

# RADIOGRAPHIC MEASUREMENT OF INTERNAL ORGANS IN GYR FALCONS (*FALCO RUSTICOLUS*) AND GYR PEREGRINE HYBRIDS (*FALCO RUSTICOLUS* × *FALCO PEREGRINUS*)

Valentina Caliendo, DVM, CertAVP (Zoo Med), MRCVS, Rachael Middleton, BVSc, MRCVS, and Raj Raghav, BVSc & AH, MVSc, GDip., Dip. ABVP (Avian)

---

## Abstract

Falconry in the Middle East is an increasingly popular tradition favoring the hunting skills of large falcons including the Gyr falcon (*Falco rusticolus*) and Gyr peregrine hybrids, particularly *Falco rusticolus* × *Falco peregrinus*. Radiography allows investigation of avian skeletal disease as well as evaluation of organs of the coelomic cavity. To objectively interpret radiographic images of the avian coelomic cavity, one must master normal radiographic anatomic size and position of internal organs in healthy birds of the same species. This study provides standardized radiographic measurements of Gyr falcons and Gyr peregrine hybrids. These measurements would serve to aid veterinarians in the interpretation of radiographic images of not only Gyr falcons and Gyr falcon hybrids but also other raptor species of similar size. Radiographic measurements of the heart (HW), liver (LW), cardiohepatic waist, kidneys, spleen, proventriculus (PW), thoracic width (TW), and keel of the sternum (HK) were obtained under standardized conditions in clinically healthy Gyr falcons (40 females and 15 males) and Gyr peregrine hybrids (40 females and 15 males). Ratios were determined for the proventricular diameter to keel height (PW:HK), the width of the heart to the width of the thorax (HW:TW), and for the cardiohepatic ratio to the LW (HW:LW). Significant organ differences ( $P < 0.001$ ) were found between sexes, with females of both the Gyr falcon and Gyr peregrine hybrids having larger organs than the males of each respective group. Gyr females had significantly ( $P < 0.001$ ) larger HW, TW, and HK than female hybrids. Copyright 2015 Published by Elsevier Inc.

**Key words:** radiography; internal organs; falcons; Gyr falcon; *Falco rusticolus*; hybrids

---

**F**alconry is important to the cultural tradition of Middle Eastern countries. The popularity of this ancient sport of hunting has been maintained for centuries, and recently falcon “speed races” have developed a fervent following and support. In this context, the speed, strength, and hunting skills of the Gyr falcon (*Falco rusticolus*) are largely favored, especially for its ability to hunt larger quarry. Gyr falcon hybrids, particularly *Falco rusticolus* × *Falco peregrinus*, are also appreciated for their adaptability to the desert environment, training regime, and performance abilities. Radiography is a valuable diagnostic tool in avian practice, acknowledged for its noninvasive ability to view internal body structures and immediate availability of the images for interpretation. Radiographic imaging allows one to evaluate the patient’s skeletal anatomy as well as internal organs. This imaging modality is particularly useful in birds because of the inherent contrast between radiopaque soft tissue organs and the radiolucent airsac system. The effectiveness of interpreting avian radiographic studies has been limited by the sensitivity of imaging technology and the lack of normal radiographic reference studies. Digital radiography has provided the advantage of quickly accessing high-quality

From the Al Wasl Veterinary Clinic, Dubai, United Arab Emirates

Address correspondence to: Valentina Caliendo, DVM, CertAVP (Zoo Med), MRCVS, Al Wasl Veterinary Clinic, P.O. Box 75565, Al Wasl Road, Dubai, United Arab Emirates. E-mail: [valentina@auvetclinic.ae](mailto:valentina@auvetclinic.ae)

© 2015 Published by Elsevier Inc.

1557-5063/15/2101-\$30.00

<http://dx.doi.org/10.1053/j.jepm.2015.12.007>

images on a computer monitor, improved interpretation of anatomic fine details by manipulation of contrast, and improved evaluation of soft tissue structures due to image postprocessing.<sup>1</sup> To objectively interpret the radiographic image, it is still fundamental to master radiographic anatomy and refer to the size and position of internal organs in healthy birds of the same species. The objective of this study was to provide a reference set of standardized measurements to facilitate the interpretation of radiographic images for Gyr falcons and Gyr peregrine hybrids. Radiographic measurements were obtained under standardized conditions from clinically healthy Gyr falcons and Gyr peregrine hybrids. The measurements were calculated from ventrodorsal (VD) radiographic views: width of the base of the base of cardiac silhouette (HK), thorax at widest point (TW), maximum width of the liver (LW), waist of the cardiohepatic shape, and from right lateral (RL) radiographic views: length of the superimposed kidneys, horizontal and vertical size of the spleen (the spine of the bird indicating the horizontal position), width of the proventriculus (PW), height of the keel of the sternum (HK). Ratios were determined for the proventricular diameter to keel height (PW:HK), the width of the heart to the width of the thorax (HW:TW), and for the ratio of the cardiohepatic shape (ratio of the width of the heart to the width of the liver HW:LW).

## MATERIALS AND METHODS

Healthy adult birds that did not present with overt clinical signs of disease during a physical examination and were normal or negative on the following diagnostic tests, complete blood count, serum biochemistry panel, fecal parasitology (flotation and direct), radiographic imaging, and endoscopic examination of the caudal thoracic air sacs, were included in the study. All the birds in the research investigation were fasted for 12 hours before the radiographic imaging procedure to measure the anatomic structures included in the study. The birds were induced with 5% isoflurane and 2 L flow of oxygen. Following induction, the birds were intubated and maintained on 2% to 2.5% isoflurane and 1.5 L flow of oxygen.

To obtain consistent images, the birds were positioned directly on the cassette and secured in position with weights. Standard VD and RL whole-body radiographs were evaluated. Criteria for image inclusion into the study were the spine and the carina sterni superimposed for the VD projection and both coxofemoral joints overlapped with minimal positional rotation for the lateral views.<sup>2,3</sup> Differences between radiographic images taken when the subject animals were either in expiration or inspiration was not considered, as per similar studies.<sup>2</sup>

In the radiographic study described in this article, all images were taken with a portable x-ray unit (Minixray HF 80; X-ray Co. LTD., Tokyo, Japan) using Fujifilm FCR IP cassette-type CC and processed by an Indirect Digital Radiography system (CR-IR 391; Fujifilm corporation Tokyo, Japan) equipped with an integrated Computed

Radiography user station with single cassette feed. The focal film distance was set at 75 cm, x-ray tube voltage of 50 kVp, on a permanent 15 mA current with an exposure time of 0.05 seconds. This standard setting was used for all the studies referenced in this article.

To compare radiographic images of different birds, it is paramount to use a standardized evaluation protocol, as measurements are proportionate to the focal film distance and the object to film distance. When it is not possible to use standard settings, one may be able to compare the ratio of different structures such as the proventricular diameter to keel height, the width of the cardiac silhouette to the width of the thorax, and the width of the cardiac silhouette to the width of the coracoid bone, as per Rettmer et al.<sup>4</sup>

Radiographic images of Gyr falcons ( $n = 40$  females and 15 males) and Gyr peregrine hybrids ( $n = 40$  females and 15 males) were evaluated in this study. Measurements were performed with the measurement program (measurement function-measure line segment) available with the digital radiography system (Figs. 1 and 2). Results were evaluated for differences between Gyr falcons compared to the Gyr peregrine hybrids and between sexes by using analysis of variance and the unpaired  $t$  test, respectively (Med-Calc Software, Mariakerke, Belgium). The level of significance was set at  $P < 0.05$ .

## RESULTS

The radiographic measurements from VD radiographic views; HK, TW, LW, and waist of the cardiohepatic shape and RL radiographic

Download English Version:

<https://daneshyari.com/en/article/2396797>

Download Persian Version:

<https://daneshyari.com/article/2396797>

[Daneshyari.com](https://daneshyari.com)