



CEREBROSPINAL FLUID SAMPLING TECHNIQUE

Atlanto-occipital CSF collection

The optimal site for sampling is determined on the basis of the neuro-anatomical localization of the suspected lesion and practical considerations regarding patient systemic health status and restraint options.

Performed with the horse under general anesthesia, lying in lateral recumbency.

Site preparation

An area of the poll and neck (15 to 20 cm caudal to the ears and 8 to 10 cm on either side of the mane) is clipped and surgically prepped.

Positioning

The head is flexed so that the median axis of the head is at a right angle to the median axis of the cervical vertebrae.

Technique

A sterile 3.5 inch (8.9 cm) 20-gauge spinal needle with stylet is inserted at the intersection of the cranial borders of the atlas and the external occipital protuberance, along the dorsal midline. The needle should be in line with the long axis of the horse, perpendicular to the skin and aimed towards the lower jaw (rostral mandible) of the horse. The needle is gradually advanced until a “popping” sensation is felt with penetration of the atlanto-occipital membrane and cervical dura. The stylet is withdrawn and the appearance of clear CSF at the hub indicates a successful procedure. If no CSF appears when the stylet is removed, the needle is rotated 90 degrees. If fluid is still not obtained, the stylet is replaced, and the needle is advanced carefully. The depth of needle insertion for entry into the subarachnoid space varies depending on the size of the horse, but is approximately 5 to 8 cm for a mature horse. If the needle contacts bone at a depth of 2 to 5 cm, it should be withdrawn and repositioned appropriately. If blood appears at the hub of the needle when the stylet is removed and does not clear with CSF in 15 to 20 seconds, the stylet is replaced, and the needle removed. A fresh needle is used for the following attempt.

Sample collection

Once CSF flows freely from the hub of the needle, the sample is collected by either allowing fluid to drip into a sterile container or gentle syringe aspiration connected via an extension set. The CSF is placed in both a serum tube (serology, PCR) and EDTA tube (cytology, fluid analysis if desired). After the sample has been collected and the needle is withdrawn, pressure is placed on the collection site, and the head of the horse is allowed to extend to a normal or slightly extended position to prevent leakage of CSF from the puncture site.



Lumbosacral CSF collection

Performed with the sedated horse standing as squarely as possible. In addition to sedation, application of a twitch and/or use of stocks may be preferred by some clinicians. Collection of CSF from the LS space while the horse is in lateral recumbency (under general anesthesia or in a tetraplegic horses) is possible, but is considered more difficult than in the standing horse. Alignment of the pelvis may be aided by elevating the upper pelvic limb to make the tuber coxae perpendicular to the ground, and advancing the pelvic limbs to flex the pelvis opening the LS space.

Site preparation

A 10 x 10 cm site is clipped and sterilely prepped.

Positioning

Landmarks for the LS site are the intersection of the midline with either a line joining the caudal borders of the tuber coxae, or the highest point of the gluteal region of the horse.

Technique

A sterile 20-gauge 6-inch (15.2 cm) spinal needle with stylet is inserted in a sterile manner and advanced carefully a few millimeters at a time. Care should be taken to keep the needle perpendicular to the dorsum and on midline. A “popping” sensation may be felt with penetration of the LS interarcuate ligament, dorsal dura mater, and arachnoid membrane. A needle depth of 12 to 14 cm is commonly required for successful CSF collection. Large breed horses or obese horses may require longer needles. Responses of sedated horses to penetration of the dura mater range from no reaction to tail movement and slight flexion of the pelvic limbs to violent kicking that can endanger the patient and the veterinarian.

The stylet is removed to check for CSF at the hub. Gentle aspiration with a syringe may be necessary to initiate flow of spinal fluid. If no fluid is obtained, the needle (with the stylet replaced) is advanced to the floor of the vertebral canal and then withdrawn with slow rotation of the needle a millimeter at a time. Indirect aspiration with a syringe through an extension set connected to the spinal needle hub is recommended to minimize hemorrhage from excessive suction pressure and resultant occlusion of the needle with meninges. The Queckenstedt’s maneuver (bilateral occlusion of the jugular veins) may be performed by an assistant to increase intracranial and intraspinal pressure and facilitate CSF flow up the spinal needle.

Sample collection: After adequate CSF is obtained, the stylet is replaced in the spinal needle and the needle is removed.