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Endoscopy of cloaca in 51 *Emys trinacris* (Fritz et al., 2005): morphological and diagnostic study

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Abstract. In this work the authors are describing cloaca anatomy, pathological findings and endoscopic technique applied to *Emys trinacris* (Fritz et al., 2005). The study has been performed on 51 wild subjects of different age and size hosted in a rescue center. Cloacoscopy is proposed as a tool for sexing turtles with reduced sexual dimorphism.

Keywords. Reptiles, *Emys*, cloaca, cloacoscopy, endoscopy.

INTRODUCTION

Variations in cloaca anatomy among Chelonian species is poorly documented in literature as well as morpho-functional aspects. In addition, from a medical point of view, the cloaca is likely to be involved in various diseases, such as congenital deformities, microbial and parasitic infections, urolithyasis, neoplasia, foreign bodies, traumas, occlusions, organ prolapse.

Endoscopy and laparoscopy are well estabilished techniques applied to non conventional species, widley used as a diagnostic tool. Moreover, the same instrumentation can be implemented to allow micro invasive surgery and foreign body retrival from different body cavities (Divers, 1998; Gobel, 1994; Jekl, 2007; Schildger et al., 1989, 1992; Scott, 2003; Spadola et al., 2001, 2003, 2008; Taylor, 2006).

Performing a cloacoscopy requires an in-depth knowledge of the anatomy of the cloaca; otherwise the risk of technical mistakes dangerous for the animals, is high (Coppoolse et al., 1985, 1986; Divers, 1998; Jekl, 2007; Scott, 2003; Spadola et al., 2001, 2003, 2008; Smith, 1958; Taylor, 2006). The cloaca has a complex structure and is divided in three regions which are termed, progressing cranio-caudally, coprodeum, urodeum and proctodeum. The coprodeum receives the terminal portion of the gut while the urodeum is the portion of the cloaca where the urethra and the vas deferens and the oviducts, in males and in females respectively, open. The proctodeum represents the most caudal por-

tion of the cloaca where the can be found the reproductive organs (Dulzetto, 1968; Miller et al., 2007; Spadola et al., 2001, 2003, 2008).

Our work aims to the description of the cloacal anatomy in *Emys trinacris*, and the cloacoscopic technique, which allows not only to diagnose cloacal pathologies, but also of establishing with certainty gender of animals with a reduced sexual dimorphism.

MATERIAL AND METHODS

The study was performed on 51 wild *Emys trinacris* of different age and size, whose cloacal openings were compatible to endoscope diameter and in good apparent general health status assessed by mean of clinical exsamination. In all the specimens cloacoscopy was routinely performed to evaluate the condition of the mucosa, to collect flushing fluids for parasitological and/or bacteriologic determination, to assesed gender in doas subjects were external dimorfism was not evident and pathological changes were recorded. Endoscopic exam was performed with a Karl Storz otoscope with linear vision 0° (8.5 cm lent, 5 mm diameter, serial number 67260A) provided with an instrument channel with an fiber optic light cable. The scope was connected to a camera (Telecam DX-II) and the whole system was connected to a Karl Storz "TELE PACK™" providing light source, camera control and image documentation. For the whole procedure all animals were manually restrained and placed in ventral recumbency. After endoscope introduction a warm saline solution NaCl 0.9% at 30 °C added with 2% lidocaine (3 ml/litre) was introduced under visual control to dilatate the cloaca for a wider and clearer vision. Distension with fluid was mantained for the whole procedure allowing clearing of cloacal mucosa (Spadola et al., 2008).

RESULTS

During cloacoscopy, progressing in a caudo-cranial sense, it was possible to observe in the most caudal portions of the cloaca the pigmented mucosa of proctodeum and in its ventral portion the penis (Fig. 1 A, B, C, D) or clitoris (Fig. 6 A). Advancing more cranially, it was possible to identify on the ventral-lateral wall the wide openings of the two accessory vesicles and, in the middle-ventral portion, the urodeum slit, formed by two muscles which converge dorsally and ventrally to cover the urogenital senum (Fig. 2 A, B, C, D; Fig. 6 B, C, D). Through the thin wall of the accessory vesicles, it was possible to observe some coelomatic organs (testes, ovaries, and intestine) (Fig. 3 A, B, C, D; Fig. 7 A, B, C, D). In the upper part of the urodeum it is visible a muscular ridge, with horizontal fibres, where the gut void into the cloaca (Fig. 4 B, D; Fig. 11 A, C). Going through the seminal furrow it was possible to reach the inner part of the urogenital senum, where the urethra opening was found in central portion (Fig. 4 A, B, C, D). This opening can be entered, allowing visual examination of the bladder wall, which is semi-transparent (Fig. 10 A, B, C, D). Laterally to the urethral opening the urogenital papillae can be seen. This structure, is small and rod shaped in males while is "cauliflower-shaped" and bigger in females (Fig. 5 A, B, C, D; Fig. 8 A, B, C, D). On the urogenital papilla, near the ureter opening, was visible the vas deferens opening and the oviduct opening in males and in females, respectively (Fig. 5 B, D; Fig. 9 A, B, C, D).

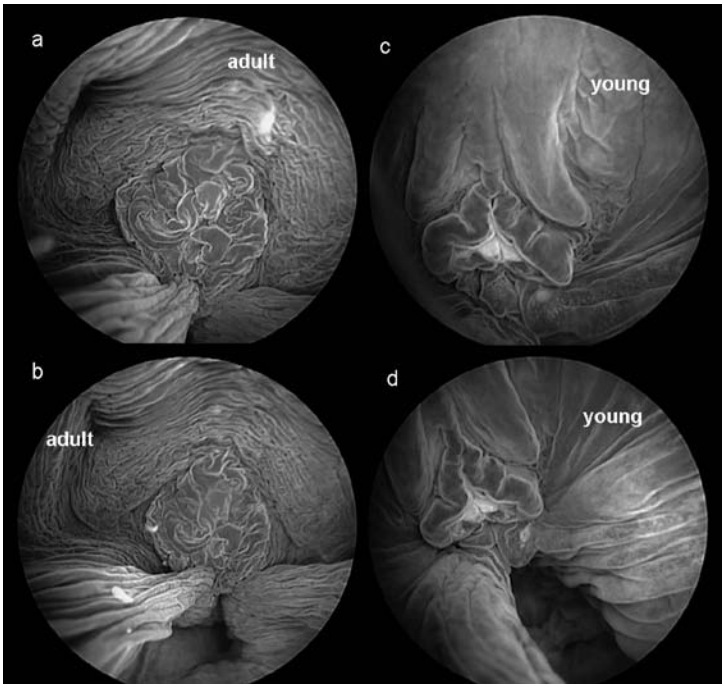
a
adult
c
young
b
adult
d
young

Fig. 1.

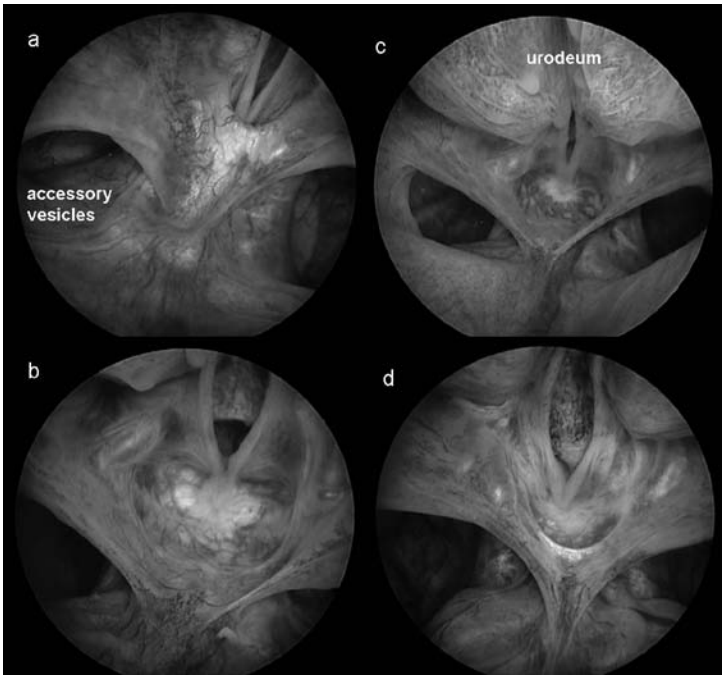
a
accessory
vesicles
c
urodeum
b
d

Fig. 2.

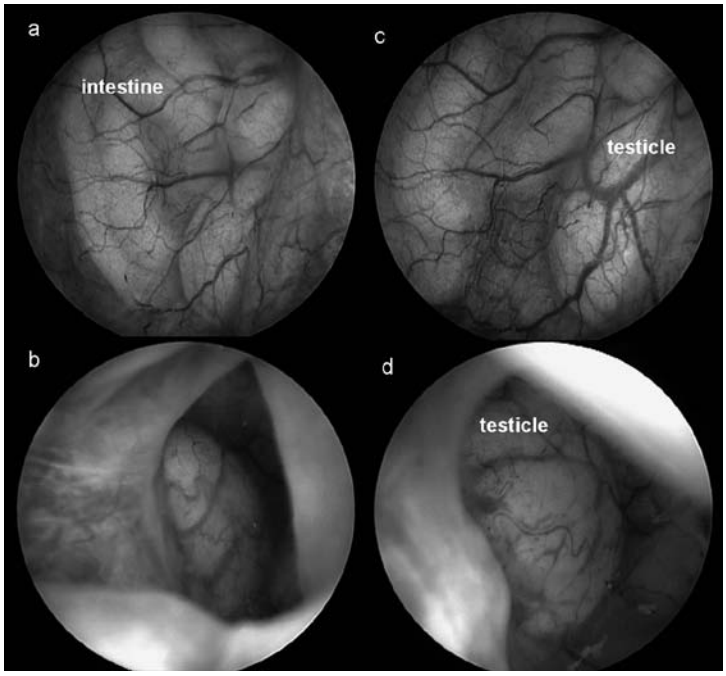

Fig. 3.

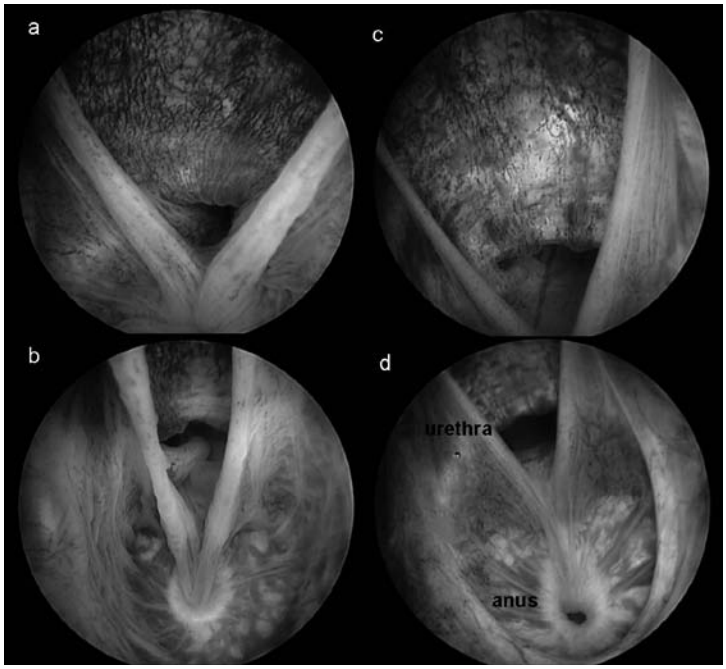

Fig. 4.

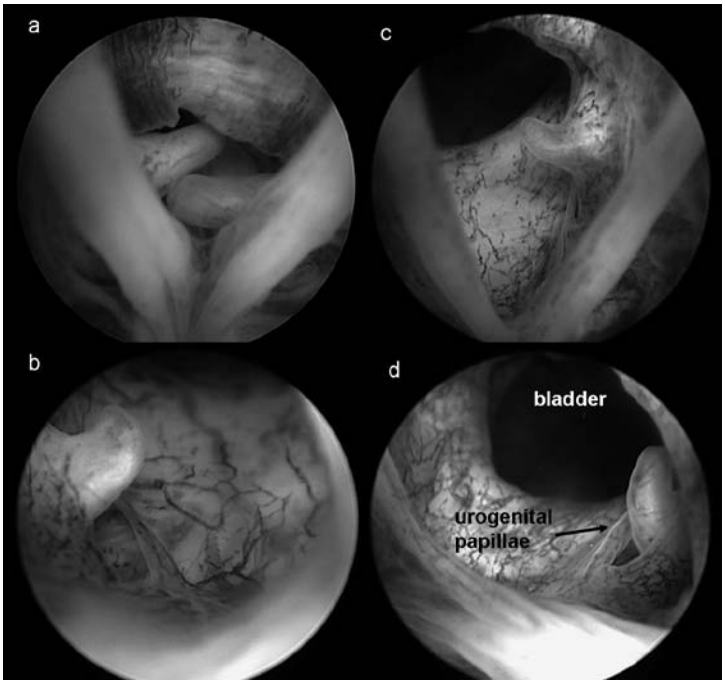
a
c
b
d
bladder
urogenital
papillae

Fig. 5.

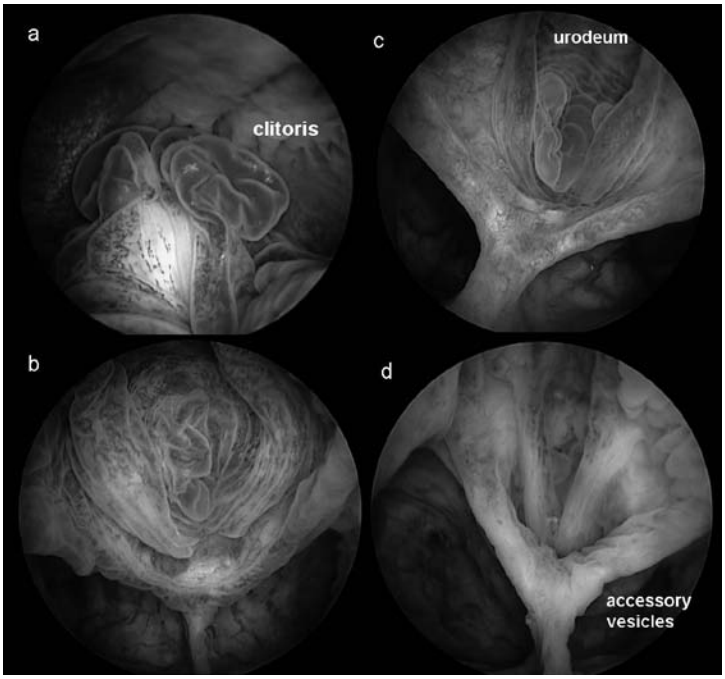
a
c
urodeum
clitoris
b
d
accessory
vesicles

Fig. 6.

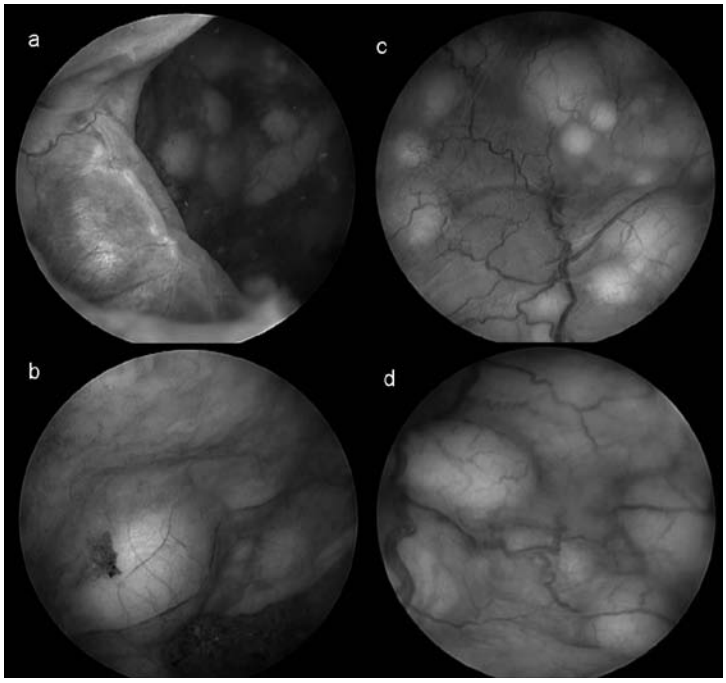

Fig. 7.

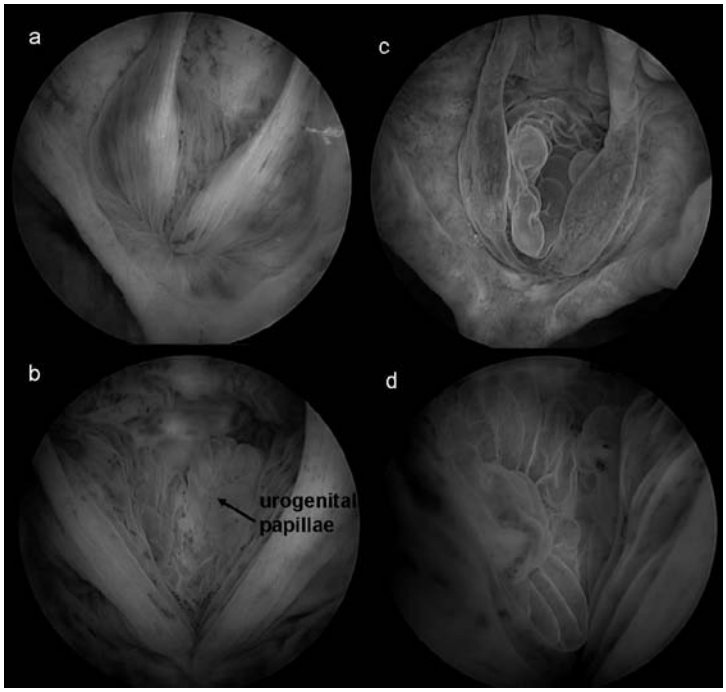

Fig. 8.

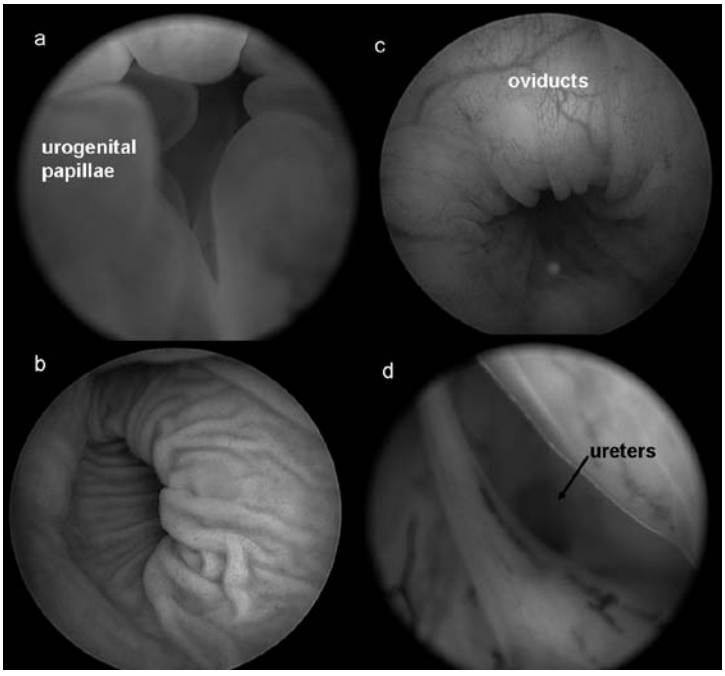

Fig. 9.

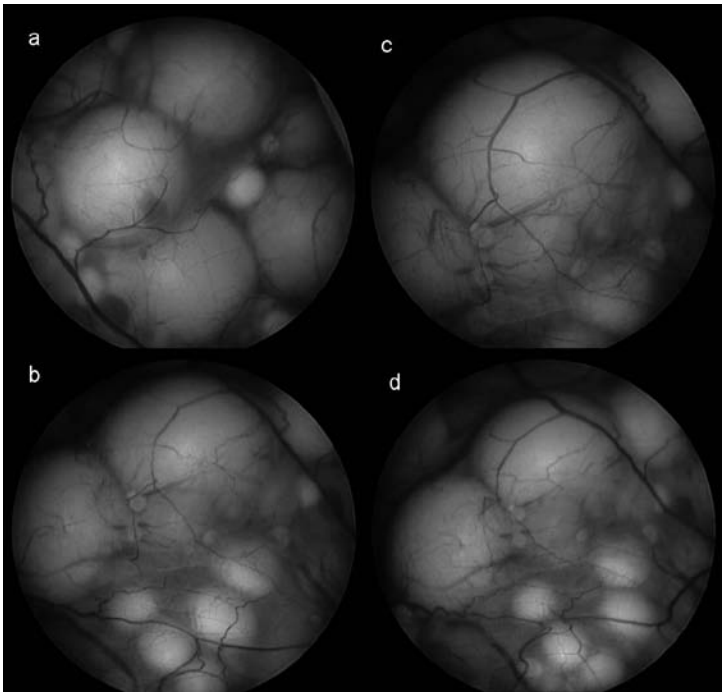

Fig. 10.

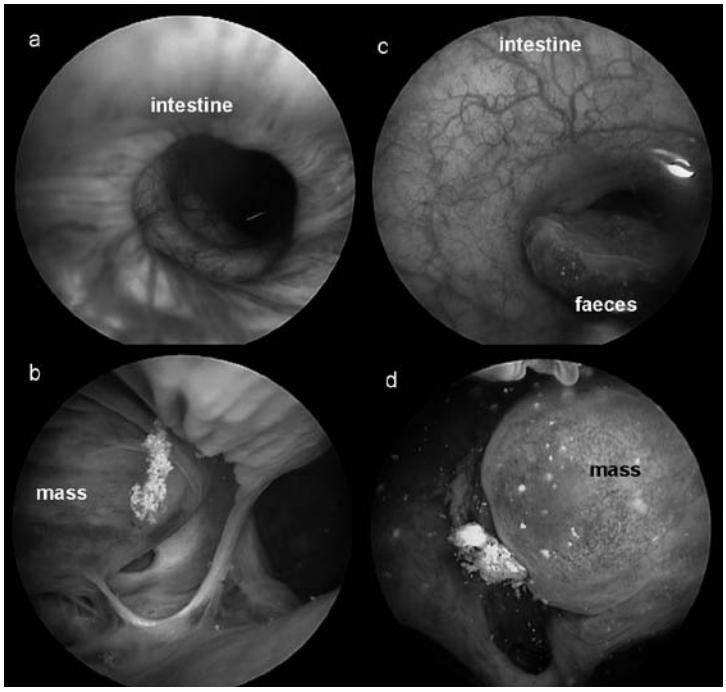

Fig. 11.

Due to their folding nature, oviducts can be explored during cloacoscopy for a limited lenght, (Fig. 9 B, C). After the procedure all animals were kept under observation for 24 hours and then housed in outdoor ponds. No undesired side effect were observed (Spadola et al., 2008).

Three of the 51 examined animals had pathological findings: one had a big bladder stone (Spadola et al., 2005) and two showed intracoelomatic neoformations of unknown origin compressing cloacal structures (Fig. 11 B, D).

DISCUSSION

Further studies are needed to compare cloacal structures of *Emys trinacris* to those of other non European fresh water species. In herpetological medicine is of paramount importance to get a deep knowledge on reptiles' anatomy and physiology. This can lead to better recognize and treat the specific disease conditions of these peculiar animals. Although cloacal pathologies in turtles are easy to find, diagnostic interpretation, should be reserve to specialized professionals. Endoscopy is minimally invasive and, thanks to the direct view under magnification and illumination, diagnosis of internal diseases is easily achieved. This technique can also be applied for sex determination in juveniles and in those species where no sexual dimorphism is evident (Coppoolse et al., 1985, 1986; Divers, 1998; Jekl, 2007; Kissner et al., 1998; Spadola et al., 2001, 2003, 2008; Smith, 1958; Taylor, 2006).

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