Anamnesis

The review and history of the horse is important being that many processes are related to the breed, sex, age... It should not be forgotten that a well done anamnesis can save us time and provide us with essential data to arrive at the diagnosis.

Age: for example, strangles due to infection by Streptococcus equi occurs in foals. But on the other hand, chronic obstructive pulmonary disease (COPD) is usually found in older animals.

Reason for visit: what is the main problem, duration, emergence of the same symptoms in other horses; existence of stress (changes in handling, alimentation, pneumonia by transportation), calendar of vaccinations and dewormings, previous illnesses, treatments...

Cough
- Intensity and duration.
- Moment of: nocturnal, diurnal, after exercise (evaluating the intensity of exercise used) or at rest, seasonal, related to the surrounding area or environment.....
- dry or productive.

Sneezing
- Syncope (related with the cardioexpiratory system).
- Intolerance to exercise.
- Appetite and loss of weight.

EXPLORATION OF THE UPPER RESPIRATORY AIRWAYS:
The First phase of exploration should be the nasal cavities and the nasal airway, the sinus paranasalis, the pharynx, guttural pouch (on both sides of the pharynx), the larynx and the trachea.

GENERAL INSPECTION:
- Rectal temperature
- Observation of hair type.
- Heart rate
- Type and quality of pulse.
- Respiration rate (10-15 rpm).
- Type of respiration (physiological costo-abdominal type).
- Evidence of inspiratory or expiratory noises.
- Existence of respiratory effort or dyspnea.
- Dilation of the nostrils, abdominal muscle effort in expiratory movements.
- Asymmetry between nostrils.
- Uniformity in the air flow.
- Mucosae: physiologically pinkish. Pallid (ischemia and anemia), congested (inflammation, dehydration, pain, fever..), icterics or cyanotics (circulatory ecstasy by passive congestion or increase in CO2 by respiratory failure).
- Lymph nodes: submaxillary, retropharyngeal, parotid, prescapular and precrural).
- Provoked cough reflex: this is a form of exploration that determines the type of cough that complements the anamnesis (especially when the description from the owner is not helpful to us).

SPECIAL INSPECTION:
EXUDATES: in the nasal cavities or nostrils. Excessive or abnormal nasal discharge is a sign of a disease in the respiratory system. Its origin can be unilateral or bilateral.
- Lesions in the nasal cavities.
- Congenital defects of the hard palate: cleft palate in the neonate.
- Sinus paranasalis
- Guttural bag
- Pharynx
- Larynx
- Trachea
- Lungs
- Diseases of the esophagus and stomach: tinged nasal secretions with stomach contents.

The origin is determined by:
- Close inspection of the external orifices and the visible portion of the nasal cavity, aided by a light
Examination of the sinuses in search of pain or deformation: sinusitis.

FIBER-ENDOSCOPE: upper and lower respiratory tracts.

RADIOGRAPHY (X-ray): nasal cavity and paranasal sinuses.

Due to its nature, here are some examples:

- Serous, copious and bilateral: initial inflammation (viral rhinitis).
- Mucosa and bilateral: inflammation after a few days.
- Purulent and bilateral: upper or lower respiratory tract inflammation.
- Caseous, copious and bilateral: bacterial or allergic rhinitis.
- Malodorous smell: severe tissue necrosis of the nasal cavity, guttural bag, necrotic or gangrenous pneumonia.
- Malodorous smell and bilateral with particles.
- Alimentary: dysphagia, regurgitation
- Bilateral: posterior lesion of the nasal area.

EPISTAXIS AND HEMOPTYSIS:
- Epistaxis: upper or lower tracts (nasal hemorrhage).
- Hemoptysis: lower tracts (coughing blood, intense hemorrhage).
- Frequent pulmonary hemorrhage in the horse.
- Differential diagnosis:
  - Serohemorrhagic liquid in the external apertures (equine infectious anaemia and equine infectious pneumonia).
  - Blood-tinged foam (acute edema of the lungs).

EXTERNAL INSPECTION:
- Measurement of the frontal and maxillary region: chronic sinusitis.
- Alterations in the size of the pharyngeal region: tympanism of the guttural pouch.
- Trauma to the lower part of the neck: sagging and tracheal collapse.

PALPATION:
- Temperature: hyperthermias in local inflammatory processes.
- Lack of response to external exploration of the laryngeal movements: "pat" method.
- Size increases in the regional lymph nodes by infections that are localized in the upper tracts...
- Consistency alterations in inflammatory processes.
- Pain when palpating: parotiditis and empyema of the guttural pouch.
- Palpation of the tracheal cartilage from the commencement of the trachea to the entry of the chest, between the two jugulars.

PERCUSSION:

Percussible structures are:
- Paranasal sinuses
- Guttural pouches (in the pharyngeal region)
- Tympanal sound in normal conditions, and often change the submate by deposits of exudates in sinusitis or guttural pouch infection.

AUSCULTATION:

The structures that produce as much as a physiological sound as a pathological are:
- Larynx and trachea:
- Physiological respiratory noises: they are heard more intensely during expiratory. They dominate LARYNGEAL MURMURS or LARYNGOTRACHEAL.
- Pathological respiratory sounds: basically inspiratory. It is called the LARYNGEAL STRIDOR.

COMPLEMENTARY METHODS:

RADIOLOGY:
- Abnormalities in the conformation and in the position.
- Recognize the existence of exudated deposits in the cavities (sinusitis and guttural infection).
- Reduction in the light of the respiratory tract. (Shrinkage)

ENDOSCOPY:

The flexible fiber-endoscopy is the method used for the examination of the upper respiratory tract. It is well accepted by horses and does not always require sedation, there is no more need for the use of normal restraining means, unless the horse becomes nervous enough that it must be sedated (xylazine, romifidine...
or detomidine). This sedation is contraindicated when needing to evaluate if the larynx or the palatine arch are functioning.

**Nasal cavity:**
- **Physiological**
- **Pathological**
  - Nasal polyps: usually unilateral; It causes a decrease in breathing and nasal discharge.
  - Ethmoidal hematoma: intermittent epistaxis, or serohemorrhagic nasal discharge. In the long run causes obstruction.
  - Granuloma: it may be of a fungal origin (cryptococcus). It produces nasal discharge and obstruction.
  - Foreign body: hemorrhage and nasal discharge.
  - Fractures of the skull: obstruction and hemorrhage.
  - Fistula: is rare. Follows trauma or loss of teeth.
  - Sinusitis: diverse causes. Releases exudates in the sinuses and leaves through the meatus medii.

**Pharynx**
- Physiological
- Nasopharynx
- Dorsal Laryngopharynx
- Oropharyngeal
- Ventral Laryngopharynx

**Pathological:**
- Pharyngeal Lymphoid Hyperplasia: intolerance towards exercise, augmented breathing sounds in severe cases or with severe exercise, nasal discharge.
- Dorsal displacement of the soft palate: intolerance towards exercise, augmented breathing sounds with severe exercise, particularly after a day's work, cough, nasal discharge. This can be normal after swallowing.
- Pharyngeal cysts: possible increase in breathing sounds, cough, nasal discharge.
- Rostral displacement of the palatopharyngeal arch: intolerance towards exercise, increased breathing sounds, dysphagia, nasal discharge, cough, weight loss.
- Pharyngeal paralysis: dysphagia, nasal discharge often with food content, weight loss.
- Fissure (crack) of the soft palate: dysphagia, nasal discharge often with food, cough and weight loss.
- Hypoplasia of the soft palate: same signs as the previous pathology.
- Pharyngeal Mycosis: sometimes hemorrhagic, nasal discharge, intolerance towards exercise, increased breathing sounds, dysphagia, cough and weight loss.
- Nasopharyngeal scars: intolerance towards exercise and abnormal phonation depending on the severity and the position of the lesion.
- Faringo-guttural fistula: nasal discharge.
- Foreign body, trauma, neoplasia, abscess: varied clinical signs depending on the location and extent of the injury.

**Guttural pouch:**
- Physiological
- Nasopharynx

**Pathological:**
- Empyema: unilateral nasal discharge, tumefaction of the parotid gland, nasopharynx discharge from the orifice of the affected pouch. Chondrosis in chronic cases.
- Mycosis: profuse epistaxis, neurological signs caused by infection of the cranial nerve, bloody or serohemorrhagic discharge in the nasopharyngeal orifice, mycotic plaques in the affected guttural pouch in varying degrees.
- Tymanism: tumefaction or external swelling of the parotid gland and in the area of the throat, decrease in the light of the nasopharynx (collapse), occasionally accompanied by empyema.
- Neoplasia: (new growth) it depends on the extension and the type of tumor.

**Larynx:**
- Physiological
- Pathological
  - Idiopathic laryngeal hemiplegia: hemiparesis, prolonged intolerance towards exercise, output of inspiratory sounds.
• Aritenoides chondritis: prolonged intolerance towards exercise, inspiratory sounds, shows up in advanced cases.
• Epiglottic entrapment: from intolerance towards exercise, inspiratory and expiratory sounds to asymptomatic.
• Epiglottis and subepiglottic ulcers: intolerance towards exercise, anorexia, dysphagia, coughing shortly after eating.
• Epiglottic hypoplasia: intolerance towards exercise and abnormal sounds compatible with dorsal displacement of the soft palate
• Subepiglottic cyst: intolerance towards exercise, abnormal sounds, cough, dysphagia. Particularly in the colt.
• Neoplasia, granulomatous disease: intolerance towards prolonged exercise and production of abnormal sounds, serohemorrhagic discharge and mucopurulent (containing mucus and pus).

ANALYSIS OF EXUDATION:

Sample collection:
For microbiological and cytological examination:

OBJECTIVES:
• Samples not contaminated with the environmental flora, common in the upper respiratory airways.
• Isolate pathogenic microorganism.
• Demonstrate the presence of inflammatory cells.

FORMS:
Nasal and nasopharyngeal smear test:
• Nasal smear:
  Evaluation of secretions caused by a disease of the upper respiratory tract (allergic rhinitis).
  Not valid for seeing the condition of the lungs because the microbiological examination reveals normally an abundant of mixed flora, of pathogenic and non-pathogenic microorganisms, difficult to interpret.
• Nasopharyngeal smears:
  More reliable. Decreases the level of contamination.
  Smear of the larynx or pharynx:
  Using a swab with a long palpation glove/sleeve which is used for the cervix of the mare.
• Nasal wash:
  Used when large amounts of nasal secretions are required for research purposes. Isolate bacterias, virus and identify immunoglobulins. This is done by irrigating the nasal cavities and collecting the liquid in a dish.
• Transtracheal secretions:
  Useful for valuating lower respiratory tract diseases.
• Percutaneous transtracheal aspiration:
  A polyethylene tube no. 280.60 cm is introduced through a cannula of 9 calibers between two tracheal rings, in the lower part of the neck where the trachea can be palpated, and is not covered obviously by another tissue. The skin is prepared aseptically and an incision is made after anesthetizing the area. The cannula is removed to avoid cutting off the probes connection and then is inserted as much as possible. When it passes through the bronchus a paroxysmal cough is produced. Then 30 ml of saline solution is introduced with a syringe and while the catheter is slowly being withdrawn an attempt is made to extract the liquid.
• Complications:
  Subcutaneous emphysema, pneumomediastinum and cellulite, but is not common.
• By endoscopy:
  The flexible fiber-endoscopy is used to obtain samples by transtracheal wash and at the same time to visualize the respiratory airways. Contamination of the catheter occurs when it is inserted through the upper respiratory airways, therefore it is recommended using a transtracheal swab or transtracheal aspiration for carrying out bacterial cultures.

Examples of some of the things we can find are:
• Inflammatory disease of the respiratory airways: neutrophils 39.5 cells/microL, 10% of the total number of nucleated cells.
• Purulent pneumonia and bronchiolitis: they predominate the neutrophils and large amounts of mucus.
• Allergies or parasitic migration: predominance of eosinophils.
• Pulmonary Hemorrhage: macrophages loaded with hemosiderin. We must take allot of care when
dealing with foals because the microbial flora and cell types that we find are very variable, and they can have different meanings depending on the age of the foal. For example it is common to find rhodococcus equi.

- Bronchoalveolar lavage (BAL):
  With a flexible fiber-endoscopy or without it. It serves to evaluate chronic lung disease. It amplifies the diagnosis and allows to obtain samples of developing terminals and alveolar spaces.
  A long endoscope of more than 2 m. or a specified BAL catheter is used. The horse is sedated to prevent coughing when surpassing the carina. The endoscope or catheter is inserted in the distal direction until it stops where it always coincides with the 3rd or 4th bronchioles. Then 200 to 300 ml of sterile isotonic saline solution is inserted, heated at 37°C to minimize cough and immediately afterwards aspirating 60 ml of liquid using syringes. This recovers 50% of the instilled liquid. The liquid obtained by this technique represents the liquid of the alveolar membranes and the lower respiratory tract but not the cellular changes of the septum intraalveolar and the interstitial gaps.

DIAGNOSTIC VALUES OF THE ASPIRATES:
• There is a good connection between the fluid from the bronchoalveolar lavage fluid (LLBA) and the histopathology of the affected lung.
• The connection between the transtracheal aspiration cytology and the BAL in chronic lung disease is inconstant.
• The BAL is a reliable technique for the study of the lung, but has a disadvantage and is not always possible to collect a sample of the affected part of the lung (pneumonia and pleuropneumonia do not affect the lungs evenly)

EXPLORATION OF THE LOWER RESPIRATORY TRACT:
STRUCTURES: Bronchial tubes, bronchioles, alveoli, interstitial tissue and pleura.
To study the chest we are going to divide them into two regions:
1. Anterior area of the chest (exploration of the trachea and prescapular nodes).
   Inspection
   Palpation
   Auscultation
2. Lateral area, ribs and hemithorax
INSPECTION:
Frequency: number of respirations per minute. This is obtained by counting the movements of the thoracic cage, abdominal press or by placing the hand in front of the nostril orifices.
Usually are 10-15 rpm.
- Tachypnea or polyplea
  Physiological: gestation, nervous excitation, digestion, foals, exercise, smaller size, increases of the exterior temperature, obesity.
  Pathological: hypercapnia, acidosis, hypoxemia, some drugs, lesions of the nervous system, fever, anemia, painful thoracic illnesses, thoracic skeletal alterations.
- Bradypnea: intense and prolonged hypercapnia, intense and prolonged hypoxemia, inflammation of the central nervous system (CNS), intracranial pressure increases, some drugs, hypocapnia.
  Type of respiration: usually costoabdominal.
  Pathological: costal respiration increase in intra-abdominal pressure (ascites, diaphragmatic hernia), painful abdominal processes;
  Abdominal respiration: pain in thorax.

Intensity, depth and duration:
• INTENSITY
  Reinforced: participative respiratory muscles in physical effort
  Enfeebled
• DEPTH
  Superficial: painful
  Deep: BATHYPLENE, ERF (external respiratory failure) by obstruction of the respiratory airway.
• DURATION
  Abbreviated: superficial respiration, PAIN
  Prolonged:
  INSPIRATION: caused by obstacles in the airways in edema and laryngeal stenosis.
  EXPIRATORY: decrease of the elasticity of the lung in pulmonary emphysema
  Normally combined in the following way:
  • Reinforced, deep and lengthened
• Weak, superficial and shortened
RESPIRATORY RHYTHM:
Physiological: alternated periods of normal respiratory ventilation with apnea.
Pathological

PERIODIC RESPIRATIONS:
• Cheyne-Stokes respiration: respiratory phase that begins with shallow respiratory movements that increases in size up to a maximum and then afterwards begins to shrink its depth gradually until it reaches transient apnea, after which it re-initializes the cycle (severe hypoxemia, breathing poor CO2 air, respiratory failure and processes that are accompanied with cranial hypertension).
• Biot's respiration: respiratory phases of irregular depth of 2-4 movements that are interspersed with alternating periods of apnea (cranial hypertension such as meningitis).
• Kussmaul's respiration: short and deep inhalation, followed by short and deep exhalation, then followed by a phase of apnea (acidotic coma).

ARRHYTHMIAS: is a consequence of excessive work of the muscles in breathing. Related to increases in pulmonary ventilation and in respiratory resistance. It is often accompanied by tachypnea.
Types of dyspneas:
• from resting
• from efforts
Inspiratory: associated with obstructions of the upper airways
• Implementation of inspiratory muscles not normally involved in breathing
• Sunken or depressed intercostal spaces
• Dilatation of nostrils
• Stretching of the neck, expression of anxiety
• Inspiratory stridor (noise of air passing through an obstacle)
Exspiratory: associated with chronic alveolar lung emphysema
• Minimum abnormal respiratory sounds
• Barrel-shaped thorax
• Cyanosis
• Strengthened and prolonged exhalation (of the expiratory muscles).
• Expiratory phase is carried out in two halves: extra abdominal effort (first half- passive expiratory, insufficient + second half with action of the muscles)
• Inverted anal respiration (protrusion of the anus in exhalation)
• Mixed: As much as in expiratory as in inspiration. In pleural effusion
• Paroxysmal: forcible entries of short duration

PALPATION:
• Temperature
• Pain
• Fremitus or palpable respiratory sounds: pleuritis
PERCUSSION: Clear
SUPERFICIAL: Pulmonary limitations
Enlarged: Diffused pulmonary emphysema
Pneumothorax
Diminished: Abdominal tympanism
Exudative pericarditis
DEEP: Intrathoracic alterations of the pleura and lung. Sonority:
• Augmented: local emphysema, diffuse emphysema, pneumothorax, diaphragmatic hernias with bowel gas.
• Diminished: subcutaneous edema, obese, pulmonary edema, Interstitial pneumonia, bronchopneumonia, tumors, diaphragmatic hernias, hydro-heme-chylothorax.
AUSCULTATORY PERCUSSION:
• Progression of sounds through the lung when percussed in the trachea: distant and unclear sounds.
• Strong and sharp sound: pneumonia and atelectasis.
AUSCULTATION:
Normal respiratory sounds:
• Laryngotraceobronchial murmur: Air vortices produced by flowing through the glottis and are transmitted to the trachea and the thick bronchi. Expiratory is more intense. Adult horses cannot be auscultated, due to the length of the trachea.
• Vesicular murmur (alveolar or respiratory sound): air currents produced by its passing through the terminal bronchiole to the alveolar duct.) During the inspiration it is prolonged and intense.

Physiological variations of normal respiratory sounds:
Vesicular murmur:
• It is milder in horses than in other species,
• Decreases with age, adults cannot be auscultated, used more in foals.
• More intense in animals with a thin thoracic wall
• Is reinforced by exercise
Laryngotraceobronchial murmur: auscultated in the bronchial area of adults
• Accidental sounds, not pathological.
• Deglutition
• Borborygmus
• False crepitations when the hair rubs up against the membrane.
• Rotative noises when compressing the cutaneous muscles with the phonendoscope.

Pathological changes of normal noises:
1. Intensity:
• Augmentation of the vesicular murmur:
• Anemia (generalized).
• Pneumonias (localized).
• Pleuresy (augmented dorsal sounds to the pleural effusion).
• Decrease of the vesicular murmur.
• Pain in respiratory movements.
• Generalized alveolar hypoventilation.
• hypoventilation by obstruction, areas of emphysema, inflammatory liquid in the alveoli.
• Abolishment of the murmur
• Massive thoracic effusion
• Atelectasis
• Tumors
• Pneumonias
• Lung edema
2. Rhythm:
• Disneas
3. Timbre:
• Bronchopneumonia (COURSE RESPIRATION: asperous murmur)
4. Tone:
• High: increase in expiratory noise caused by obstacles in the lower bronchi.
• Low

Bronchial murmurs:
• Increasing of the laryngotracheobronchial murmur.
• Accessory or odd respiratory sounds.
• Rales/crackles (abnormal sounds due to the narrowing of the airways and by noises produced by the movement of the alveolar walls).

OF 2 TYPES:
Type 1: Crepitant (inspiratory):
Dry: emphysema
Wet: catarrhal pneumonias (with exudation)
Type 2: Bronchial (heard in both respiratory halves, but more in exhalation):
Dry: bronchitis (RHONCHUS and SIBILANCE)
Wet: catarrhal bronchitis
• Bronchoalveolar edema
• Pleural friction rubs (abrasive sounds of the pleura's two layers sliding against each other: constant, not continuous, inspiratory, can give pleural fremitus).
• First stages of Pleuritis (not exudates)
• Disappears in: Pleuritis with resolution, presence of exudation, pleural effusion, presence of interpleural adhesions.

COMPLEMENTARY METHODS:
Radiology: Is useful for seeing alterations in the lung and tracheobronchial tree:
• Consolidations
• Presence of fluids

Indicated in:
• Congenital alterations
• Mediastinal alterations
• Atelectasis
• Condensation
• Pneumothorax
• Neoplasia
• Pleural effusion, hydropericardium and other injuries that take up space in the thorax.

Inflammatory or infectious processes:
• Pleuritis
• Pneumonia (exudative or interstitial).
• Bronchitis
• Allows to evaluate the ventilatory capacity and pulmonary ventilation. (serves no purpose for: tracheitis, alveolitis, alveolar emphysema or hypersensitivity pneumonia)

Ultrasound
Values:
• The surface of the alveolar (when the lung is normal)
• The internal structures of the lung (when there is an accumulation of fluid or densification of the parenchyma), air and bone are the limitations of this technique.

Indicated in:
• Pleuropneumonia
• Pulmonary abscesses
• Tumors of parietal localization
• Pleural effusions
• It is used as a guide in thoracentesis
• Endoscopy

Bronchoscopy:
• Evaluation for the type of exudate
• Indicated in pulmonary hemorrhages

Pleuroscopes:
• Tumors
• Trachea and bronchi
• The fiber-endoscopy required is 3 meters long, 12 mm in diameter.

Physiological:
• Trachea
• Carina
• Tracheobronchial tree
• Bronchi

Pathological:
• Traumatism: depends on the situation and severity. Can cause epistaxis, cough.
• Stenosis: light signs, generally in inspiration, intolerance towards exercise, and sometimes there is cough.
• Chondroma: depends on the size. Similar to stenosis symptoms. There can be complete obstruction.
• Foreign body: cough, nasal discharge with hemorrhage and malodorous breath.
• Hemorrhaging: frequent pulmonary hemorrhaging induced by exercise, associated with a decrease in functionality and epistaxis.
• Purulent discharge: cough, nasal discharge, intolerance towards exercise. If it is septic it will cause fever.
• Pulmonary abscess: cough, nasal discharge that may be hemorrhagic, weight loss, fever, leukocytosis. It can degenerate to pleuritis.
• Fungal infection: cough, nasal discharge. If it is severe there is weight loss and intolerance towards exercise.
• Cardiac failure: tachycardia, arrhythmias and murmurs, jugular pulse, peripheral edema, intolerance towards exercise. With the endoscope we can see a characteristic sign of heart failure such as congestion of the bronchial vein
• Tumor: depends on the size and situation. Can cause cough, nasal discharge, weight loss

Thoracentesis:
• Aspiration of fluid from the pleural space for posterior cytology and bacteriology (culture + antibiogram). The needle is inserted between the 6th or 7th intercostal space, below the expected level of fluid, and the aspiration is performed with a needle.
We can find purulent liquid, sanguinolent, signs of chronic infection or neoplastic cells as diffuse mesothelioma.
• Gasometry
Values:
• The capacity of gaseous exchange
• Pulmonary ventilation
• Blood gas analysis (from arterial and venous blood).