Atypical fibroepithelial hyperplasia of the teats in a Sphynx cat: a case report

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ABSTRACT: This study was conducted on a three-year-old Sphynx breed female cat which was brought to the clinic for masses on the teats. The medical history showed that these masses had developed slowly within the period of six months to one year. Following the clinical examination, these masses were removed via surgery. They were between 0.6 cm and 1.5 cm in diameter. Ulcer areas 2 mm to 5 mm in size were observed over the skin. Their sectional surface was uniformly grayish in colour. Histopathological examination of the masses revealed that the cells originated from the glandular duct and had given rise to hyperplasia; connective tissue was densely attached to the masses. Moreover, inflammatory changes and areas of ulceration were observed. Immunohistochemical analysis showed that the cells surrounding the epithelial hyperplasia were vimentin-positive and the proliferative activity of epithelial cells was measured to be 50% by analysis of proliferating cell nuclear antigen (PCNA). Based on clinical, histological and immunohistochemical findings, it was found the masses were diagnosed as atypical fibroepithelial hyperplasia. This case is the first to present a fibroepithelial hyperplasia in the teats of a cat.

Keywords: Sphynx cat; fibroepithelial hyperplasia; teats

List of abbreviations

ABC = avidin-biotin complex, AEC = 3-amino-9-ethilcarbazole, FEH = fibroepithelial hyperplasia, HE = haematoxylin & eosin, PCNA = proliferating cell nuclear antigen, SMA = smooth muscle actin

Fibroepithelial hyperplasia (FEH) of the mammary glands in cats (also known as fibroadenomatous hyperplasia or feline mammary hyperplasia) was first reported in 1973 (Allen 1973; Görlinger et al. 2002). It is characterised by a non-neoplastic proliferation of interlobuler ducts and periductal stromal cells (Goldschmidt et al. 2011). FEH is more frequently observed in young, pregnant or non-pregnant intact cats under the influence of luteal progesterone and develops in mammary tissue (Allen 1973; Hayden et al. 1981; Johnston et al. 2001; Görlinger et al. 2002). FEH cases were also observed in male and female cats of any age receiving synthetic progestins (Hayden et al. 1981; Hayden et al. 1989; Johnston et al. 2001; Loretti et al. 2005). To our knowledge, to date there has been no report on FEH in teats in the veterinary literature. The aim of this study was to evaluate a case of FEH in the teats of a cat with respect to clinical and pathomorphological parameters.

Although the Sphynx is known as a hairless cat breed, they may have hairs on the nose, tail and toes (Robinson 1973; Gandolfi et al. 2010). The numbers of this breed have been increasing in Europe, and it is now the most popular cat breeds overall (Chetboul et al. 2012; CFA 2014). Although studies have been published on skin diseases, muscular dystrophy and heart diseases in the Sphynx (Martin et al. 2008; Volk et al. 2010; Chetboul et al. 2012; Silverman et al. 2012), there are no reports in the literature regarding mammary hyperplasia and tumours in this breed.

Case description

A three-year-old female Sphynx cat was brought to the Clinic of Obstetrics and Gynaecology Department, Faculty of Veterinary Medicine, Afyon Kocatepe University because of masses in her teats.

Anamnesis revealed that the cat gave birth twice. The masses first presented as redness and then developed into masses impending from the teat edges within six to 12 months. Clinical examination revealed that these masses were present in all teats except for the right inguinal one (Figure 1A). No inflammation or masses were detected during mammary gland lobe examination.

The teat masses were removed under general anaesthesia. The cat was premedicated using 0.045 mg/kg of atropine sulphate (Belladone, 2 mg/ml, Alke, Istanbul, Turkey). The sedation was performed with 2 mg/kg xylazine hydrochloride (Alfazyne® 2%, Ege Vet, Izmir, Turkey) and 10 mg/kg ketamine HCI (Alfamine®, 10%, Ege Vet, Izmir, Turkey). While the animal was in the supine position, the operation area was disinfected. To remove the mass, ligature was placed between the teat and the starting point of the mass on the teat (Figure 1B). The mass was cut over the ligature and removed in such a way that the ligature stayed over the teat (Figure 1C). No pathology was revealed in the teats or mammary glands at a control inspection carried out on the second month following the operation (Figure 1D). One year after the operation, however, a similar mass was seen, this time over the right inguinal mammary lobe where it had not been observed previously. This mass was removed in a similar way under general anaesthesia and the masses were subsequently sent to the pathology laboratory.

On macroscopic evaluation the right thoracic, right cranio-abdominal and right caudo-abdominal teats were 0.7 cm, 1.3 cm, and 1.3 cm in diameter, respectively; the left thoracic, left cranio-abdominal, left caudo-abdominal and left inguinal teats were 1.4 cm, 0.6 cm, 1.5 cm, and 0.9 cm in diameter, respectively, and they were firm to palpation. Further, the surfaces of the teats were ulcerated, the skin was 2–5 mm in length and was brown-black. The sectional surface was of a homogeneous grayish colour.

Tissues were fixed in 10% neutral-buffered formalin, processed and blocked with paraffin and then sectioned at a thickness of 5 micrometers and stained with Haematoxylin & Eosin (HE) and trichrome.

Figure 1. (A) Macroscopic appearance of atypical fibroepithelial hyperplasia in teats. (B) Ligature was placed between the teat and the mass. (C) The mass was cut over the ligature and removed. (D) Teats and mammary glands two months after the operation

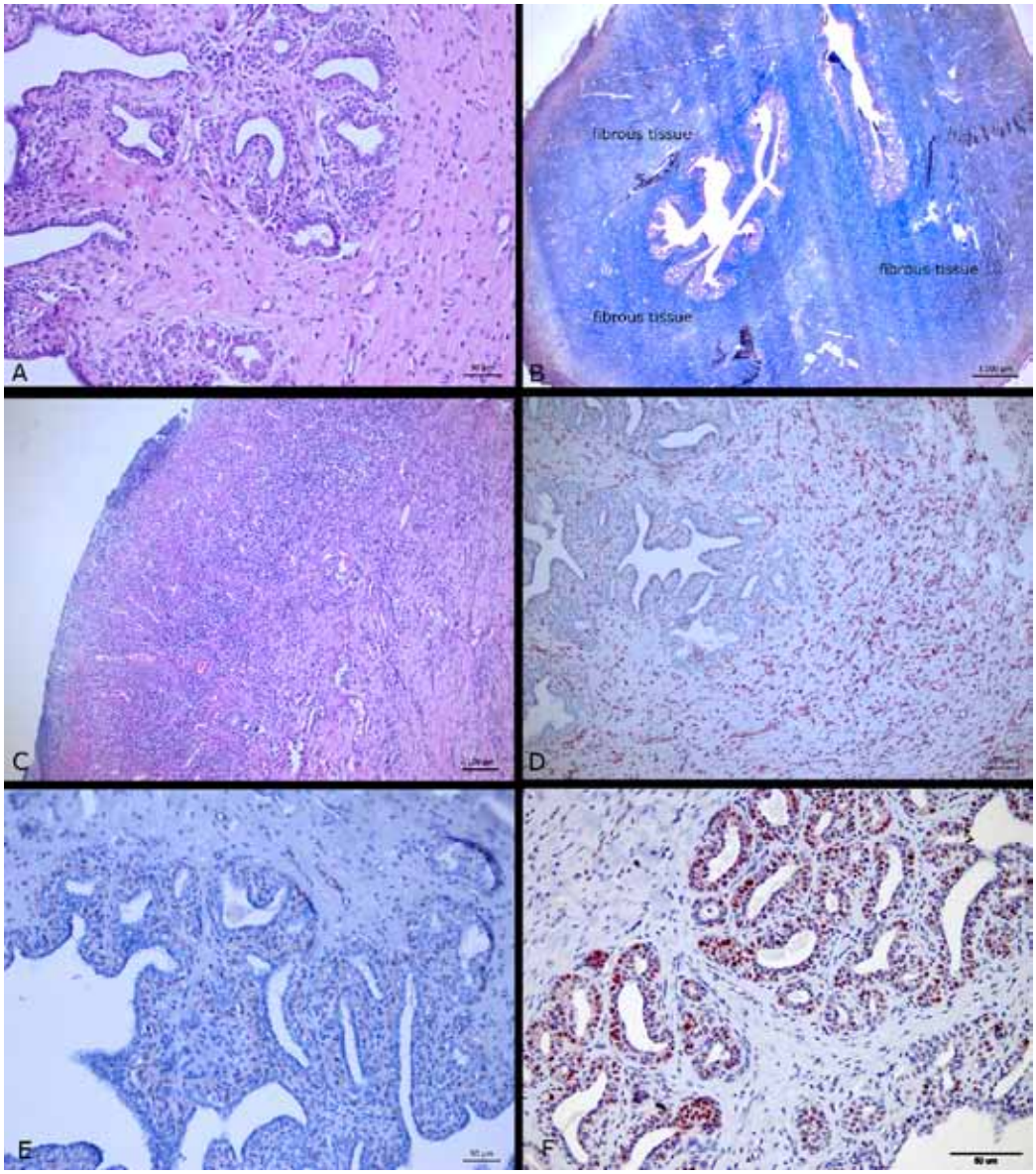

Figure 2. (A, B) Histopathological appearance of atypical fibroepithelial hyperplasia in the teats, HE and trichrome. (C) Histopathological appearance of purulent inflammation and ulcers on the skin, HE. (D) Vimentin-positive connective cells around the adenoid area. AEC chromogen, Gill's haematoxylin. (E) SMA-positive myoepithelial cells at the bases of the hyperplastic areas. (F) PCNA-positive nuclei of adenoid cells, AEC chromogen, Gill's haematoxylin

On histopathological evaluation, cells originating from the mammary ducts, which had expanded outside of the duct to give rise to areas of developing epithelial hyperplasia were observed. These cells were completely surrounded by wide connective tissue made of fibrocytes and collagen-rich fibroblasts (Figure 2A, 2B). These changes were accompanied by areas of ulceration consisting of dense neutrophil leucocytes, erythrocytes and bacteria (Figure 2C).

Immunohistochemical evaluation was achieved using the following antibodies for connective tissue-muscle differentiation: vimentin (1/200 dilution, Abcam, ab28028), desmin (1/50 dilution, Genetex, GTX28592) and smooth muscle actin (SMA, 1/100 dilution, SantaCruz, SC-53142). Proliferating cell nuclear antigen (PCNA, 1/500 dilution, Abcam, ab18197) antibody was used to detect changes in cellular proliferation. For this purpose, antigen was extracted via microwave application in a citrated tampon. Following incubation with primary antibodies, biotinylated anti-rabbit and anti-mouse IgG (BA-1100, BA2000, Vectorlab) were used as secondary antibodies. Conjugated avidin-biotin complex (ABC) kit (PK-6100, Vectorlab) was used

Figure 3. The cat's bedding material

with peroxidase enzyme. Samples were stained with 3-amino-9-ethilcarbazole (AEC, Invitrogen, 002007) substrate. Gill's (I) haematoxylin was used for background staining. Slides were covered with aqueous mounting medium. All slides were examined and photographed under light microscopy.

Immunohistochemical analysis revealed that surrounding cells of hyperplastic epithelia were positive for vimentin (Figure 2D) and negative for desmin and SMA. Myoepithelial cells at the bases of the hyperplastic areas were positive for SMA (Figure 2E). Proliferative activity, as measured by PCNA staining, was 50 percent in hyperplastic epithelial cells (Figure 2F).

Based on the results, these teat masses were diagnosed as atypical fibroepithelial hyperplasia.

DISCUSSION AND CONCLUSIONS

This is the first report of atypical presentation of feline fibroepithelial hyperplasia in the teats of a cat. Fibroadenomatous changes in cat mammary glands were reported due to endogenous or exogenous progesterone administration in young and pregnant animals (Misdorp 2002). These lesions may involve one or more mammary glands and can rapidly grow and cause clinical problems. In this case no pathological masses were observed in the mammary glands. FEH was only detected on the edges of the teats. Further, the animal was not pregnant and no history of progesterone use was reported. This case was presented with eight teat masses in the course of two years. Since this cat was three years old, we speculate that such masses may also occur in older animals.

Acrylic, polyester or cotton fabrics are often used as bedding materials for cats. In this case, polyester plush fur was used for the cat's bedding (Figure 3). In the production of polyester synthetic fibres, mercaptobenzothiazole, a chemical irritant is used. In humans, direct use of this material or the substance used for its production is known to cause skin pathologies such as irritant contact dermatitis (Maiphetlho 2007). The Sphynx cat breed is hairless and we assume that lying on plush bed material led to local irritation and itchiness in teats resulting in inflammatory changes and FEH. Common use of this type of bedding material for the comfort of cats may represent a risk to animal health, a potential danger which should be the subject of further studies.

Clinical signs of fibroadenomatous changes are generally non-painful, dome-shaped, firm, circumscribed mammary gland tissue (Sontas et al. 2008). Microscopically fibroadenomatous changes often exhibit oedematous or myxomatous fibrous stroma (Goldschmidt et al. 2011). However, in this case we observed that proliferative ductal epithelial cells were completely surrounded by dense fibrous connective tissue rich in collagen fibres and fibrocytes. The presence of this dense fibrous connective tissue is more consistent with an atypical presentation of feline fibroepithelial hyperplasia. We speculate that atypical FEH developed due to the closeness of the teats to the ground and their chronic irritation in response to chafing against the bedding material.

This report described the first atypical presentation of a feline fibroepithelial hyperplasia case in the teats of a cat. We observed bilateral FEH that may also occur in animals of advanced age.

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