

# Avian Endoscopy – Principles and Application

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## Introduction

Coeloscopy is a technique, which has been established in birds within the early 70s of the last century. The main focus of this technique has been sexing of monomorphic birds species, primarily psittacine birds. Even as nowadays DNA based techniques are the method of choice for sex determination in birds, coeloscopy resp. endoscopy includes numerous advantages including the possibility for direct optical presentation of the gonads for the evaluation of rearing suitability. Furthermore coeloscopy is of greatest importance for diagnosing numerous diseases as well as archiving a microinvasive access to the body cavity including for sterilisation and castration (in wild living birds or falconry birds) purposes if needed. Thus this technique has been a standard routine technique in avian medicine ever since. From an anatomical standpoint birds are predisposed for using coeloscopy, as the air sacs, i. e. air filled cavities within the common body cavity, are ideal for using endoscopy without the necessity for air insufflation such as in mammals.

## Technical requirements

Technical requirements for avian coeloscopy are basic. As a standard setup a lightsource (preferentially with a xenon or LED light source) and a rigid endoscope (arthroscope) with a 30° viewing angle and a hopkins optic (one tubular lens rather than multiple single lenses), a curved anatomical forceps, a scalpel and suture material is needed. The 30° optics allows the endoscopist a round view while turning the endoscope around its axis, whereas 0° optics are including the disadvantage of a limited optic field. Socalled Hopkins lenses provide the endoscopist with an image, which is superior in contrast, sharpness and detail necessary to evaluate the most often very small and delicate avian structures. Furthermore a video device may be advantageous in documentation of findings as well as numerous instrumentation for sampling, such as a grasping forceps etc. which may be used in combination with a shield (trocar). Some companies (such as Karl Storz, Germany) offer complete setups meeting the specific demands for avian endoscopy.

## Practical aspects

Endoscopy may be used in birds as small as 50 grams of body weight. Endoscopical techniques include a single (one entrance for the optics and additional instrumentation), a two point access (with separate entrance of optics and additional instrumentation). In principle surgical access to the body cavity is archived via one of the four main paired sac groups - cervical, clavicular, cranial and caudal thoracic air sac and the unpaired abdominal air sac. As a standard the access via the left caudal thoracic air sac is used under general anaesthesia (induction period 4 Vol.% and 0.8 to 4 Vol.% within maintenance period using Isoflurane in combination with an analgesic) within right recumbency and

the left leg torn into caudal direction. The landmark for the entrance site is determined by the cranial contour of the left upper leg musculature and half or the upper third of the distance between the hip and knee joint. After feather plucking in this area a small cut and blunt dissection of the abdominal wall and the lateral air sac wall using an anatomical curved forceps, the endoscope is introduced into the body cavity. In principle the evaluation of inner organs follows direct optical inspection through the air sacs, a unique structure in birds and without the necessity of air insufflation. Thus besides the gonads, which are situated right at the cranial aspect of the dorsally located kidneys embedded in the so-called synsacrum, liver, spleen, the gastrointestinal and urogenital tract as well as the caudal portion of the lungs and the heart are visible. Normally, the air sac walls appear as clear structures with embedded vessels.

Common indications for coelioscopy besides sexoscopy include unclear radiographical findings and foreign bodies. Common findings include pathological plaque formation on the air sac walls due to aspergillosis especially in psittacine and various zoo birds, foreign bodies, air sac parasites (such as mites and filaria spp.). Additional even conditions with gout in the kidney tissue and unclear laboratory results may be visualized.

Contraindications for coelioscopy include intra-abdominal haemorrhage or adipositas (which may be physiological, for example in raptor species in the autumn) or excessive subcutaneous emphysema following exceeding perforation of the air sac walls.

## References

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