**Special examination of the nervous system:**

Veterinarians commonly include several components of a neurological examination in a complete clinical examination. Most often a diagnosis and differential diagnosis can be made by history and the clinical findings.

However, if the diagnosis is uncertain it may be necessary to conduct a complete

neurological examination, which may uncover additional clinical findings necessary to make a diagnosis and give a prognosis. The use of careful and thorough clinical examinations and diagnostic techniques, combined with confirmed pathological diagnoses, will result in more accurate diagnosis and therapy.

THE NEUROLOGICAL EXAMINATION

The primary aim of the neurological examination is to confirm whether or

not a neurological abnormality exists and to determine the neuroanatomical

location of the lesion.

A- CASE HISTORY:

Special attention should be given to the recording of an accurate history. The

questioning of the owner should focus on: 1-the primary complaint and when it

occurred and how it has changed over time (the time-sign relationship) . 2-The

duration of signs, 3- the mode of onset, particularly whether acute with later

subsidence, or chronic with gradual onset, 4-the progression and the description of signs that occur only intermittently should be ascertained.

5-morbidity and mortality rates and 6-the method of spread may indicate an

intoxication when all affected animals show signs within a very short period.

Diseases associated with infectious agents may have an acute or chronic onset.

Neoplastic diseases of the nervous system may begin abruptly but are often slowly progressive. The occurrence of pallor or cyanosis during the convulsion is of particular importance in the differentiation of cardiac syncope and a convulsion originating in the nervous system.

b- COLLECTION AND EXAM INATION OF CEREBROSPINAL FLUID

The collection and laboratory analysis of CSF from farm animals with clinical

evidence of nervous system disease can provide useful diagnostic and

prognostic information.

**Analysis of cerebrospinal fluid**

Analysis of CSF has greater diagnostic value than hematology in animals with

nervous system disease. CSF can be examined for the presence of protein,

cells and bacteria. The white blood cell count in normal animals is usually less

than 5 cells/µL but a report exists of higher counts (12-200 cells/µL) in sheep.

An increase in CSF leukocyte count above 5 cells/µL is termed a pleocytosis and is categorized as mild (6-49 cells/µL), moderate (50-200 cells/µL) or marked (> 200 cells/µL). The differential white cell count comprises mostly lymphocytes and monocytes; there are no erythrocytes in normal animals. Samples that show visible turbidity usually contain large numbers of cells (> 500 cells/µL) and much protein. In cattle, protein concentrations range from 23-6 mg/dL, sodium concentrations from 132-144 mmol / L, potassium 2.7-3.2 mmol/L, magnesium 1.8-2.1 mEq/L and glucose concentrations 37-51 mg/dL

With bacterial infections of the nervous system the CSF concentration of protein will be increased and the white blood cell count increased up to 2000 cells/f.1L with more than 70% neutrophils. the CSF glucose concentration will be decreased and CSF lactate concentration will be increased in animals with bacterial meningitis because of bacterial metabolism.

C- EXAMINATION OF THE NERVOUS SYSTEM WITH IMAGING

TECHNIQUES

1- Radiography

Examination of the bony skeleton of the head and vertebral column to detect

abnormalities which are affecting the nervous system of large animals.

Conventional diagnostic radiography remains the best method for the initial

evaluation of trauma to the brain and spinal cord. The injection of contrast

media into the CSF system (myelography) is used for the detection of spinal cord compression but is rarely indicated in large animals because spinal cord

depression surgery is rarely performed. In cases of peripheral nerve injury the radiograph of the appropriate limb may reveal the presence of a fracture or space­occupying lesion that has caused dysfunction of the peripheral nerve.

2-Magnetic resonance imaging :

Magnetic resonance imaging (MRI) scanning uses nuclear magnetic resonance to create cross sectional images based on the magnetic properties of tissues. In general MRI provides an excellent image of soft tissue defects, but the limiting factors are the weight of the patient, accessibility for large animals and the need for general anesthesia.

d-RHINOLARYNGOSCOPY (ENDOSCOPY) AND OPHTHALMOSCOPY

Endoscopy (rhinolaryngoscopy) is now a routine technique for the examination of horses with suspected laryngeal hemiplegia. Ophthalmoscopy for the examination of the structures of the eye is important in the diagnosis of diseases affecting the optic nerve such as in vitamin A deficiency.

**Principles of treatment of diseases of the nervous system**

Treatment of disease of the nervous system presents some particular problems

because of the failure of nervous tissue in the brain and spinal cord to regenerate

and because of the impermeability of the blood-brain barrier to many antimicrobial agents, antiprotozoal agents, and anthelmintic.

When peripheral nerves are severed, regeneration occurs if the damage is not

extensive but no specific treatment, other than surgical intervention, can be provided to facilitate repair. When neurons are destroyed in the brain and spinal cord no regeneration occurs and the provision of nervous system stimulants can have no effect on the loss of function that occurs.

The emphasis in the treatment of diseases of the nervous system must be on

prevention of further damage. On occasion this can be done by providing specific or ancillary treatments.

ELIMINATION AND CONTROL OF INFECTION

Most of the viral infections of the nervous system are not susceptible to chemotherapeutics. Some of the larger organisms such as Chlamydia spp. are susceptible to broad -spectrum antimicrobial agents such as the tetracyclines and chloramphenicol. Bacterial infections of the central nervous system are usually manifestations of a general systemic infection as either bacteremia or septicemia. Treatment of such infections is limited by the existence of the blood-brain and blood-CSF barriers, which prevent penetration of some substances into nervous tissue and into the CSF.

In humans it is considered that most antimicrobials do not enter the sub­

arachnoid space in therapeutic concentrations unless inflammation is present,

and the degree of penetration varies among drugs. Chloramphenicol is an

exception, The most promising antimicrobial agents for the treatment of bacterial meningitis in farm animals are the third­generation cephalosporins, trimethoprim-sulfonamide combinations and gentamicin likely that the blood-brain barrier is not intact and that parenterally administered drugs will diffuse into the nervous tissue and CSF. Intramuscular penicillin or a broad-spectrum antibiotic suggests that the blood-brain barrier may not be a major limiting factor when inflammation is present.

DECOMPRESSION

Increased intracranial pressure probably occurs in most cases of inflammation of the brain but it is only likely to be severe enough to cause physical damage in acute cerebral edema, space-occupying lesions such as abscesses, and hypovitaminosis A. In these circumstances some treatment should be given to withdraw fluid from the brain tissue and decrease the intracranial pressure.

One treatment that may be attempted is the combination of mannitol and

corticosteroids used in man and in small animals. Mannitol given as a 20% solu­

tion intrave nously over a 30-60-minute period is a successful intracranial decompressant with an effect lasting about 4 hours; the effect can be prolonged by the intravenous administration of dexamethasone 3 hours after the mannitol. The treatment has been used in calves with polio encephalomalacia, combined with thiamin, with excellent results to relieve the effects of acute cerebral edema. The dose rates have been those recommended for dogs and are very expensive: mannitol 2 g/kg BW, dexamethasone 1 mg/kg BW, both intravenously. Dexamethasone on its own is safe and has a good effect but does not decompress sufficiently. Hypertonic glucose given intravenously is dangerous because an initial temporary decompression is followed after a 4-6-hour interval by a return to pretreatment CSF pressure when the glucose is metabolized.

TREATMENT OF BRAIN INJURY AFTER HEAD TRAUMA

The general principles are:

1) stabilize the patient by ensuring a patent airway, obtaining vascular access and attending to wounds.

2) specific treatment for hyperthermia as brain defects may result in an inability to regulate core temperature.

3) prevent or treat systemic arterial hypotension.

4) optimize oxygen delivery.

5) ensure adequate ventilation by placing in sternal recumbency whenever possible.

6)decrease pain.

7) monitor plasma glucose concentration and maintain euglycemia, and,

8) prevent or treat cerebral edema by having the head elevated or by the

intravenous administration of a hyper­osmolar agent (hypertonic saline, 7.2%

NaCl, 2 mL / kg BW every 4 hours for 5 infusions; 20% mannitol as a series of

bolus infusions of 0.25 to 1 g/kg BW every 4-6 hours, the latter is an expensive

treatment). Seizures should be treated when they occur by administering diazepam, midazolam, phenobarbital, or pentobarbital.

CENTRAL NERVOUS SYSTEM STI MULANTS

These substances are used to excess in many instances. They exert only a transitory improvement in nervous function and are indicated only in nervous shock and after anesthesia or other short-term reversible anoxias such as cyanide or nitrate poisoning. It is unlikely that terminal respiratory failure caused by anoxia over a long period, and in which anoxia is likely to continue,

will respond permanently to their use.

CENTRAL NERVOUS SYSTEM DEPRESSANTS

Animals with convulsions should be sedated to avoid inflicting traumatic injuries on themselves. Most of the general anesthetic agents in common use will satisfactorily control convulsions, and allow some time to examine the animal properly, assess the diagnosis and institute specific therapy if possible.