

Gizzard Impaction with Bile Stasis in Captive Oriental White Storks (*Ciconia boyciana*)

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Abstract : The Korea Institute of Oriental White Stork Rehabilitation Research (KIOWSRR) is breeding oriental white storks for residential rehabilitation in South Korea. Three oriental white storks were referred with anorexia and depression. Two storks were died before examinations and one stork was died after 1 day of fluid therapy. On necropsy, salmon-colored subcutaneous and visceral fats were examined in all storks. Multiple focal necroses on liver surface were also examined. In gizzards, many gravels and grasses were severely tangled; therefore, it produced a large mass that blocked digestive system of the storks. Small intestinal segments of the stork, which was dead after the fluid therapy, were severely adhesive. On histopathology, diffuse necroses with/without inflammation were examined in the liver, gizzard and intestine in all storks. Bile stasis was additionally examined in the liver. According to the results of the examinations, all storks were diagnosed as gizzard impaction caused by parorexia.

Key words : gizzard impaction, oriental white stork, *Ciconia boyciana*, parorexia.

Introduction

The oriental white stork (*Ciconia boyciana*) belongs to the family ciconiidae and the order ciconiiformes. This stork is listed as an endangered species on the Red List of Threatened Species of International Union for Conservation of Nature (IUCN) and has become also extinct as a permanent resident in South Korea. Since 1996, Korea Institute of Oriental White Stork Rehabilitation Research (KIOWSRR) is making an effort to reintroduce them as breeding birds in South Korea. Since 2004, Veterinary Medical Center of Chungbuk National University also participates in the project.

The avian stomach consists of proventriculus and ventriculus. The proventriculus is confluent with esophagus and acts mainly as storage. The ventriculus, also called gizzard, performs physical and chemical digestions. For physical digestion, the gizzard has thick muscle layers, especially in species that ingest hard foods such as granivores and insectivores (3). Also, avian may eat harden foreign materials for supporting the physical digestion. For chemical digestion, the digestive enzymes, which are secreted from gallbladder and pancreas, are flowed backward to gizzard by duodenal retroperistalsis (3).

This report describes the cases of gizzard impaction by excessive ingestion of foreign materials in captive oriental

white storks.

Cases

History of stork 1 and 2

Two dead cases of the storks (1 and 5 years old), which were bred in the KIOWSRR, were referred for necropsy. The storks were unexpectedly depressed and were died at once. Environment or food was not changed before onset of the symptoms.

Stork 3

A 10-year-old stork was referred with anorexia and depression. The patient was deteriorating rapidly in a short period of time. Environment or food was not changed before onset of the symptoms. On physical examination, the stork showed severe cachexia. A hard mass in the lower abdomen was palpated. Radiographic examination showed several foreign materials in the gizzard (Fig 1). Thus, gizzard impaction was suspected. The patient was treated with oral mineral oil for lubrication and intravenous crystalloid fluid (Hartman choongwae solution[®], Choong Wae Pharm, Korea) with 5% dextrose for nutritional supplement. However, the patient died on next day.

Necropsy

On palpation, all storks revealed a hard mass in lower abdomen. During necropsy, a little salmon-colored adipose

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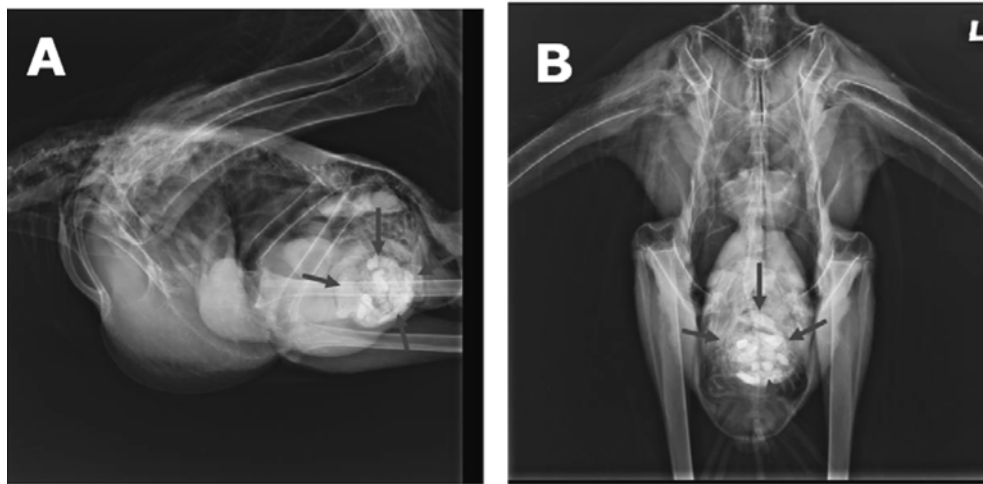


Fig 1. Representative radiographs of the foreign materials from the gizzards. (A) Right lateral view. Multiple radiopaque materials were seen in lower abdomen (arrows). (B) Ventro-dorsal view. Same materials were seen in lower abdomen (arrows).

tissue was observed in the storks. In abdominal cavity, severely expanded gizzard was examined in all storks. In gizzards, many ground grasses and gravels were severely tangled, therefore, it produced large masses. The pylorus was obstructed by the masses (Fig 2). The multiple focal necroses on the liver surface were also found. In the stork 3, cohesive small intestinal segments under the duodenum were additionally examined.

Histopathological examination

The livers of all storks contained an excessive amount of granular, yellow bile pigment. Ballooning degeneration and monocytic infiltrates were found in the parenchyma, and several necrotic bodies were distributed in the intercellular space (Fig 3). The walls of the gizzard and the intestine in the stork 3 revealed diffuse necrosis without inflammation.

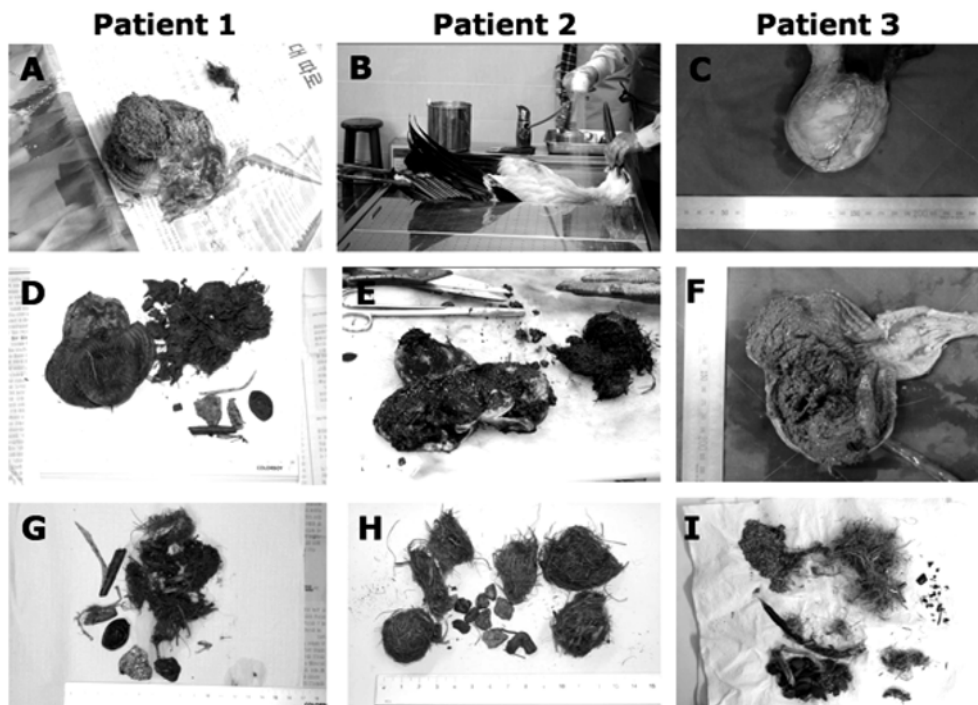


Fig 2. The photograph of the necropsy. (A, C) Severely expanded gizzards were seen. The gizzards were filled with gravels and grasses. (B) The photograph of stork 2 at the time of necropsy. (D-F) Tangled grasses and gravels produced large masses. A mudfish was additionally seen in stork 3. The masses blocked pylorus. The hyperemia and ecchymosis of wall were also examined. (G-I) Ground grasses, gravels and a mudfish from the gizzards of storks were seen after washing. These grasses and gravels were same with those on the ground of cage. In stork 3, sands were also examined.

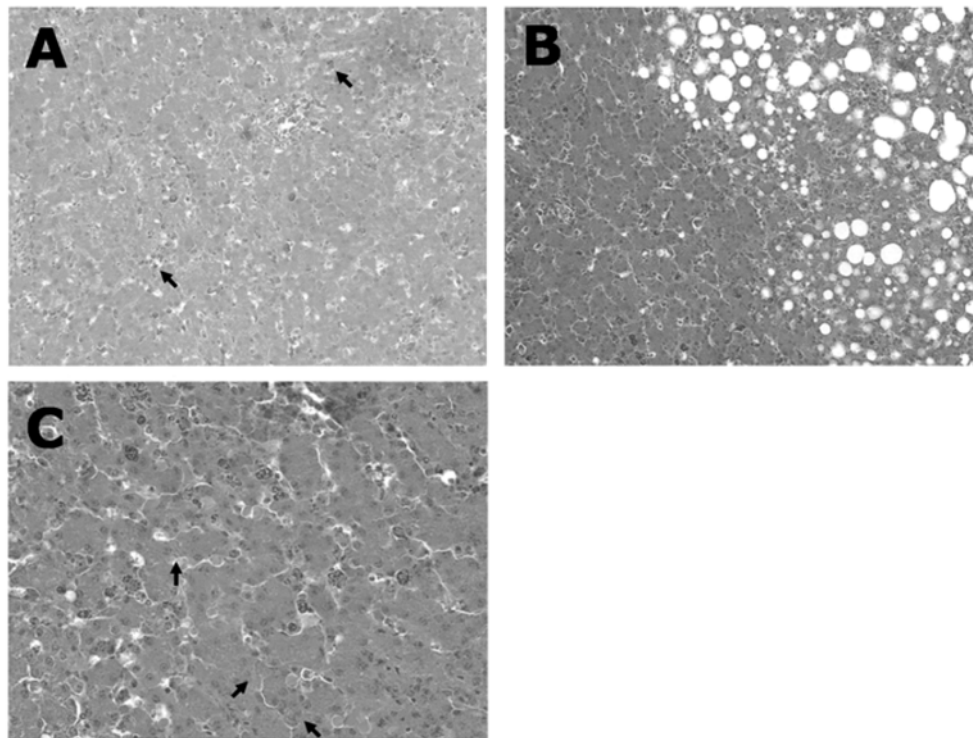


Fig 3. Representative histopathology of the liver. (A) Bile stasis is seen in intercellular spaces (arrow). H&E. $\times 100$. (B) Ballooning degeneration and monocytic inflammation in liver parenchyma are seen. H&E. $\times 100$. (C) Necrotic bodies are examined in intercellular spaces (arrow). H&E. $\times 200$.

Discussion

As normal behaviour, the avian species eat foreign materials for physical digestion. However, this habit can be abnormally altered in specific situations including excessive stressful circumstance, mental retardation and learning disability (1). Altered behaviour can be induced excessive ingestion of foreign materials and consequently, gastrointestinal obstruction may happen. Proventricular or ventricular impaction is commonly encountered in several species including ostrich, galliforms, waterfowl and captive psittacine (2,4,5). In addition, the occurrence of intussusception together with gizzard impaction has also been reported in great rhea, which was fed by excess fibers (4). In KIOWSRR, all storks were fed by fishes, chicks, and insects only. However, in necropsy, we found many gravels and grasses in the gizzards. The storks lived with their parent and learned the habit about food and wariness at infancy. After maturity, they were separated and lived alone. After the separation, the storks have been lived without any abnormal behaviour related to mental retardation or learning disability for a long time before the onset of the symptoms. Therefore, we guessed that some unnoticed factors presented in the breeding cage cause the impaction in all captive storks. Our interpretation was verified by identification of another captive storks' gizzard. Though the severity was variable, all storks showed mild to moderate

expansion of the gizzard. In KIOWSRR, limited kinds of grasses on the ground of the cage than natural state grew only and the storks ate these grasses with gravels as their normal behaviour. However, the grasses don't seem to be digested by storks' digestive enzyme and consequently, its accumulation seems to cause the impaction. It suggests that the creation of proper ground condition is very important for breeding of the storks besides the establishment of proper food, cage or mating condition.

Acknowledgement

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사육하는 황새에서 담즙정체를 동반한 사냥경색

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요 약 : 한국교원대학교 황새복원센터에서는 한국내 야생 황새 복원을 위해 인공적인 황새 사육을 진행 중이다. 세 마리의 황새가 식욕부진과 침울을 보여 충북대학교 동물의료센터에 진료 의뢰되었다. 두 마리는 내원 전 사망하였으며, 한 마리는 내원 후 수액요법을 실시하였으나 1일 후 사망하였다. 부검시 salmon-color의 피하 및 내장지방이 전체 황새에서 관찰되었다. 간 표면의 다발성 국소 괴사병소도 확인되었다. 근육위 내강에는 많은 양의 풀과 자갈이 뭉쳐져 큰 덩어리를 형성하고 있었으며, 유문부는 이것에 의해 폐색되어 있었다. 수액요법을 받은 황새의 소장 분절은 유착되어 있었다. 조직병리학적 검사상 염증을 동반하지 않은 괴사병변이 전체 황새의 간, 근육위, 장에서 관찰되었다. 간에서는 담즙정체도 관찰되었다. 이 검사 결과들에 기초하여 황새들은 이식증에 의한 사냥 경색증으로 최종 진단되었다.

주요어 : 사냥경색, 황새, *Ciconia boyciana*, 이식증.