Avian paediatric medicine

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Paediatrics is the study of young animals from birth to weaning/independence. In avian medicine, and in the context of this paper is the study of chicks from hatching to fledging, i.e. independence from the parent birds/rearer. These chicks, known as nestlings, can be divided into two groups according to their state of maturity at hatching. Precocial birds (poultry, pheasants and waterfowl) are covered with down and are able to see, walk and feed themselves at hatching. Altricial birds (parrots, passerines, pigeons) are born with their eyes closed and are totally dependent on their parents for warmth and food. The care and requirements of these two groups are obviously different, although there are similarities.

This paper will concentrate on psittacine paediatrics, because this genus is more demanding, more common in practice and generally more economically worthwhile for our clients. Ratite birds, such as ostriches, are in a field of their own, and I will leave them for a separate study.

FACTORS AFFECTING HEALTH STATUS

The psittacine nestling, hatched with its eyes closed, lacking a competent immune system and totally dependent on its parents and environment for survival, is a very fragile and susceptible organism. Factors influencing its survival are more than just the immediate environment after hatching. I have grouped these factors into three broad classes:- pre-laying, incubation and post-hatching.

Pre-Laying

Given that the entire embryonic development is determined by the nutrients and tissue deposition laid down in the oviduct over a period of 24 hours, and that after laying, the hen has little direct effect on the development of the embryo (apart from its destruction/death caused by poor incubation in the nest), the health status of the hen is, to a large extent, a major factor in the successful hatching and early survival of the chick.

The health status of the hen is determined by:

a. nutrition;
b. maturity;
c. infectious diseases;
d. environment; and
e. stress.

When investigating a paediatric problem, the veterinarian is always wise to investigate the

parents as part of the work-up.

Another pre-laying influence is genetic. Genetically determined abnormalities and defects are poorly documented, but should be considered as part of the investigation.

Incubation

Once the egg is laid, the development of the chick is heavily influenced by the environment. In aviculture today, this can be either in the nest box or in an incubator.

The nest box environment is dependent on the design of the box, type of nesting material, humidity, sanitation and temperament of the parents. Incorrect, too much or too little nesting material can have an effect on the egg, although factors such as contamination, humidity, eggs buried in nest material, or eggs broken accidentally play a role. Too dry or too wet an environment can have a direct effect on the development and positioning of the embryo. A heavily contaminated environment can lead to infection of the egg if the shell is cracked. Nervous parents can damage or abandon eggs, often when the aviculturist checks the nest box.

Artificial incubation of eggs, widely practiced in the USA, is becoming more popular in this country. Factors such as incubator temperature, humidity, egg positioning and rotation, and sanitation can all affect the timing and degree of difficulty of hatching. Malpositioned eggs can lead to problems such as torticollis, etc. Incubation techniques will be covered in more detail by another speaker.

Post-Hatching

Once the chick is hatched, its environment, to a large extent, will determine its health and/or survival.

Factors to be considered include:

a. sanitation;
b. temperature;
c. humidity;
d. nutrition; and
e. management (especially in a nursery situation).

It can be seen from the above that an investigation into a paediatric problem should not be limited to the immediate presenting problem, and that the veterinarian should fully investigate all factors contributing to the development of the chick.

EXAMINATION OF THE CHICK

One of the initial obstacles that veterinarians have to overcome when treating birds, especially when they are not used to it, is a fear of their own ignorance. The old maxim "You will miss more by not looking than you will by not knowing" applies as equally to birds as it does to any other domestic species. A good history and thorough examination will solve 90% of the cases you are presented with.

1. **History.**

The history for a chick should include the following parameters:

a. Parents - past breeding and health history, diet, environment, etc.

b. Siblings - is this an individual problem, or are other birds affected. Look beyond the affected clutch, and see if this problem has occurred or is occurring in other clutches.

c. Incubation - natural or artificial. Look at incubation techniques or nest box environment.

d. Hatching - were there difficulties in the hatch?

e. Nursery environment and management:
- brooder conditions
- substrate
- hygiene
- diet - type
- preparation
- amount
- frequency of feeding
- method of feeding

f. Records - date of hatching
- weight charts

2. **Physical Examination.**

a. Posture: This can be very awkward, particularly when asleep. Watch closely for any apparent abnormal posture that does not correct itself with the next movement - e.g. torticollis, limb abnormalities. The normal sitting posture is resting on the hocks and the protuberant abdomen. All chicks should be able to lift their head while feeding.

b. Conformation: The normal chick has very little muscle mass; even at weaning it is less than the adult bird. Look at the muscles over the elbows, hips and toes - these should be reasonably well developed. The pectoral muscles are poorly developed until the bird begins to fly. The abdomen is very enlarged due to the proportionally large gizzard and proventriculus.

c. Behaviour: This is dependent on the age and species. The veterinarian should compare the chick with clutch mates or chicks of a similar age, and note behaviour such as hyperactivity, depression, dullness or unusual calling. A strong feeding response should be present.

d. Skin: The normal chick will have yellowish-pink skin with a warm, moist feel. Dry, red wrinkled skin indicates dehydration; white, cool skin indicates hypothermia. There is normally some flaking; excessive flaking indicates dehydration or a hot, dry

environment.

e. Crop: The crop should empty completely at least once daily (usually overnight), and should be nearly empty within 4 hours of feeding. There should be few, if any, solids (apart from seed) in the crop on palpation. There should be no scabs on the lower ventral area - this can indicate a crop fistula. Trouble indicators include crop stasis, doughy food or foreign bodies in the crop, or scabs or reddening on the overlying skin.

f. Head: The veterinarian should note the following:

i. The head should not be over-sized in comparison to the rest of the body. (see later - "Stunting")

ii. The beak should not show any defects such as

- lateral deviations
- shortened maxilla
- prognathism
- traumatic injuries

iii. There should be no swellings around the eyes, indicative of sinusitis

iv. The eyes should open at 2-3 weeks. There may be a clear ocular discharge before the eyes open, but there should be no discharge after opening.

v. The external ears may be closed till 2-3 weeks, but when open there should be no exudate or wetness in or around the ear.

vi. The nares open within a few days, or at hatching. They should be checked for discharge, blood, blockage or unequal size.

vii. The mouth should be examined for ulcerations (often associated with a misdirected syringe or spoon while feeding), yellowish-white - brown plaques (indicating candidiasis) or abnormal exudates.

g. Abdomen: As the skin is translucent, the abdominal organs can be directly visualised, especially if a bright light is used for transillumination. The right lobe of the liver can usually be seen, and evaluated for haemorrhage/ enlargement. The duodenal loop can be seen; this should be full of ingesta at all times. Recently hatched chicks retract their yolk sac through the skin within 24-48 hours, however, it will not be completely absorbed internally for up to 5 days. It should not be visible after 48 hours. Check the umbilical area for evidence of discharge/infection.

h. Feather growth: At hatching, most psittacine chicks are naked, or may have a sparse covering of down. Around about 3 weeks of age, pin feathers start to appear on the head, wing and tail, and shortly after on the rest of the body. Look for gross discrepancies in this pattern, misdirected feathers and also for pinched off feathers, etc

indicative of PBFD or papovavirus.

i. Droppings: Chicks often have polyuric, unformed droppings of varying colour, due to the often liquid diet they are fed.

3. **Laboratory Work-up.**

a. Clinical pathology. This is still a poorly documented area, but more data are slowly becoming available. In general, chicks have a lower PCV (20-30 %), lower serum protein (1-3 g/dl) and a higher WCC (20,000-40,000). Uric acid is lower, but creatinine phosphokinase is higher. These observations are limited, and may not apply to all chicks.

b. Microbiology. Chicks are highly susceptible to infection, and routine Gram stains/cultures from the choana, crop and vent should be carried out on valuable chicks. Any Gram-negative bacilli should be regarded as a potential pathogen.

c. Radiography. Remember that chicks have different proportioned anatomy to adult birds - the gastro-intestinal tract is larger and fills more of the abdomen, muscle mass is smaller and bones are less radiodense and may have open growth plates.

COMMON MEDICAL PROBLEMS

This discussion will be limited to those problems commonly seen, and which are better classified as medical rather than surgical problems. They include stunted growth, crop stasis, papovavirus, orthopaedic problems and bacterial infections.

1. **Stunted Growth.**

This can be a problem in both parent-reared and hand-reared birds. Anything that interferes with the homeostasis of the chick can cause stunting.

***Aetiology*:**

a. improper feeding
   - dietary imbalance
   - insufficient food
   - infrequent feeding
   - low total solids
b. poor environmental conditions
c. disease

***Clinical signs*:**

a. subnormal weight gains - refer to weight gain charts if available
b. reduced muscle mass - thin toes, elbows and hips
c. abnormal feathering - delayed growth in some areas, circular pattern on head due to feathers growing in the wrong direction
d. chronic, recurrent bacterial infections

e. general ill health - dehydration, sluggish behaviour, pale skin
f. constantly calling and begging for food
g. eyelids failing to open at the normal time

Treatment:

Identify predisposing cause and correct it. Badly stunted birds may not recover despite intensive treatment.

2. **Crop stasis.**

A crop that is full of food and does not empty normally is a common sign of illness in chicks.

Aetiology:

a. gut stasis
- generalised bacterial, viral, yeast or chlamydial infection
- foreign bodies
- chilling
- heavy metal poisoning
- dehydration

b. crop
- foreign bodies
- overstretched/atonic crop
- bacterial/yeast ingluvitis
- fibrous food impaction
- crop burns

c. dietary
- cold food
- watery food
- food that allows the solid portion to settle out and form a doughy, immovable mass
- overfeeding
- overly dry food

Diagnosis:

a. palpate crop for impaction, foreign bodies, burns, overstretching
b. crop and/or cloacal Gram stain/culture and sensitivity
c. radiographs - plain and contrast
d. haematology/biochemistry if systemic signs are present

Treatment:

a. cease all feeding till crop emptying
b. empty crop with a feeding tube. Flush with sterile saline until all food is removed. Upturning the bird and milking out crop contents can lead to aspiration pneumonia, and is not recommended

c. give SC or IV fluids to correct dehydration
d. treat with appropriate antimicrobials orally or parenterally. Avoid sulphas and aminoglycosides due to nephrotoxicity potentiated by dehydration
e. if indicated, perform ingluviotomy or proventriculotomy to remove impaction/foreign body
f. support an atonic, overstretched crop with a crop bra until crop motility returns to normal
g. once the crop is emptied, feed a dilute, low volume diet high in complex carbohydrates. Poly-Aid (Vetafarm) may be suitable. Feed small amounts, often. As the crop returns to normal, slowly return to the normal (or correct) diet.

3. **Papovavirus.**

This viral group derives its name from the three main types: papilloma, polyoma and vacuolating virus. The second of these, polyomavirus, is of significance in paediatric medicine, and is the virus discussed here under the name Papovavirus.

Papovavirus was first described in Budgerigars as an acute viral infection of newly hatched chicks. (Budgerigar Fledgling Disease - BFD). Young chicks (2-3 weeks old) die suddenly, with abdominal distension and subcutaneous haemorrhage. Gross pathology shows hydropericardium, cardiomegaly, hepatomegaly with multiple

pinpoint white - yellow foci, pale enlarged kidneys and occasionally ascites. Survivors show retarded growth and feather abnormalities.

Similar signs and lesions have been reported in other psittacine species (lovebirds, macaws, conures, cockatoos etc) and in gouldian finches. Age range is from 14 days to 16 weeks, and in most cases death is unexpected, or follows only a brief period of illness.

Diagnosis is based on history, clinical examination, gross pathology and histopathology. The identification of large, clear to slightly basophilic intranuclear inclusion bodies is diagnostic. Serology has been used in attempt to diagnose *ante mortem*, but is considered to be unreliable at this stage.

There is no specific treatment currently available, although supportive treatment (warmth, feeding, Vitamin K) may be of some benefit. Control should centre around hygiene and quarantine. Interrupting breeding for several months has been suggested as a means of control in the face of an outbreak.

4. **Orthopaedic problems.**

Paediatric leg deformities arise due to a wide range of causes. These include:

. diet - calcium deficiency
. genetic

. congenital
. poor nesting surfaces
. parental trauma
. developmental malpositioning within the egg

There is insufficient time or space here to cover paediatric orthopaedics in detail. Therefore, I will cover the principles of treating these conditions, and some of the more common problems.

Treatment of orthopaedic problems can involve any one, or combination of, the following:

a. changing management - bedding, diet, etc
b. braces and splinting
c. surgery.

Some of the principles of treatment include:

a. **Age of patient.**

As a general rule, the younger the age of the patient when treatment is initiated, the less severe and prolonged is the therapy that is required. However, tiny infants may not be able to tolerate bulky corrective

devices.

b. **Nutrition.**

A significant percentage of paediatric orthopaedic problems have their origin in some degree of malnutrition, either of the parents (causing deficiencies in the egg or while feeding the chick) or as a result of poor handfeeding diets and/or technique.

c. **Nesting surfaces.**

Shallow, slippery nesting surfaces can contribute to problems such as splay leg. If caught early, this condition can often be treated by correcting the nesting surface.

d. **Duration of therapy.**

This will vary according to the age of the patient and the severity of the problem but, in general, 7 - 15 days is sufficient for the correction of most problems.

Some of the more common problems include:

a. **Splay leg** - the legs are splayed from the hips. This can be either congenital or due to a slippery nesting surface. Treatment involves hobbling the legs with a soft material at the distal femur and tarsometarsus, placing the chick in a deep container well padded with towels, and reassessing every 3 - 5 days. Avoid placing adhesive tape directly on the leg, as it can cause avascular necrosis in a rapidly growing limb.

b. **Deviation of toes** - either lateral deviation, or a front toe pointing back or vice versa. Early correction by splinting is usually successful.

c. **Trauma** - this is due to rough handling, either by the parents or by the handler, and is often seen in calcium deficient chicks. If there is a calcium deficiency, try and avoid unilateral surgery or splinting, as this can put excessive stress on the (at this stage) unaffected limb. Support in a container and diet correction may be successful in these cases. If there is no dietary deficiencies, surgery and/or splinting is usually successful.

d. **Toe constriction** - this can be due to thread-like nesting material wrapping around the toe and restricting blood supply. There is also a syndrome seen in macaws, African greys and eclectus parrots, where one of the rear toes becomes swollen distal to a fibrous constriction. Where possible, threads should be removed. If this is not possible, both syndromes can be treated by making longitudinal incisions across the constriction and massaged with DMSO and warm soaks to encourage circulation. If the toe becomes necrotic or excessively painful, it should be surgically removed.

5. **Bacterial infections.**

These are the most commonly seen problems in chicks, and are diagnosed by cultures from the crop, choana and vent. A Gram stain from these areas will give an indication as to the flora present. Any Gram-negative bacilli and yeasts should be viewed with suspicion as potential pathogens. Some veterinarians believe in treating any of these regardless of clinical signs; others maintain that treatment should only be given if warranted. The veterinarian must make a decision, based on experience, but it should be remembered that a small growth of little significance in a healthy chick can become very significant in times of stress.

PAEDIATRIC THERAPEUTICS

The most important aspect of paediatric therapy is stabilising the environment and ensuring the proper body weight of the chick. Chicks have a lowered immune response and homeostatic capabilities. They are therefore much more dependant on a suitable environment and adequate nutrition to gain weight. If these are not provided, the chick will respond poorly to therapy, regardless of the origin and severity of the disease. General paediatric therapy is therefore directed at maintaining weight gain through:

a. **environment control** - newly hatched chicks should be maintained at a temperature of 32°C (95°F). As they develop feathers, it can be dropped to 28-30°C (80-85°F). Relative humidity should be kept at 50% to avoid dehydration and drying out of mucous membranes.

b. **fluid administration** - sick chicks rapidly dehydrate, which leads to gastro-intestinal stasis, which in turn worsens the dehydration. Parenteral fluid administration then becomes necessary. Once the G-I stasis is corrected, oral fluids can be given. Volume and type of fluid replacement follows standard fluid therapy protocols.

c. **restoration of crop function** - see earlier segment on crop stasis.

d. **nutritional support** - the diet should be examined and corrected if nutritionally deficient. A lot of people still firmly believe that a diet of Farex with Pentavite drops equals complete nutrition for a chick. Other speakers will address the subject of paediatric nutrition, so I will not go into detail here, other than to say that the best medications are useless in a malnourished bird.

Many of the drugs used in paediatrics are the same as those used in treating adult birds. Very little work has been done, but at this time it would appear that these drugs and doses are safe for chicks.

The relatively small muscle mass of the chicks means that the use of IM injections is limited. The thigh muscle can be used, but the clinician needs to be aware of the renal portal system and its effects on the drugs he/she is using. The pectoral muscles can be used, but care must be taken not to inject too deeply, possibly into the soft bone or underlying viscera.

SC injections can be used, injecting into the inguinal or interscapula area. Large amounts of fluid can be given, but care must be taken not to cause haemorrhage and to ensure that fluid absorption is occurring.

Oral administration can be used, although tissue levels may not be as high as by parenteral routes, particularly if there is any degree of intestinal stasis. Drugs that can cause intestinal dysfunction (e.g. doxycycline can cause vomiting) should be avoided or used very carefully.

Some specific drugs that can be used in avian paediatrics are listed below:

Antibiotics

Amoxicillin (Amoxil Drops)	150-175 mg/kg PO bid
Cefotoxamine (Claforan)	50-100 mg/kg IM tid
Doxycycline (Psittavet)	20 mg/kg PO bid
Lincocin - Spectinomycin (Linco-Spectin)	30 mg/kg IM or SC bid

Antifungals

Nystatin (Nilstat)	1 ml/300g PO bid-tid
Ketoconazole (Nizoral)	5-10 mg/kg PO bid