiva) of the tooth as possible. Once placed on the tooth, a bicycle tire inner tube should be placed around the handles of the forceps. To do this, make a loop out of one end of the inner tube and slide it over one handle of the forceps. With one end looped around one handle of the forceps, take the free end of the inner tube and pull it around the other handle of the forceps. Wrap it around the handles a few times and then bring the free end of the inner tube between the handles and wrap it around the section of inner tube between the handles and tuck it between the practitioner’s fingers so that the inner tube may be freed in case of emergency.

Once secured, the handles of the box-jaw forceps should be moved in a lateral-to-lateral oscillating movement. This is done to set the jaws of the forceps into the sides of the tooth. As the jaws work their way into the tooth, the inner tube will keep steady pressure on the tooth. It is only after the forceps are set in the tooth should the handles be rotated side to side. If this is done before the handles are set into the tooth, the forceps will make vertical grooves and slip off the tooth. I usually oscillate the handles of the forceps for about 45-60 minutes before I try rotating them as oscillating takes less effort.

It is very important to get a nice impression into the side of the tooth to keep the forceps from sliding up the side of the tooth when force is applied.

A leverage bar can be used to hasten the loosening of a tooth. The head of the leverage bar is slid over the handles of the forceps as close to the head of the forceps as possible. It is important that the leverage bar be constructed of one piece of solid stainless steel to add weight to the tool to reduce the amount of force needed by the practitioner. The head of the leverage bar must fit securely around the handles of the forceps to prevent any “play” in the bar as it is
used to apply leverage to the forceps head. A practitioner may need more than one leverage bar to fit different manufacturer’s forceps.

Only moderate pressure should be applied with this tool. It is very easy to fracture the crown of a tooth if used improperly. The practitioner must allow the weight of the leverage bar to do the work. The leverage bar is only used when rotating the handles of the forceps and not when oscillating the handles.

Molar spreaders (separators) are used to move the diseased tooth in a mesial distal direction. There are several types of spreaders sold with the difference being in the jaw width and the angle of the jaws. The first spreader used in most cases is one with thin straight jaws. Their selection is based on the fact that the diastema (interproximal space) between teeth in a young to middle age and even in an older horse is very tight. Only in aged horses is there a true diastema that one may see.

In application of the molar spreaders, the practitioner has to keep in mind the natural curvature of the upper dental arch. What this implies is that the buccal jaw of the spreaders will be inserted into the interproximal space rostral to the palatal spreader jaw. The long handles of the spreaders will be projecting across the mid-plane of the horse’s head pointing toward the contralateral arch. This is an extremely important thing to note. If the spreaders are applied in a straight line with the dental arcade, the buccal jaw will be closed on the tooth and may fracture the crown.

On the lower arcade, the spreader’s jaws are inserted in alignment with each other as the lower dental arcade is in a straight line. Spreaders are not indicated when trying to use in the caudal part of the lower dental arcade in horses with a spee curve (upward curvature of the lower dental arcade as the last few molars are erupting at an angle at the transition between the vertical and horizontal ramus of the mandible) to the arcade as the long handles of the spreader will prevent them from being inserted into the interproximal space.

An inner tube is applied to the handles as with any other forceps. The spreader is allowed to remain in place for 2-3 minutes then moved to the opposite side of the tooth. Repeated several times, this process aids in the breakdown of the periodontal ligament and distorts the alveolus. Once the jaws of the spreaders are closing within the interproximal space, a larger (thicker jaw) set of spreaders should be selected. The process of slowly closing the thicker spreaders is done as previously. I find that using the spreaders is as much an art as anything. I have broken more crowns and distal roots with spreaders than with any other dental forceps.

Spreaders with an angle jaws should only be used in geriatric cases and with caution. The angle allows for much more pressure to be applied to the tooth, and the potential for tooth fracture is high.
Occasionally, the practitioner will come across two cheek teeth adjacent (side by side) with one another. Traditional forceps will not allow contact and special forceps that close front to back and not side to side are needed. If the affected tooth is an upper, the jaws of the tool should be angled forward and if a lower tooth, the jaws should be at a right angle to the tool handle.

Simply simply putting a rod inside a pipe and having the end forged to the desired shape can make this tool. The opposite end of the rod should be threaded and a large nut threaded into the rod to adjust the width of the head.

Fulcrums are used to apply leverage to the head of a forceps only when the diseased tooth is ready for extraction. The diseased tooth is only ready for extraction when the practitioner sees foamy blood around the tooth and the movement of the tooth makes a “squishy” sound (like wet tennis shoes). This may not be the case in some older expired teeth.

Most anything can be used as a fulcrum. It is helpful if more than one size of fulcrum is available. I commonly like to use a small piece of square wood. Pine is a nice soft wood that will give with pressure without splintering. In addition, small square pieces of rubber mats can be used and if needed, can be stacked on top of one another to give more leverage.

It is imported that the fulcrum be placed close to the head of the forceps when attempting to extract the tooth.

Offset molar forceps are used most often to remove cheek teeth in the caudal aspect of the dental arcade when the diseased tooth is long, as in a young horse, and there is little room for extraction. These forceps may be mistaken for a pair of incisor forceps. Incisor forceps are of the same shape but about a third of the size.

The offset molar forceps are placed upon the crown of the diseased tooth once it is sufficiently loose and the tooth is extracted toward the medial plane of the head. It should be noted that extraction with these offset forceps should only be attempted once the diseased tooth has been partially extracted with a “normal” pair of molar forceps. As the diseased tooth is partially extracted, the length of the tooth prevents it from being brought straight up out of the socket. Thus, the offset forceps are used to remove the tooth towards the medial plane.

The practitioner may try to cut the tooth in half in young horses with long teeth. Warning! If the tooth is cut in half, it must be prevented from falling back into the socket. I would suggest not doing this. If one decides to do this, I would secure the bottom half of the tooth with umbilical tape. If the cut half of the tooth does fall into the socket, the practitioner can use a small Steinmann pin to repulse the tooth.

**Post extraction**
Take the horse’s head out of the head support and wash the mouth out with an antiseptic solution. Allow the blood to set in the socket a few minutes. In older horses with shallow alveoli, I usually do nothing to prevent feed materials from entering the space. However, in young to middle age horses, I use some type of material to cover the extraction site. It is very important here NOT to put anything down into the alveolus.

I have tried several types of compounds and still find some type of polymethylmethacrylate material the best to make a patch out of. I will rinse the deep socket, dry it with gauze and then place a patch. Placement of some petroleum jelly on the practitioner’s hand will help prevent the patching material from sticking. The patching material should be shaped to the form of an ‘H’ with the cross-arm of the ‘H’ over the hole (alveolus) and the legs of the ‘H’ on the sides of the teeth in front and behind. It is very important to keep the surface of the patch very smooth as it dries. The legs of the patch should be kept on the surface of the supporting teeth and off the gingiva. The ‘patch’ should cover the entire hole of the alveolus and rounded over the edges. The depth of the patch should be no more than ¼ the depth of the socket.

If I am placing a patch over the extracting site of a sinus maxillary tooth, I will place a small sheet of dental wax over the hole and then place the patch. As the patching material cures, it will melt the wax forming a tight seal to prevent migration of feed materials. This is especially important when placing a patch over a maxillary tooth with sinusitis or one that has an oral-nasal fistula.

I like to watch the horse eat later on that day to see if the height or shape of the patch is causing discomfort. I always check on the patch the next day to ensure a tight fit. Depending upon the tooth location and disease state of the surrounding area, e.g., sinusitis, I will usually remove the patch in 2-4 weeks.

**What To Do When Things Go Bad**

Things will go bad every now and then. One way to minimize this is to select your cases very well. As suggested before, I would encourage the inexperienced practitioner to work with an experienced practitioner or attend an extensive “hands-on” short course before attempting an extraction of a tooth in a middle to younger age horse.

The most common complication that I see is the inability to remove the tooth. There is nothing wrong with not being able to remove a tooth. If the practitioner finds himself unable to remove a tooth, he should refer the case. The most common reasons for the inability to remove a tooth is not allowing sufficient time for the procedure, fracturing the crown of the diseased tooth or not having the right equipment. If the crown is fractured, the tooth should be repulsed.

Frequently, the practitioner will fracture a tooth into multiple fragments. If this occurs, the tooth can still be extracted. Select a pair of forceps with small jaws with little or no gap between the jaws and use them to remove the
fragments. If a fragment is lodged against the side of the socket, select a dental pick and elevate the fragment away from the socket and extract it. If a fragment is below the depth of the pick, then the fragment will have to be repulsed with a Steinmann pin.

Occasionally, I will see a horse with a fractured alveolus from an attempted extraction. If the alveolus is fractured, the fragment should be left in situ in most cases and allowed to heal.

**Things not to do**

A frequent complication is when a practitioner discovers a fractured tooth and grinds (floats) the fracture fragment(s) down. This does nothing to improve the immediate situation and only makes it harder for the referring practitioner to remove the diseased tooth.

Often, when performing a standing extraction, the horse is aware of his surroundings and quite comfortable if proper sedation and restraint has been administered. However, one must remember that once the initial stimulation of tooth extraction is over and the facial nerve blocks are working well, it will take less sedation to continue the working procedure of extraction and the level of sedation should be closely monitored.

Be mindful of placing the extraction forceps on the correct tooth or loosening adjacent teeth. Guard against bruising the tongue with the extraction forceps. Do not leave the speculum on a horse for more than about 45 minutes at a time without giving the horse a chance to close its mouth for about 5 minutes. Do not allow the horse’s mouth to dry out during the extraction process.

Horses will urinate as a result of the anesthesia and may become dehydrated. Always put in an intravenous catheter for prolonged extractions. Make sure the horse stays hydrated via intravenous fluids at 1-5 mls/lb/hour in these cases.

Don’t forget to take post-extraction radiographs to indicate all tooth fragments are removed. If a tumor is suspected, submit the extracted tooth for histology.

When doing facial nerve blocks, be sure and let the anesthetic have enough time to work before repeating the nerve block. If you do a maxillary or mandibular nerve block, be sure and watch the horse after the procedure and when they are back in their stalls. A few horses will rub their face or chew on their tongue as the anesthetic is wearing off. If a horse becomes irritated as the nerve block is wearing off, just have someone walk the horse until the irritation is gone.
Geriatric horses may have special considerations. Their liver and/or kidney function may be altered. Either could affect the blood clotting time post extraction, and the type of medication used with the horse. It is encouraged for the practitioner to have blood chemistries done on geriatric horses with suspected disease.

Summary

In conclusion, intraoral extraction of equine teeth can be rewarding but the practitioner should be prepared to handle the potential complications that come with this procedure. Having proper equipment, good patient selection and allowing time for the procedure will increase the chances of positive outcome.

All owners should be informed that if intraoral extraction does not work that they should be prepared to have surgical repulsion of the diseased tooth, and that once a tooth has been disturbed, extraction should be completed.