Ultrasound-guided Liver Biopsy of Birds

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Karolin Zebisch received her veterinary degree in 1997. She developed the technique of ultrasound-guided fine needle biopsy of birds over a period of two years at the Institute for Avian Diseases at the Justus-Liebig-University, Giessen, Germany. After completion of her thesis she joined her husband's veterinary practice.

Illustrations by **Klaus Riester** except as noted.

LIVER DISEASE IS A COMMON PROBLEM IN AVIAN AND EXOTIC practice. Diagnostic tests include radiography, ultrasound and clinical pathology. Ultrasound-guided biopsy, adapted from human medicine diagnostic techniques, has become an additional routine diagnostic tool.

The area of contact for ultrasound examination in birds limits the ultrasound-guided liver biopsy. The right lobe of the liver is the larger in most avian species and may be best suited for biopsy unless pathology is confined to the left lobe.

Advantages of Ultrasound-guided Liver Biopsy

- Histologic examination of the tissue sample permits an exact diagnosis of morphologic changes in the liver, enabling a more precise treatment protocol and prognosis.
- Samples can be obtained for bacterial or fungal culture or virus isolation.
- Treatments, such as site-specific medication or aspiration of liver cysts, can be directly applied.
- Ultrasound-guided biopsy has been performed in birds as small as 145 g.

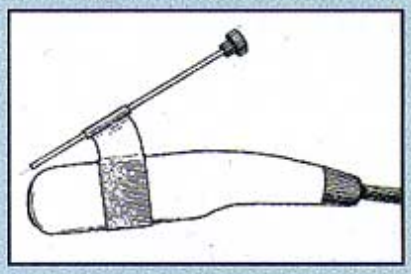
Considerations for Ultrasound-guided Liver Biopsy

- A biopsy aimed at a specific liver site is possible in birds weighing more than 350 g.
- Organomegaly or egg-laying activity (e.g., the presence of an egg, enlarged oviduct or an active ovary) can limit access to the liver.
- Existing ascites can contribute to suffocation in the event of entry into the abdominal air sac.
- The possibility of extrahepatic obstruction of the gall bladder must be considered.
- Deficiency in vitamin K, coagulopathy or thrombocytopenia may play a role in post-biopsy hemorrhage.
- Oral administration of vitamin K for approximately 48 hours preoperatively is recommended to decrease the risk of bleeding.
- It is advantageous to fast the bird for an average of 2-7 hours (overnight) prior to the procedure (most carnivorous species should be fasted for 1-2 days). Dilated or ingesta-filled intestines can greatly limit the view of the liver and increase the risk of an accidental puncture of the intestines.

Ultrasound-Guided Liver Biopsy of Birds

Products at a Glance

- PB-PV 65/10ED mini-curved array scanner (used at a frequency of 7.5 MHz)
- Biopsy rail developed for the SW15/5B scanner



- 20 gauge Vet-Core® biopsy needle, beveled point style, 15 cm long (Cook Veterinary, www.cookgroup.com)

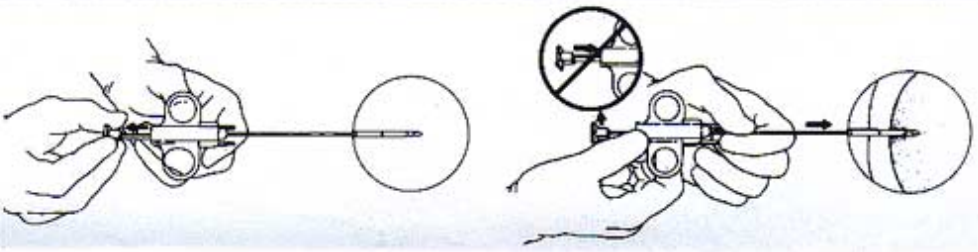
Photo courtesy of Cook Australia

Instrumentation

Because there are currently no biopsy aids for existing ultrasound scanners, a biopsy rail must be specially fixed to the ultrasound scanner for each subject. The lack of flexibility restricts the guided liver biopsy to specific areas of the liver.

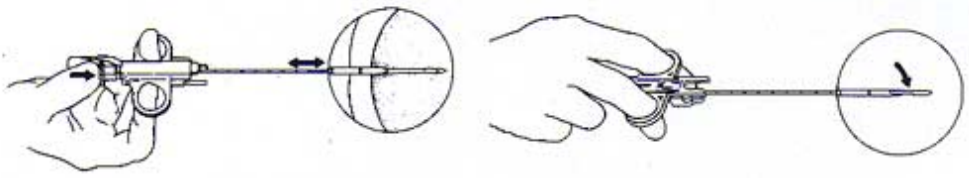
An ultrasound-guided liver biopsy can be performed in small patients of low body weight, but targeted removal of localized liver parenchyma changes is hardly possible. The method described here can be used in cases of diffuse changes in the liver parenchyma. A flexible biopsy rail for this weight class would be of great value.

Using the Biopsy Needle



1. Prior to insertion, prepare the biopsy needle by pulling back on the plunger until a firm click is felt, indicating that the needle spring is locked into ready position.

2. With the stylet fully retracted so that the specimen notch is completely covered by the cutting cannula, advance the needle to a level 1.3 cm proximal to the area to be biopsied (if using the needle with 10mm throw length). Do not advance stylet until biopsy needle is in position.



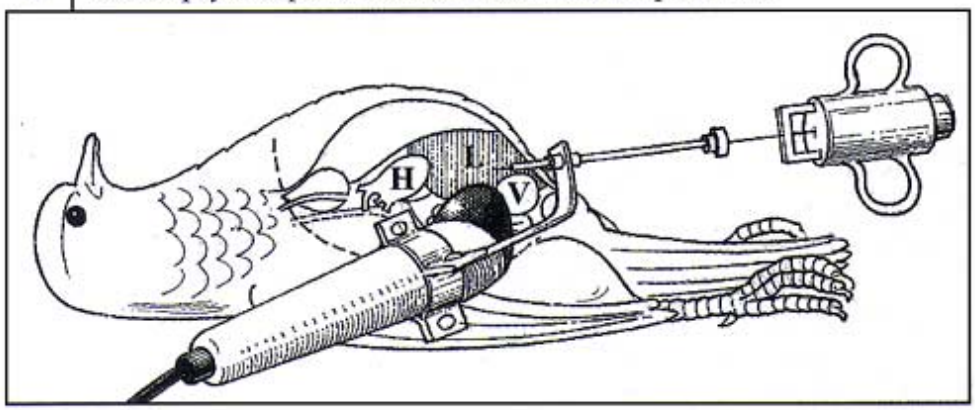
3. While maintaining needle position, advance stylet with thumb to expose specimen notch within the area to be biopsied. Fire the cutting cannula by fully depressing the plunger with the thumb to capture tissue within the specimen notch.

4. Withdraw needle from the biopsy area. To remove tissue specimen, pull back on the plunger until a firm click is felt to indicate the cutting cannula is locked into position. Push the stylet forward to expose tissue specimen within the notch. Remove tissue from specimen notch.

Illustrations courtesy of Cook Australia

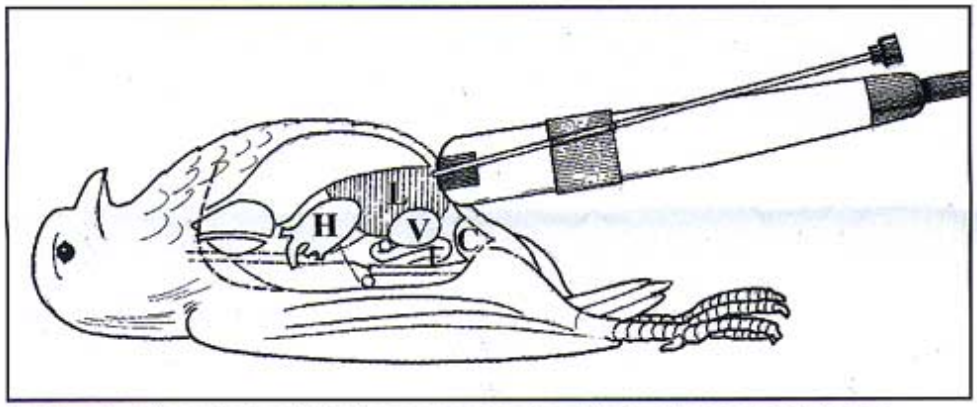
1 Positioning

The biopsy was performed from two different positions.

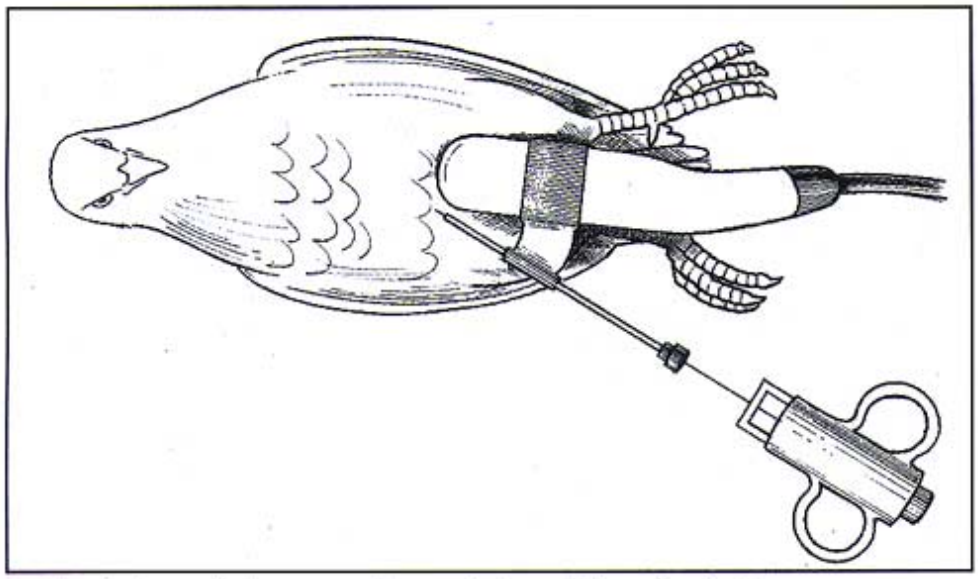


Key
H = heart
L = liver
V = ventriculus
C = cloaca

Position 1 - Sonographic examination and biopsy sample collection (lateral view). The contact surface is located on the right side between the last rib and the pubic bone, on the cranial edge of the M. iliotibialis cranialis. The biopsy needle was inserted deep to the sternum parallel to the long axis of the body and to the right of midline.



Position 2 - The contact point for the scanner is to the right of midline and caudal to the sternum. We refer to this as the ventromedial access (side view).



Position 2 - Access for the sonographic examination and biopsy (top view).

ULTRASOUND-GUIDED LIVER BIOPSY OF BIRDS

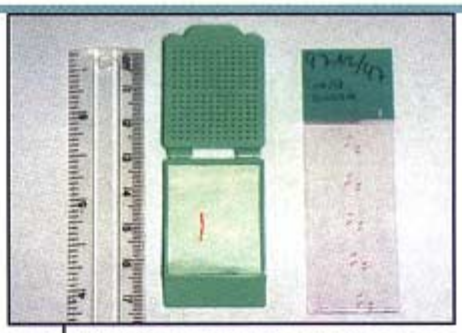
2 Patient Preparation

The biopsy is performed under isoflurane anesthesia. The anesthetized bird is placed in dorsal recumbency in preparation for biopsy. To improve the image quality, feathers are removed around the area of contact of the scanner, and water-soluble ultrasound gel is applied. The skin is aseptically prepared.

Because the bird's liver is located almost completely within the thorax dorsal to the sternum, contact by the ultrasound probe is limited. The convex scanner shown here uses a small area of contact.

The biopsy needle is introduced beneath the ultrasound head by first penetrating the skin. The cutting cannula portion of the biopsy needle is rapidly introduced into the liver to minimize damage to the liver capsule.

Once the desired position in the liver is achieved, the biopsy is accomplished according to the steps on page 28.



3 The tissue sample obtained by biopsy is applied to a blotting paper in the cassette for fixation in formalin. The samples can also be placed in the appropriate transport media for bacterial or fungal culture or virus isolation.

The biopsy performed on 61 individual pigeons, quail, ducks, African grey parrots and cockatoos yielded usable liver samples in 30 of 31 birds in the weight class greater than 340 g. Usable samples were obtained in 19 of 30 subjects in the 144-306 g weight class. One bird in this group was terminally injured by accidental puncture of the heart. The general health condition of the remaining animals was not adversely affected by the biopsy.

Orientation

The liver parenchyma, which is visible in the ultrasound image in cross section, is clearly echogenic. The tip of the biopsy needle can be seen as a highly reflective linear object in the upper left section of the figure.

Key
H = heart
L = liver
LC = liver capsule
N = needle