

## Acute Gastric Dilatation in Rhesus (*Macaca mulatta*) and Cynomolgus (*Macaca fascicularis*) Monkeys

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(Accepted: July 28, 2008)

**Abstract :** Acute gastric dilatation (AGD), one of the common causes of emergency occurs in macaca monkeys that are accommodated as laboratory-housed nonhuman primates. This report introduces some cases of occurrence in raising primates. The primates revealed an acute gastric dilatation, including the histories that were trained by monkey chair, anesthetized for the study or intact case. The clinical signs were comatose condition with sever abdominal distension, dehydration, cyanosis and apnea. One case died by deterioration of systemic body condition and performed necropsy. The other cases recovered from the AGD by the emergency treatment using the gastric tube and fluid therapy. Necropsy revealed the huge stomach filled with water, gas and ingesta. This report suggests that etiologic factors of AGD may include non-specific factors like these cases, with special emphasis on the incidence and management of AGD in nonhuman primates.

**Key words :** acute gastric dilatation, emergency, gastric tube, nonhuman primate.

### Introduction

Acute gastric dilation (AGD) syndrome in nonhuman primates is a continuing enigma within the veterinary research community (1-5,7,8,10-14). It occurs in numerous species of nonhuman primate in captivity and with relative frequency as a sporadic disease in macaques (11-13). The impact of this syndrome on primates colonies and research institutions can be considerable, with mortality rates of 78% being reported (13). Therefore, this is an emergency case hard to handle and essential to observation all the time. The cause of acute gastric dilatation is unknown, but it probably has multifactor. For example, chronic drug administration, food restriction, accidental overfeeding, and prior anesthesia are included (11). It is difficult to diagnose in its early development. We report that non-specific factors may affect the occurrence of acute gastric dilatation in the nonhuman primates.

### Case 1

One rhesus monkey which has been reared at a laboratory institute of Japan was suffered from the acute gastric dilatation after the morning meal. Up to that time of daily health surveillance and cleaning the room in the morning, the primate was appeared normal body condition to animal caretaker. However, at 30 minutes after feeding a pellet, the

animal showed abnormal motion gradually. The clinical signs revealed suddenly diminishing activity and abdominal distention, dyspnea, and a hunched posture (Fig 1, 2). Abdominal palpation revealed severe inflation of the upper part of abdomen, so it was suspected of having an acute gastric dilatation and moved into the monkey chair. And then the animal was performed intubation of gastric tube and emptying of the stomach with gruel more than 260 ml (Fig 3). The most of ingesta seemed sloppy mixture of pellet food and a lot of water. During one hour of observation after abdominal distension reduced, the animal was getting back physical condition including activity and agility in the cage.

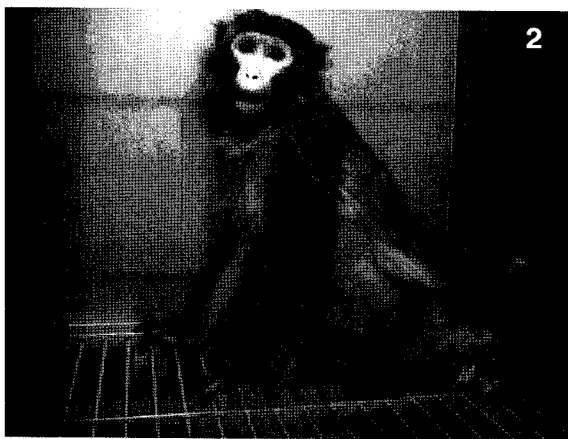
### Case 2

In the case of cynomolgus monkey, the animal just has been accumulated for the study in the individual cage, and sometimes, performed anesthetized with ketamine HCl 5mg/kg, IM (YUHAN Co., Korea) for the venipuncture. The animal occasionally showed mild distension of upper abdomen. There were no peculiar clinical signs except for mild abdominal distension compared to other primates. In this case, clinical sign was not severe and manual palpation of stomach was performed after gastric tube intubation. Consequently, some gastric fluid and gas was extracted from the stomach.

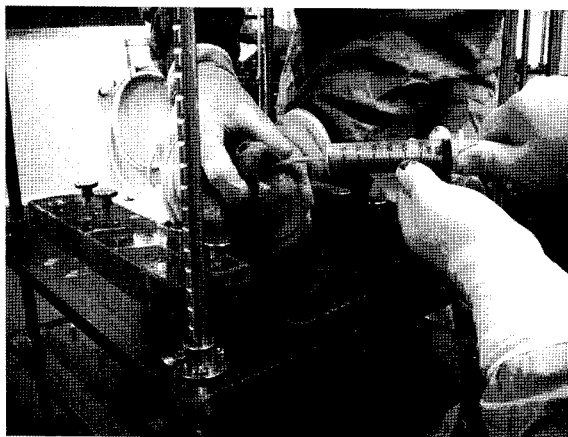
### Case 3

The third case was just trained by a monkey chair for a short-

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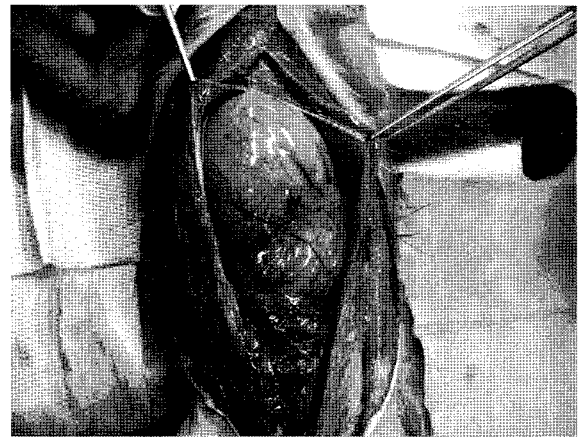


**Fig 1-2.** The monkey was suddenly decreased motility in the cage and presented abdominal distention and a hunched posture.



**Fig 3.** To reduce of gastric distension, the monkey seat in the chair and relieved gruel more than 260 ml by gastric intubation.

term, and then returned to the cage. Several hours later, the monkey fell into a coma with severe abdominal distension. The animal showed pallor and cyanosis of the mucosal membrane, respiratory distress and bradycardia and hypotemperature (32.5°C). At first, gastric tube intubation and emptying of gas-



**Fig 4.** An excessively distended stomach was showed in the abdomen. Congestion and hemorrhage revealed at the greater curvature and pylorus of stomach, omentum, small and larger intestine.

tric contents were performed. A fluid and prophylactic drugs were administered to correct the hypovolemic shock and acid-base imbalances. Cefazolin sodium (25 mg/kg, IM; Chong Kun Dang Pharm, Korea) was administered for anti-inflammation. However, in spite of medical treatment, the monkey was not recovered and died after all.

Therefore, this case was performed necropsy. In gross finding, the stomach was distended excessively with water and a little gas. The distended stomach occupying a great part of abdomen was huge enough to compress the caudal vena cava. Most of abdominal organ including the greater curvature and pylorus of stomach, omentum, small and large intestine revealed congestion and hemorrhage (Fig 4).

## Discussion

Acute gastric dilatation has been reported in man, dogs, horses, ruminants, pigs, cats, foxes, mink, captive wild carnivores, rabbits, nutria, guinea pigs, rats, and mice in addition to nonhuman primates (14). One of the common causes of emergency in nonhuman primates is gastric torsion and dilatation, also known as bloat, which can occur in all species, but is especially common in macaques and baboons (9). The sporadic nature, propensity to occur in apparently healthy monkeys, and high mortality rate combine to frustrate clinicians in managing the problem (6). Several reports of the syndrome in nonhuman primates have focused on *Clostridium perfringens* found in feed and gastric contents as a possible etiology (1,4,10). Unfortunately, in this report, microbiologic examination for the gastric contents was not performed. Therefore, it was not certain whether gastric distension occurred by gas production of *Clostridium perfringens*. According to the report, AGD has implicated alteration of feeding schedules and gluttony as causative factors (4,10). Although these factors may be a role in reducing the gastric motility, it should not overlook fundamental causes as insuf-

ficient exercise, extreme tension and anxiety. In these cases, there was no overfeeding after food restriction or chronic drug administration for study. The causative factors in these cases were just visit of stranger for observation or short-term restrain by a monkey chair. If so, this result suggests that the only circumstance feeling restlessness could be occur an acute gastric dilatation in the laboratory nonhuman primates.

The acute gastric dilatation in this report occurred after feeding or simple training. Although its causes are various, it seems that the monkey's greedy and sensitive characters are increasing potential occurrence of this AGD. In other words, the psychologic factor may be a role in prevalence of AGD. The important thing is the time that it happens to the animals. It usually occur at night or after observer get out their room. Therefore, it is important that continuous observation for the sensitive or suspected animals to prevent a life-threatening accident.

### Acknowledgments

We would like to thank the Korea Institute of Toxicology in Korea and HAMRI Company in Japan for the case experience.

### References

1. Bennett BT, Cuasay L, Welsh TJ, Beluhan FZ, Schofield L. Acute gastric dilatation in monkeys: A microbiologic study of gastric contents, blood, and feed. *Lab Anim Sci* 1980; 30: 241-244.
2. Boyce L, Miller C. Acute gastric dilatation with herniation in a rhesus monkey. *Vet Med Small Anim Clin* 1980;75: 130-131.
3. Chapman WL. Acute gastric dilatation in *Macaca mulatta* and *Macaca speciosa* monkeys. *Lab Anim Care* 1967; 130-136.
4. Christie RJ, King RE. Acute gastric dilatation and rupt in *Macaca arctoides* associated with *Clostridium p fringens*. *J MedPrimatol* 1981; 10: 262-264.
5. Elwell MR, Depaoli A. Gastric dilatation and volvulus in squirrel monkey. *J Am Vet Med Assoc* 1978; 173: 1235-1236
6. Fanton JW, Cosgrove DJ, Golden JG. Gastrin levels & gastric emptying times in rhesus monkeys with a history acute gastric dilatation. *J Med Primatol* 1995; 24: 243-245
7. Holmberg CA, Leininger R, Wheeldon E, Slater Henrickson R, Anderson J. Clinicopathologic studies gastrointestinal disease in macaques. *Vet Pathol* 1982; 163-170.
8. Kim JCS, Abee CR, WolfRH. Acute gastric dilatation & rickets in a pet spider monkey. *Vet Med Small Anim C* 1978; 73: 1303-1306.
9. Mahoney J. Medical care. In: *The Laboratory Primate*. ed. Oxford: Elsevier Academic Press. 2005: 255.
10. Newton WM, Beamer PD, Rhoaders HE. Acutebloat syndro in stumptailed macaques: a report of four cases. *Lab An Sci* 1971; 21: 193-196.
11. Pond CL, Newcomer CE, Anver MR. Acute gastric dilatation in nonhuman primates: Review and case studies. *Vet Pat* 1982; 19: 126-133.
12. Smith AW, Casey HW, Lacroix JT, Johnson DK. Ac bloat syndrome in *Macaca mulatta*. *J Am Vet Med As* 1969; 155: 1241-1244.
13. Soave OA. Observations on acute gastric dilatation in nonhun primates. *Lab Anim Sci* 1978; 28: 331-334.
14. Van Kruiningen HJ, Gregoire K, Meuten DJ. Acute gast dilatation: a review of comparative aspects, by species, and study in dogs and monkeys. *J Am Anim Hosp Assoc* 19 10: 294-324.

## Rhesus 및 *Cynomolgus* 원숭이에서 급성위확장 증례

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**요 약** : 급성 위확장은 실험시설에서 사육되고 있는 *Macaca* 원숭이에서 가장 흔하게 발생하는 응급상황 중에 하나이다. 이 보고서는 사육 원숭이에서 발생한 몇몇 증례를 소개하고자 한다. 급성 위확장증을 보인 원숭이들에게는 실험을 위해 원숭이 보정의자에 앉힌 경우나 마취를 한 경우, 그리고 아무런 처치도 하지 않은 경우 등이 있었다. 이환된 동물들은 심한 복부팽만, 탈수, 청색증과 호흡곤란 등을 동반한 혼수 상태를 보였다. 한 증례는 전신장애로 인해 상태가 악화되고 폐사하여 부검을 실시하였다. 나머지 두 증례는 위관과 수액요법으로 응급처치를 한 결과 병중에서 회복되었다. 부검결과, 위의 대부분은 위내 가스과 물 그리고 섭취물로 채워져 있었다. 이 보고서는 영장류에서 급성위확장증의 발생과 관리에 대한 특별한 강조와 더불어 본 질환이 비 특이적인 원인에 의해 발생할 수도 있음을 시사한다.

**주요어** : 급성위확장증, 응급, 위관, 영장류