

## REGIONAL ANAESTHESIA OF THE EQUINE HEAD AND BODY

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### EYE

#### *Upper eyelid - motor paralysis*

This makes examination of the eye much easier

Equipment and preparation – Routine skin preparation. 25gauge 5/8 inch needle and 5 ml local anaesthetic.

An *auriculopalpebral* nerve block can be performed at the dorsal edge of the most dorsal point of the zygomatic arch by injecting about 5 ml of local anaesthetic subcutaneously. This block produces no loss of sensation.

#### *Eyelid desensitisation*

This is necessary to remove an eye in a standing horse. They may also be useful when repairing eyelid lacerations.

Equipment and preparation – Because these injections are so close to the eye disinfection of the skin must be done carefully to avoid chemical irritation of the eye. Very dilute povidone iodine solution with no detergent is one option. A 22 gauge 1 inch needle and 3-5 ml local anaesthetic per nerve.

Technique - To completely desensitise the eyelids injections are made at 4 points around the rim of the orbit of the eye in roughly a diamond shape, with the tip dorsally at the supraorbital foramen.

Dorsal – The *supraorbital nerve* is infiltrated where it exits the supraorbital foramen. Palpate the two edges of the bone bridge caudal to the eye (supraorbital process of the frontal bone) and follow these to the point where they diverge, which is about level with the dorsal rim of the orbit, the foramen will be felt midway between your finger and thumb. Local anaesthetic can be infiltrated subcutaneously. Some authors advise injection of 2 ml subcutaneously, plus 1 ml as the needle is inserted into the foramen and an additional 2 ml when the needle is at its full depth of 1 inch. This block will desensitise the middle 2/3rds of the upper eyelid as well as the forehead.

Lateral – The *lacrimal nerve* is anaesthetised subcutaneously by inserting the needle at the lateral canthus and infiltrating along the dorsal rim of the orbit for the length of the needle. This anaesthetises the lateral canthus and lateral aspect of the upper eyelid.

Medial – The *infratrochlear nerve* is injected subcutaneously at the notch in the rim of the orbit just dorsal to the medial canthus. This desensitises the medial canthus, and the third eyelid.

Ventral – The *zygomatic nerve* is located by palpating along the edge of the bony orbit ventral to the eye at the point where the rim starts to curve dorsal and rostral. Local anaesthetic is infused subcutaneously against the bridge of bone (zygomatic process of the malar bone) that makes the ventral rim of the orbit and continues rostrally to become the facial crest. This block removes sensation from the lower 2/3rds of the lower eyelid.

#### *Anaesthesia of the eye (Retrobular nerve block)*

Most commonly used for surgical removal of the eye. This block is usually used for surgical removal of the eye (enucleation).

Equipment and preparation – This is a deep injection where introduction of infection would be bad, so aseptic preparation of the skin is important. A 3.5 inch spinal needle, and 10-20 ml of local anaesthetic.

Technique - Using aseptic technique a 3.5 inch spinal needle is inserted vertically just caudal to the bony dorsal orbital rim. The needle is advanced gradually while watching for eye movement. At a depth of about 2 inches when the eye rotates upwards (dorsal) the needle is in the retrobulbar space. 10-20 ml of local anaesthetic is slowly injected, the volume of fluid making the eye protrude slightly. After 10 minutes there should be anaesthesia of the eye (optic, trigeminal and oculomotor nerves) so that sensation, vision and the blink reflex are all stopped.

Aftercare and precautions – If the block is not being used for an enucleation then the horse should be boxed and have eye lubricants administered until sensation, blink and vision return (up to 4 hours).

#### *DENTAL /JAW related regional anaesthesia*

The two branches of the trigeminal nerve (Cranial nerve 5) responsible for sensation in this area are the maxillary and mandibular. The maxillary nerve enters the infraorbital canal at the maxillary foramen axial to the eye, giving off branches to innervate the upper cheek teeth and maxillary sinuses. The nerve emerges as the infraorbital nerve from the infraorbital foramen to innervate the nose, muzzle, rostral maxilla and incisors. The mandibular nerve runs on the medial side of the mandible. One of its branches the inferior alveolar nerve enters the mandibular foramen, on the axial side of the vertical ramus of the mandible. This nerve which runs inside the body of the mandible gives off branches that innervate the mandible and lower cheek teeth before emerging rostrally at the mental foramen as the mental nerve that innervates the rostral mandible, incisors and lower lip.

#### *Maxilla (upper Jaw)*

##### *Maxillary nerve block*

This block will anaesthetise the upper teeth, the maxilla, the mucosa inside the nose and lining the maxillary sinuses, the muzzle, and nose.

Equipment and preparation – This is a deep injection so aseptic preparation of the skin is required, being careful not to get antiseptic solution in the eye. A 3.5 inch 22 gauge spinal needle and 10 – 20 ml local anaesthetic solution.

Technique - The maxillary nerve is blocked close to where it enters the maxillary foramen. A 3.5 inch spinal needle is inserted about 3 cm caudal to the lateral canthus below the zygomatic arch, being careful not to puncture the transverse facial artery and vein. The needle is advanced in a horizontal rostral direction until it hits the vertical ramus of the mandible and then redirected off the rostral edge of the mandible and carefully advanced until it touches bone. 10-20 ml of local anaesthetic is injected.

Aftercare and precautions - It is possible to perforate the maxillary artery which may result in dramatic swelling in the orbital fossa and the masseter below the zygomatic arch as well as bulging of the globe. This swelling usually resolves within 3 days. Needle penetration of the artery is the reason for using a small gauge needle. If blood is aspirated or flows from the needle during placement the needle should be withdrawn and redirected slightly dorsally. It is also possible to affect the structures at the back of the eye targeted by the retrobulbar block. Relaxation of the intraocular muscles may be responsible for some of the bulging of the eye with the risk of prolapse of the globe. If these signs start a pressure bandage over the eye would be a sensible precaution.

##### *Infraorbital nerve block*

This block is useful for desensitising the nose, muzzle, incisors and rostral maxilla on the side injected

Equipment and preparation – Routine skin cleaning. 22 gauge 1.5 inch needle and 5-10 ml of local anaesthetic.

Technique - The infraorbital nerve is blocked where it exits the infraorbital foramen, the caudal edge of which can be felt, after moving the levator labii superioris and levator nasolabialis muscles dorsally, just caudal to the midway point on a line from the rostral end of the facial crest to the nasal incisive notch. The needle should be directed rostral to caudal and angled to get down to the nerve at the level of the foramen. Horses can react violently to a needle penetrating the nerve so this block should be done with care. If time is taken to infuse local anaesthetic subcutaneously and around the nerve before actually penetrating the nerve pain will be less. As an alternative to the maxillary nerve block, a spinal needle can be gradually (with infiltration as you insert) directed up the infraorbital canal to get local anaesthetic more proximally to block the nerves innervating the cheek teeth. Presumably because the needle can get imbedded in the actual nerve advancing the needle and injection within the canal can be difficult. Finger pressure over the foramen as you inject may encourage local anaesthetic to flow along the canal.

Some innervation to the upper incisors and surrounding mucosa comes from branches of the maxillary nerve that run through the incisive bone and emerge through the incisive canal which is in the midline of the rostral mandible at the junction of the lip and the gum (gingival and labial tissues). Injection of local anaesthetic under the mucosa here will add additional desensitisation to an infraorbital block.

#### *Mandible (lower jaw)*

##### *Inferior alveolar nerve block*

Blocking the inferior alveolar nerve close to the mandibular foramen will desensitise the lower teeth, the mandible and lower lip on that side.

Equipment and preparation – A deep injection so aseptic preparation is advised. 7 inch needle and 10 - 20 ml of local anaesthetic solution.

Technique - The nerve is injected close to the mandibular foramen on the medial side of the mandible is at the intersection of a line along the occlusal surface of the cheek teeth and a perpendicular line through the lateral canthus of the eye. A needle can be inserted vertically from the caudal aspect of the horizontal ramus of the mandible, being careful not to puncture the facial artery. The distance to the occlusal surface of the teeth can be premeasured on the needle (about 5 inches). The medial surface of the mandible is slightly concaved so bending the needle before insertion can help get the 20 ml of anaesthetic closer to the foramen. A shorter approach to the foramen is from caudally on the vertical ramus. Turning the horse's head to the opposite side moves the caudal aspect of the mandible laterally which makes directing the needle easier.

Aftercare and precautions – It is possible that the lingual nerve will also be affected by this block which will desensitise half of the tongue. This has resulted in horses injuring their tongue by chewing it. This is even more of a concern if both inferior alveolar nerves have been blocked. Using a short duration local anaesthetic like lidocaine is sensible, as is not feeding horses until the block has worn off. Some people have completely stopped horses chewing by placing a gag until sensation returns.

##### *Mental nerve block*

This block will desensitise the ipsilateral rostral mandible, the canine and incisor teeth as well as the lower lip.

Equipment and preparation – Routine skin cleaning. 22 gauge 1 inch needle and 5 ml local anaesthetic solution.

Technique - The mental nerve can be injected close to its exit from the mental foramen on the lateral side of the mandible rostral to the first cheek tooth. To feel the foramen the depressor labii inferioris muscle needs to be displaced ventrally. The needle is directed in a rostrocaudal direction towards the foramen, where 5 ml of local anaesthetic is infused. Similar to the infraorbital block infusion should be done gradually with needle insertion to get some anaesthetic around the nerve prior to penetration. It is difficult to direct a needle proximally along the canal to effect anaesthesia of the cheek teeth, although a slight bend in the needle and directing it dorsorostral to ventrocaudal may help.

#### *Paravertebral block*

This block is done to enable a surgical incision in the paralumbar fossa (flank) of a standing sedated horse

Equipment and preparation – The clipping and aseptic preparation of the flank should be extended dorsally to the midline to include the landmarks described so that the injections can be performed aseptically. Three subcutaneous skin blebs are each made with a 25 gauge  $\frac{5}{8}$  inch needle and 3 ml of local anaesthetic. Then a 7 to 8 inch spinal needle, and 120 ml of local anaesthetic solution are used for the block.

Technique - A paravertebral block, involves anaesthetising the dorsal and ventral branches of T18, L1 and L2 to anaesthetise the paralumbar fossa. One, although not the only, way of performing this block is to use a vertical line up from the most caudal point (curve) of the 18<sup>th</sup> (last) rib. In a 450 kg horse a 7 to 8 inch spinal needle is used through a subcutaneous bleb of local anaesthetic. The needle is inserted about 12 cm from the midline and directed ventrally until bone (transverse process of L2) is contacted. The needle is “walked” off, by withdrawing redirecting and advancing, the caudal edge of the transverse process. 20 ml of local anaesthetic is injected just (1cm) below the transverse process. The needle is then repositioned so that it is on the dorsal caudal edge of the bone and another 20 ml is injected. This process is repeated 5 cm and 10 cm proximally (towards the head end) to anaesthetise L1 and T18. If at any stage when advancing needles you see a twitch of the flank muscles then infuse 5 ml of local anaesthetic solution at that spot in the hope that the needle is close to a branch of a nerve. If the needle penetrates the peritoneum there will be negative pressure. Keeping some local anaesthetic in the hub of the needle will indicate when the peritoneum has been punctured with disappearance of the fluid, an indication to withdraw the needle to less depth.

#### *Caudal epidural block*

A caudal epidural is performed to produce regional anaesthesia of the pelvic viscera, genitalia and skin, hopefully without losing locomotor function of the hind legs.

Equipment and preparation – Aseptic preparation is important. A subcutaneous skin bleb may be used. A 2 to 3.5 inch needle and 6-8 ml of local anaesthetic solution or 100 mg of xylazine mixed with 6 ml of local anaesthetic is used for the epidural.

Technique - The injection should be done aseptically to avoid introducing infection. The needle is placed in the first intercoccygeal space (Co1-Co2) which is the first moveable space when the tail is elevated and lowered. This spot is about 5 cm cranial to the root of the first tail hairs. The horse should be positioned so that it is standing squarely, and you should be protected so that you can stand directly behind it, so as to find the midline. A subcutaneous bleb of local anaesthetic may be helpful. Because a 2 inch needle can occasionally be too short it is safest to use a 3.5 inch spinal needle although its whole length is not needed. The needle is inserted either at right angles to the skin with the tail down or slightly ventro-cranially. The hub of the needle should be filled with lidocaine or saline. The needle is directed between the two spinous processes of the vertebrae, and through the

interspinous and interacuate ligaments, when increased resistance will be felt. When the epidural space is reached its negative pressure may suction the fluid from the hub. There will also be no resistance to injection which can be checked by injecting a few ml of air or saline to avoid risking an overdose of anaesthetic. If the needle has gone beyond the epidural space it will usually hit the floor of the vertebral canal, in which case withdrawal by ¼ inch will be needed. It is possible to push the needle between the 2 vertebral bodies and continue into the rectum.

The most common drug to inject is lidocaine. A 450 kg horse will require 6-8 ml of 2% lidocaine HCl to anaesthetise the tail, anus, vulva, perineum, rectum, vagina, urethra and bladder within about 10 minutes, lasting for about 90 minutes. Additional epidural local anaesthetic during this time risks affecting the hind leg's motor function. A longer lasting epidural can be obtained by either using bupivacaine or a mixture of 100 mg xylazine mixed with 6 ml of 2% lidocaine HCl. Both of these will produce local analgesia for about 5 hours.

Aftercare and precautions – If the block does not work the first time then it may be safest to postpone the procedure because injecting more local anaesthetic increases the risk of affecting the nerves to the hind limbs. If the horse starts to have difficulties standing on its hind legs it should be kept in the stocks and a tail rope placed over an overhead beam to help support it until the block wears off.

#### *Pudendal nerve block*

A pudendal nerve block can be used to protrude and anaesthetise the penis.

Equipment and preparation – This dirty area will require careful cleaning to avoid introducing infection. Two 3.5 inch spinal needles and 50 ml of local anaesthetic solution are used.

Technique - The superficial and deep branches of the perineal nerves are blocked first by inserting a needle 1 inch dorsal to the ischial arch and 1 inch lateral to the anus. 5 ml of local anaesthetic is injected subcutaneously. The needle is then directed dorsally for about ½ inch and another 5 ml is injected to get the deep branch of the perineal nerve. The needle is then redirected and advanced towards the midline to touch the ischial arch at a depth of about 2 inches. 15 ml of local is infused into this area. The procedure is then repeated on the opposite side.

Aftercare and precautions – This block is rarely used but once the procedure has been completed supporting the prolapsed penis in a sling around the abdomen until the block wears off will help to reduce oedema and swelling of the penis.

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