Myelography in dogs

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Introduction

Myelography is the special radiographic technique by which the spinal cord is outlined by a positive contrast medium injected into the sub-arachnoid space (Wheeler, 1989). Prompt and accurate diagnosis is the foremost requirement for treating spinal trauma in dogs. Radiography is one of the most important diagnostic aids for localization of spinal injuries. Plain radiography, though, reveals fractures and luxations in spine, yet, usually fail to suggest any compression (Horlein, 1978) and other soft tissue disorders. Myelography performed following plain radiography, aids in confirmation and localization of spinal injury and evaluation of its severity and extent (Horlein, 1978).

Indications

Myelography is indicated when focal spinal cord lesion is suspected and no inflammatory response is seen on CSF analysis. The contrast media mixes with CSF that surrounds the spinal cord and demonstrates focal spinal cord compression or expansion. Myelography is performed in following conditions.

1. Where the neurological examination indicates a particular spinal lesion, but none is visible on plain radiography.
2. To determine the significance of multiple lesions identified on plain radiographs.
3. To determine the presence of persistent cord compression.
4. To assist in deciding the indications for surgery and type of procedure to be performed (Wheeler, 1989).

Techniques

A) Cisternal Myelography: Horlein, (1978) recommended an angle of 45-60o, while Butterworth and Gibbs, (1992) gave a tilt of 15o. Thilagar, *et al.* (1996) recommended 15o inclination for 5-10 minutes to minimize the flow of contrast media into intracranial sub-arachnoid space. Fatone, *et al.* (1997) tilted the table to 10-15o for cervical studies to facilitate caudal contrast progression. Jaspreet Singh, *et al.* (1998) in their study gave a tilt of 60o anterior-posteriorly and found dye satisfactorily traveled to lumbosacral region within 5 min. Kumar, *et al.* (2003) used 15o inclination throughout experimental period except radiographic procedure. Kaur and Singh, (2004) used 45-50o tilt with head held high at highest position for 3-5 min.

Advantages

1. Provides easy access to sub-arachnoid space allowing collection of requisite amount of CSF with minimum chances of blood contamination. (Jaspreet Singh, *et al.,* 1998).
2. Needle insertion is technically easier.
3. Less contrast medium is required for evaluation of cervical lesions.

Disadvantages

1. According to Penderis, *et al.* (1999), sub dural injection is most common complication observed during cisternal injection of contrast medium.
2. Post-procedural seizures
3. Slight risk of needle puncture into *medulla oblongata* or cervical spinal cord (Kishimoto, *et al.,* 2003).

B) Lumbar Myelography: General anaesthesia is administered to the patient. The back is arched dorsally with patient in sternal recumbancy. A 3-inch 22 G needle with syringe is introduced in the midline just anterior to L6 (i.e. 15th lumbar space). Cerebrospinal fluid 1-3 ml is removed for examination and medium is injected slowly and carefully. The spine should be tilted for some time toward the head (20o) to encourage cranial migration. Radiographs are made on similar intervals as cisterna magna myelography.

Advantages

1. It is safer than cisternal puncture

2. It is useful for compressive lesions of thoraco-lumbar region.
3. More useful in cases with acute disc prolapse.

Disadvantages

1. Technically it is more difficult than cisternal myelography (McCartney, 1997).
2. Kishimoto, *et al.* (2003) reported various side effects of lumbar myelography as spinal cord edema, cystic necrosis, myelomalacia, axonal necrosis and hydromelia.

C) Lumbosacral Myelography:

Advantages

1. Spinal cord terminates at caudal lumbar so there is minimal risk for cord injury.
2. Lumbosacral myelography is less difficult because of large space.
3. Puncture site is easily palpable
4. No neurological signs, including seizures are observed after myelography.

Contrast Media

The selection of contrast medium has a crucial role in myelographic examination. The ideal contrast preparation, should be minimal neurotoxic, should be pharmacologically inert, miscible with CSF and radio opaque at an isotonic concentration (Widmer and Blevins, 1991). A number of contrast media have been recommended for myelography, which include ionic and non-ionic monomers of benzoic acid. Various contrast media are:

1. Oil based contrast media: Pentoplaque, thorotrast, neo-ipex (75%), idochlorol, skiodon (20%), lipidal and diodrast (35%) are various type media. Vaughan, 1990 listed various disadvantages of oil-based contrast medium such as poor diagnostic quality, poor flow characteristics, tendency to globulate, and post myelographic arachnoiditis. Because of the above disadvantages oil based contrast media are no longer used.

2. Non-ionic water-soluble contrast agents: They are Metrizamide, Iohexol and Iopamidol.

Sideeffects: Complications from radiographic contrast media depend on variety of factors, including the route of administration, chemical composition of the media and the patients underlying condition, the mechanical effect of needle placement is also a consideration.

Carroll, *et al.* (1997) performed iohexol myelography with concentration of 300 mg I2/ml. Asystole was observed as a side effect in this case. He mentioned other side effects like fasciculation, seizures, bradycardia, vomiting, fatal cardiopulmonary arrest, death due to acute sub dural hemorrhage involving brain stem and cranial cervical spinal cord caused by wrong needle placement. McCartney, (1997) observed no side effects in 79 days who had undergone myelography, however, he mentioned a possibility of iotrogenic hydromelia due to rapid injection under pressure leading to neurological deficits.

Difficulties

1. Poor radiographic quality: Incorrect patient positioning, incorrect exposure or artifact results into poor radiographic quality. Myelography should be performed only after satisfactory quality survey radiographs have been obtained and carefully examined.

2. Poor distribution of contrast medium

- Inadequate volume injected
- Incorrect injection site
- Epidural opacification
- Contrast not inadequately mixed with CSF
- Incorrect radiographic views

3. Pathoanatomical problems

- Normal anatomical variations
- Spinal cord swelling

Clearance of Dye

Getty (1977) observed quick elimination of contrast agent from sub-arachnoid space and stated the reason to be fast absorption of contrast medium by dense venous plexus. Widmer (1989) observed that after myelography contrast medium carries in general circulation following its absorption by venous plexus of spinal column and finally it is excreted by kidney. Carroll, *et al.* (1997) reported that passive subarachnoid elimination of contrast medium occurs with the outflow of CSF into venous blood. Thollot, *et al.* (2006) indicated that radiographic contrast media are eliminated exclusively by glomerular filtration.

Conclusion

1. Myelography is radiography following opacification of the sub-arachnoid space.
2. Iohexol and Iopamidol are commonly used contrast media.
3. Contrast filling of spinal column is observed to be dose dependent.
4. Concentration of these dyes at 300-350 mg I2/ml is commonly chosen. Recommended volumes of contrast media for myelography in dogs are generally accepted to be 0.3-0.4 ml/kg.
5. Contrast media distribution in the sub-

arachnoid space may be improved by creating turbulence during injection of contrast medium, warming of contrast medium to minimize its viscosity, using an appropriate volume of contrast medium and tilting the animal to promote contrast medium flow.

6. Opacification time is about 5-10 mins and diagnostic myelograms can be obtained upto 60 mins.
7. Cisternal puncture should be preferred to delineate cervical lesions whereas lumbar puncture should be used for compressive lesions of thoraco-lumbar region.
8. Lateral myelograms are of comparatively better diagnostic quality than ventro lateral views for different regions of spinal cord, however in cases of intervertebral disc prolapse, additional ventro-dorsal view can be helpful.

Future Prospects

1. In India, veterinary radiology and imaging is in infancy and carries a big gap as compare to medical radiology and imaging.
2. Recognition of radiology and imaging as a separate discipline at various levels of veterinary education is demand of the time.
3. Speciality and superspeciality in veterinary imaging have potential scope in Veterinary Health Care, Biotechnological research and forensic sciences.

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Rare brain fever in pigeon detected

NAGPUR: A rare case of brain fever in pigeon was detected in city during a diagnostic camp for domestic animals organised by Dr Hemant Jain, a veterinary surgeon and Dr Ajay Poharkar, a vulture conservationist associated with National Association for Welfare of Animals and Research, to mark the World Veterinary Day.

”Brain fever (polio encephamalcia) is known to occur in cattle due to vitamin B1 deficiency. But is not common in pigeon,” said Dr Hemant Jain, on the sidelines of the camp. This fever has world-wide distribution and as of now has no available cure. “We are still helpless and handicapped in treating this disease,” he added.

Dr Poharkar said that a lot of research is going on in the world. “We are also doing some work in all forms of medicine - allopathy, homoeopathy and ayurveda and hope to find some solution in a year or so.” He said adding that animals with disease appear normal, have normal appetite but have no control over their necks.