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Surgical Treatment of Renal Gout in Monocellate Cobra, Naja kaouthia

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Short Communication

Surgical Treatment of Renal Gout in Monocellate Cobra, *Naja kaouthia*

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Abstract

A wild captured, male Monocellate cobra, *Naja kaouthia* of unknown age was observed with anorexia, imbalance of swimming and mild swelling in the distal fourth of the body. Physical examination revealed a palpable firm mass in the coelomic cavity, of which radiographic examination was suspicious as an obstruction of large intestine by a foreign body. Removal of the foreign body through its cloaca was attempted by enema and digital manipulation, but was not successful. Thereafter, an exploratory surgery was performed and revealed an abnormality in the left kidney that was compressing the large intestine. Nephrectomy was performed and histopathologically identified as renal gout. The snake fully recovered within three months after surgery. The function of the remaining right kidney was monitored using BUN and creatinine weekly for six months. The result indicated that snake could compensate for living with one kidney and unilateral gout in snake could be treated by nephrectomy of the affected kidney.

Keywords: gout, *Naja kaouthia*, nephrectomy

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บทคัดย่อ

การผ่าตัดแก้ไขภาวะเกาต์ที่ไตในงูเห่าไทย (*Naja kaouthia*)

ทักษะ เวสารัชชพงศ์* ลาวัณย์ จันทร์โฮม

งูเห่าไทยที่ถูกจับจากธรรมชาติ เพศผู้ ไม่ทราบอายุ มีอาการเบื่ออาหาร เสียสมดุลในขณะว่ายน้ำ และมีอาการบวมที่บริเวณหนึ่งในสี่ทางด้านท้ายของลำตัว เมื่อทำการคลำตรวจร่างกายทั่วไปพบว่ามีก้อนแข็งอยู่ภายในช่องลำตัว การตรวจภาพถ่ายรังสี พบว่าเป็นก้อนแข็งทึบรังสีกดทับบริเวณลำไส้ใหญ่ที่อาจทำให้เกิดการอุดตันของทางเดินอาหาร ก้อนดังกล่าวไม่สามารถนำออกมาได้ด้วยการสวนทวารและการบีบไล่ด้วยมือ จึงพิจารณาทำการผ่าตัดแก้ไขเพื่อนำก้อนแข็งดังกล่าวออก แต่จากการเปิดผ่าช่องท้องพบว่าก้อนแข็งดังกล่าวเป็นลักษณะความผิดปกติที่ไตข้างซ้ายและมีการกดทับลำไส้ใหญ่ จึงทำการผ่าตัดเอาไตข้างที่ผิดปกติออก และทำการตรวจทางจุลพยาธิวิทยาพบว่าเป็นเกาต์ที่ไต หลังการผ่าตัด 3 เดือน งูหายเป็นปกติ และมีการติดตามสภาวะการทำงานของไตข้างที่เหลืออยู่โดยตรวจวัดค่ายูเรีย และครีเอทินีนในเลือดทุกสัปดาห์ เป็นเวลาต่อเนื่อง 6 เดือน จากผลดังกล่าวแสดงให้เห็นว่าสามารถใช้การผ่าตัดเอาไตออกเพื่อรักษาสภาวะเกาต์ที่ไตในงูได้ และงูสามารถปรับตัวให้มีชีวิตอยู่ได้เมื่อมีไตข้างเดียว

คำสำคัญ: เกาต์ งูเห่าไทย การผ่าตัดเอาไตออก

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Introduction

Reptiles are primarily uricotelic, with uric acid being the predominant nitrogenous waste product that is produced by the liver from the catabolism of proteins. Unlike mammals, reptiles lack the loop of Henle in the nephron and are unable to produce hypertonic urine. This results in the inability to excrete excess electrolytes from the blood without further water loss. Abnormal uric acid excretion may be caused by nephropathy, nephrotoxicity agents, chronic dehydration, and excessive protein intake (Smeller et al., 1978; Johnson, 1994; Gregor, 2001; Mader, 2006). In addition, improper husbandry may lead to immunosuppression and susceptibility to infection affecting the kidneys (Miller, 1998). Uric acid levels become elevated in the blood or other body fluids and the uric acid may crystallize to form insoluble precipitates that are deposited in tissues of the body (Johnson, 1994). Gout is one of the frequent abnormalities in reptiles which is caused by uric acid retention deposited at different sites such as the articulation of joints, visceral organs and subcutaneous areas (Mader, 2006). Treatment of gout is initially concerned with lowering the serum uric acid level and promoting urate excretion (Mader, 2006). In this report, surgery or nephrectomy of the renal gout was considered.

Case history

A male Monocellate Cobra, *Naja kaouthia* of unknown age, was caught and donated to the Snake Farm, Queen Saovabha Memorial Institute (QSMI), the Thai Red Cross Society. The snake had a snout-to-vent length of 155 cm and weighed two kg. Upon arrival, the snake showed clinical signs including imbalance swimming and mild swelling in the distal fourth of the body. Two months after donation, the snake has been refused food but yet active.

Diagnosis and treatment

Physical examination revealed moderate dehydration, pale mucous membrane and was otherwise within normal limits. Coelomic palpation found a hard, round mass, with an estimated diameter of 4.5 cm, at 27 cm cranial to the cloaca. Radiographic examination revealed a radiopaque mass apparently causing gas accumulation from compression in the large intestine (Fig 1). The snake was treated by enemas with a 70 ml warm normal saline solution and digital manipulation in order to move the foreign body down through the cloaca. The manipulation was not successful. In addition, the

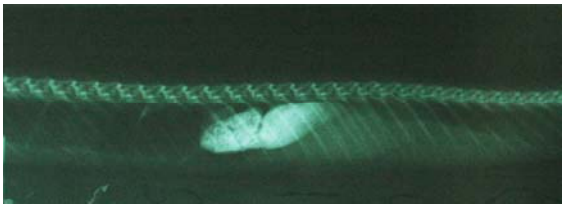

Figure 1 Radiopaque mass with gas accumulation cranial to the mass in the intestinal tract, which was interpreted as a total obstruction of the large intestine

mass cannot detract or reduce the size because the location of the mass is unreachable. Thus, the surgical correction was considered.

The snake was anesthetized with ketamine 20 mg/kg (Clypsol, Gedeon Richter Ltd., Budapest, Hungary) and xylazine 1 mg/kg (Rompun, Bayer Korea Ltd., Seoul, South Korea) by intramuscular injection. The incision line was between the first and the second dorsal scale rows on the left lateral side of the body above the midpoint of the hard mass. The suspected foreign body was found to be a yellowish-substance accumulation in the left kidney which considered as an impaired kidney (Fig 2). Therefore, nephrectomy of the affected kidney was immediately performed. The seminiferous tubule (Fig 3) was separated by blunt dissection with artery forceps. Renal arteries and veins were separated and ligated (Fig 4) with 2-0 polyglyconate (Connek, Novatec Healthcare Co., Ltd., Samutprakan, Thailand) close to the dorsal aorta, post cava and renal portal veins. The ureter was ligated with 2-0 polyglyconate caudal to the kidney. Then, renal blood vessel and the ureter were cut and the left kidney was removed. Coelomic and subcutaneous tissues were sutured with 2-0 polyglyconate in a simple continuous pattern. The skin was sutured with 2-0 nylon (Nylon, UNIK, Taipei Hsien, R.O.C., Taiwan) in an everting horizontal mattress pattern. Antibiotic and analgesic therapy were performed using ceftazidime 20 mg/kg (Cef-4, Siam Bheasach Co Ltd, Bangkok, Thailand) by intramuscular injection q72h for 5 treatments and carprofen 2 mg/kg (Rimadyl, Pfizer (Thailand) Limited, Bangkok, Thailand) by intramuscular injection q24h for 3 treatments, respectively. The function of right kidney was monitored by blood urea nitrogen (BUN) and creatinine weekly for six months. Physical examinations were performed weekly after surgery for a period of three months.

Results and Discussion

The incision line was completely healed within one month after surgery. During that period the snake shed once. Urination and defecation were normal. The snake was active, developed a good appetite and no other clinical signs. The removed kidney was examined and histopathological study identified as renal gout by the accumulation of uric acid crystal in renal tissue resulting in multinucleated giant cells (Fig 5). The levels of BUN were < 5 mg% and creatinine were < 0.4 mg%. However, the snake died at 14 months after surgery. The necropsy was performed and revealed no deposition of uric acid in any organs and the cause of death was severe parasitic lung infestation.

In spite of several predisposing factors of reptilian gout, the treatment was mainly focused on correcting the underlying cause. Studies in reptilian gout are limited and surgical corrections of renal gout in snakes have not been reported. Therefore, most treatments have been adapted from human medicine which initially treated with allopurinol (Mader, 2006). In this report, the snake was caught in the wild with an unknown history of previous sickness.

Figure 2 Accumulation of yellowish substance in left kidney

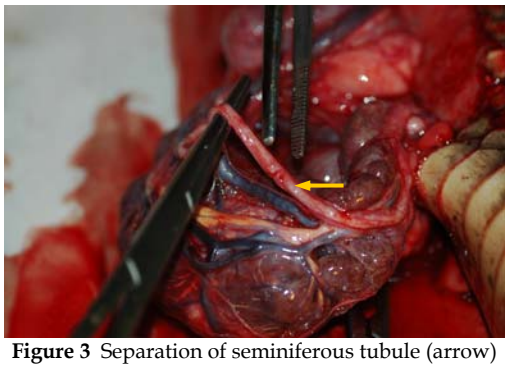

Figure 3 Separation of seminiferous tubule (arrow)

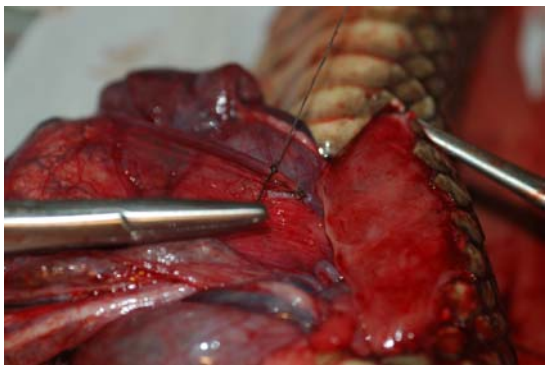

Figure 4 Ligation of renal blood vessel.

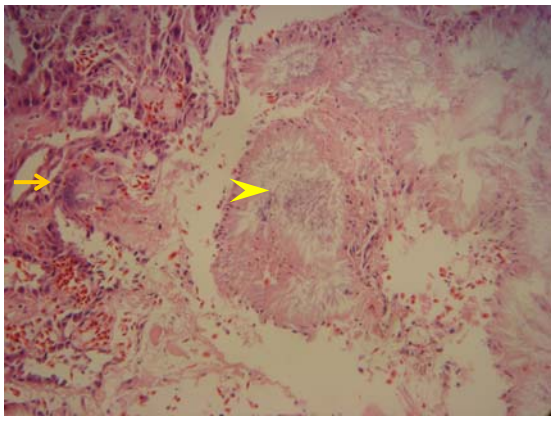

Figure 5 Photomicrograph (x4) with H&E staining, showing uric acid crystal (arrow head) accumulated in renal tissue resulting in multinucleated giant cell (arrow)

The radiographic image showed a compression of the intestinal tract which was firstly suspected as an intestinal obstruction that might be the cause of inappetite during two months in captivity. The mass may be further investigated by biopsy, ultrasound or endoscopy, but because of the

total obstruction of intestine, the snake needed to be treated promptly. Therefore, the surgical treatment was considered on removing the affected organ without initial treatment with allopurinol and identification of the mass. The histopathological finding of the affected kidney exhibited the accumulation of uric acid with unclear etiological problems. Therefore, the underlying cause of renal gout in this snake was not resolved even after surgical treatment. The recovery was assured by the improvement of general condition in accordance with the normal plasma levels of BUN and creatinine which was followed up for six months after surgery.

Gout in snake is diagnosed by history and clinical examination which definitive diagnosis is made on demonstration of monosodium urate crystal within tophi of diseased tissue (Mader, 2006). Three stages of gout can be described in mammals, which acute gouty arthritis can present in the second stage, but the articulation gout is not presented in snake. The most common site of uric acid accumulation in reptile is located in visceral organs including the pericardial sac, kidneys, liver, spleen, lungs and subcutaneous tissue (Mader, 2006). Therefore, gout in snake is mostly asymptomatic.

Due to unavailable of laboratory determination, the pre-operative blood check was incompletely examined, but the physical examination was carefully performed before anesthesia. After surgery, the function of the right kidney was monitored using serial plasma chemistry examinations to determine the degree of compensation of the remaining kidney. Although gout in reptiles may occur with or without hyperuricemia (Mader, 2006) depending on the stage of disease, the level of plasma uric acid is the best parameter to monitor reptile kidney function. Evidence of hyperuricemia is mostly detected in the latest stage of the disease (Miller, 1998), indicating the impaired kidney function. Unfortunately, the plasma uric acid was not evaluated because of unavailability of laboratory determination in this case report. Therefore, BUN and creatinine were used although these parameters are less sensitivity for kidney function in reptiles (Mader, 2006). But, there is no referential data of BUN and creatinine in Monocellate Cobra (*Naja kaouthia*). Therefore, the value of BUN 1-5 mg% and creatinine 0.2-0.4 mg% of the Reticulated Python (*Python reticulatus*), a native snake in Thailand (Carpenter, 2005), was used as the basic value in this case report. In mammals, the intact kidney after nephrectomy is compensated by renal hypertrophy and increase of glomerular filtration (Dicker and Shirley, 1971). These results indicated that snake could compensate for living with only one kidney and the surgical treatment or nephrectomy of renal gout was successful.

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