TRICHOMONIASIS is a widespread protozoan disease amongst falcon in the Kingdom of Saudi Arabia and the Middle East as a whole (Samour and others 1995, Samour 1996). The occurrence of the disease appears to be directly linked to the falconry practice of feeding falcons with live or freshly-killed domestic pigeons (*Columba livia*) (Harden 1996, Bailey, 1997). In order to feed their falcons, Arab falconers normally purchase domestic pigeons from bird markets or conversely, these are trapped around farms where they are kept free-flying and are provided with lofts in the form of traditional “pigeon towers”. In a recent survey carried out in the United Arab Emirates (UAE), up to 68% of the domestic pigeons offered for sale in two bird markets and 35% of the free-flying domestic pigeons caught in the vicinity of a sheep farm were found positive to the presence of *Trichomonas gallinae* (Bailey, 1997). The high incidence of *T. gallinae* amongst the two populations of domestic pigeons in the UAE is probably identical throughout the Middle East since the housing, management and general husbandry are very similar in all countries. This coupled with the traditional practice of feeding falcons with live or freshly-killed domestic pigeons could probably explain the high incidence of this disease throughout the Middle East (Samour and others 1995, Samour 1996, Bailey, 1997).

As a general rule in birds, infections with *T. gallinae* produce classical white-yellow caseous lesions confined mainly to the oro-pharynx region, but the crop, oesophagus and proventriculus are commonly involved (Greiner and Ritchie 1994, Samour and others 1995, Greve 1996, Hoefer 1997). Trichomoniasis lesions have also been described affecting the lungs, oro-pharynx, air sacs, the palate and sinuses (Levine 1985). In some cases, infections caused by *T. gallinae* have also been observed in the trachea, spleen, kidneys, navel region and bone marrow (Levine 1985).
In a previous report, Samour and others (1995) described trichomoniasis lesions in the oropharynx, nasal cavities, infraorbital sinuses, crop, oesophagus, coelomic cavity and the tracheobronchial syrinx in different falcon species. Trichomoniasis infections within the nasal cavities and infraorbital sinuses in falcons are very little understood and very often are not detected by clinicians. These type of infections are only diagnosed if the lesions are large enough as to form a bulge through the palate or if they are of a chronic nature and have produced fistulae to the oro-pharynx (Samour and others 1995). The choana is presumably the port of entry for trichomoniasis infections localised in the nasal cavities and infraorbital sinuses and therefore it could be possible for similar infections to spread to other interconnected areas of the head. This paper describes two recent clinical cases of supraorbital trichomoniasis infections in two saker falcons (*Falco cherrug*).

Two one-year old female saker falcons were admitted for clinical examination to the Falcon Medical and Research Hospital of the newly established Fahad bin Sultan Falcon Center in Riyadh, Kingdom of Saudi Arabia during the month of February 1999. The clinical history included reduced appetite, progressive weight loss, partial obstruction of the nostrils (nares), fluttering of the skin over the infraorbital sinuses, unilateral ocular discharges and severe unilateral supraorbital swellings (Fig. 1 and 2). On examination, the swelling process felt hard to the touch and appeared to be confined to the dorso-cranial aspect immediately above the ocular globe. In the more severe of the two clinical cases, there was unilateral enophthalmos due to the extent of the inflammatory process (Fig. 1 and 2). The upper eyelids *per se* were not directly compromised.

The birds were anaesthetised using isoflurane (Isofl, Mallinckrodt Veterinary Ltd., UK) and held upside down while 5 ml of sterile saline was injected through the nostrils to flush the sinuses. In each case, a bacteriology swab was held below the choana to collect any discharge resulting from this procedure. Samples were examined in our microbiology laboratory using conventional bacteriology and mycology analyses. Direct wet smears were made from the discharges and examined under light microscopy at 400 X. Direct smears were also made and stained using Romanowsky stains (Rapid Romanowsky, TAAB Laboratories, UK) and examined under light microscopy at 1000 X. No significant bacterial or fungal growths were observed after 48 hrs and 72 hrs of incubation. However, a scanty number of flagellate protozoans were observed on direct wet smears. Consequently, the
flagellate *T. gallinae* was differentiated on stained preparations. No trichomoniasis lesions were present in the oropharynx or in the crop.

The two birds were treated with metronidazole (Metronidazole Tablets, Regent-GM Laboratories Ltd., UK) at the dose rate of 50 mg/kg for five consecutive days. Support therapy included force-feeding using minced chicken breast (80%), egg yolk (15%), Ringer’s lactate solution (5%) and a small amount (approximately 2 g) of a vitamins and minerals preparation (Daily Essentials 1, The BirdCare Company, UK). This mixture was administered at a dose rate of 25 g/kg three times a day via a crop tube until the bird was able to eat voluntarily. Also, an injectable multivitamin preparation (Duphafral, Duphar Veterinary, UK) was administered intramuscularly at the dose rate of 1 ml/kg every seven days. A 2.5% enrofloxacin preparation (Baytril, Bayer plc., UK) was also administered intramuscularly at the dose rate of 15 mg/kg twice daily for 5 days. In addition to the above therapy, the affected sinuses were flushed every day with 0.1 ml chlorhexidine (Hibitane, Zeneca Ltd., UK) diluted to 10 ml with sterile saline solution and administered using a 20 ml disposable syringe with a modified luer-lok tip.

Seven days after the therapeutic regime was instituted, the supraorbital swellings had not resolved. Nevertheless, after this period, the swellings had decreased slightly in size on both birds, but were even harder to the touch. In view of these observations it was decide to carry out an exploratory surgery on one of the falcons.

The supraorbital area was carefully prepared for surgery taking special care that the disinfectant solutions used did not drip into the eye. A skin incision of approximately 15 mm was made over the inflammatory process and the resulting haemorrhage arrested using manual compression. A small cavity was observed immediately under the skin filled with a hard white-yellow caseous material adopting the same shape as the cavity. The caseous mass was removed by careful digital manipulation and with the aid of a small Volksmann’s curette (Fig 3). The cavity was repeatedly flushed with 2 ml of a 2.5% enrofloxacin preparation (Baytril, Bayer plc, UK) diluted to 20 ml using sterile saline solution before closure as to ensure full retrieval of the caseous material. The incision was closed using simple interrupted sutures using 5/0 vicryl (Ethicon Ltd., UK). The incision and the supraorbital area were
dressed twice a day with an antibiotic-corticosteroid ointment (Neo-Cortef, Dominion Pharma Ltd., UK). The same surgical procedure was repeated on the second falcon following the same lines. The supraorbital swellings were completely reduced by day fifth after surgery and recovery was uneventful on both birds.

To the knowledge of the author this is the first report of supraorbital trichomoniasis lesions in falcons. Commonly, supraorbital swellings in birds of prey are associated with bacterial infections produced mainly by *Escherichia coli, Klebsiella* spp., *Pasteurella* spp., *Pseudomonas* spp., *Aeromonas* spp. and others. Infections with *Chlamydia psittaci* could also produce peri-orbital swelling and conjunctivitis (Forbes 1995). In the present study, *C. psittaci* infection was ruled out in the absence of related clinical signs. In falcons in the Middle East, the upper eyelid is also a very common site for swellings (Samour and Cooper 1993) due to pox infections. However in the present study, falcon pox was also ruled out since the eyelids were not directly involved in the inflammatory process.

In the two clinical cases described in this report, the infections with *T. gallinae* were localised deep into the infraorbital sinus. It is assumed that the infections may have crossed into the orbital region through the supraorbital diverticulum of the infraorbital sinus forming the caseous lesions as described on both falcons.

A virulent strain of *T. gallinae* may have been involved in these two clinical cases. Virulent forms of *T. gallinae* can produce lesions in anatomical sites others than the oropharynx and the crop. For example *T. gallinae* strain Eiberg, could produce lesions in the brain, liver, lungs and air sacs (Narcisi and others 1991). Conversely, *T. gallinae* strain Jone’s Barn has been associated with extensive liver damage while producing only mild oropharyngeal lesions (Perez Mesa and others 1961). In the present study it was not possible to determine the strain involved in the clinical cases described in this report.

Although domestic pigeons are still widely used as food source for falcons in the Middle East, every effort is been made to promote the use of alternative food items such as quails and mice.
Intensive and extensive campaigns have been set up in different countries to raise public awareness on the aetiology of and ways of preventing trichomoniasis.

The supraorbital trichomoniasis lesions described in this report portray an unusual clinical finding. It is proposed that trichomoniasis infections should also form an integral part in the differential diagnosis of supraorbital swellings in falcons.

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References


**Figure legends**

Fig. 1.- Lateral view of the head of a female saker falcon (*Falco cherrug*) showing a large supraorbital swelling.

Fig. 2.- Frontal view of the same bird as in Fig. 1.

Fig. 3.- A photograph of the head of a female saker falcon immediately after surgery to remove a caseous mass produced by *Trichomonas gallinae* infection. In the background, the caseous mass is shown after removal by surgery.