Unusual Vesical Calculus in Rhesus Monkey (Macaca mulatta)

1,2Hong Wang, 1,2Wei Si, 1,2Yuyu Niu, 2Lixian Chen and 1,2Ye Yan
1Kunming Institute of Zoology, Chinese Academy of Sciences, 650223 Kunming, P.R. China
2Kunming Biomed International and Yunnan Key Lab of Nonhuman Primate Biomedicine, 650550 Kunming, P.R. China

Abstract: Several cases of urinary calculi have been reported in cynomolgus monkeys but vesical calculi were not reported in rhesus monkeys. The adult male rhesus monkey (Macaca mulatta) presented here had a vesical calculi which was entire urate.

Key words: Vesical calculus, histopathology, rhesus monkey, urinary calculi, cynomolgus monkey

INTRODUCTION

Vesical calculi appear to be definitely associated with obstruction of bladder neck contracture, prostatic enlargement and stricture of urethra, diverticulum of the bladder or recurrent lower urinary tract infection (Adsan et al., 1996; Gurdal et al., 2003). Several cases of urinary calculi have been reported in cynomolgus monkeys (O’Rourke et al., 1995; Renland et al., 1986; Stephens et al., 1979) but vesical calculi were not reported in rhesus monkeys. In this study, researchers present an entire uric acid calculi in bladder in an adult male rhesus monkey.

MATERIALS AND METHODS

An 8 years old male rhesus monkey was bred in colony facility in Kunming Biomed International accredited by Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC). The animal was bred in a same shielding house with other rhesus monkeys. The animals were fed a monkey chow that contained 23.2% crude protein, 5.6% crude fat, 3.1% crude fiber, 1.2% calcium and 0.75% phosphorus. They were supplied with monkey chow twice a day and fresh fruits or vegetables including apples, bananas, oranges, cabbage and pears daily.

All of the animals were free to get water via an automated system. The animal had no previous medical problem and was negative for Herpes B virus and tuberculosis tests confirmed by the routine annual body examination. The animal was never involved in any experiment. On October 25, 2011 the animal was anorectic, unanimated, fleshless, hypothermic and inactive. Considering the poor condition of the animal, it was euthanized at that time by 100 mg kg⁻¹ sodium pentobarbital solution. Necropsy was performed subsequently and sections from liver, spleen, kidney and bladder tissue were submitted for histopathological analysis. The liver, spleen, kidney and bladder tissue collected from this monkey were fixed in 10% neutral buffer formalin, embedded in paraffin and prepared microscopic sections in diameter 5 μm, routinely processed for histopathology. All the sections were stained with haematoxylin and eosin. The tissue slides were observed by microscope (Leica DM2500M).

RESULTS AND DISCUSSION

The calculus located in the bottom of the bladder and was easily removed from the bladder (Fig. 1a). Bladder outlet was obstructed by the calculus. The alone calculus was elliptical with 5.23 g weight and 2.1×1.8×1.5 cm² in size. The surface of the calculus was regular and yellowish colour (Fig. 1b). Chemical analysis of the calculus was composed of entirely urate. There is no urine in the bladder but a large area of hemorrhages was observed in the bladder wall. The bladder was significant erosions, erythema and edema (Fig. 1c).

No obvious pathological changes of the liver, spleen and kidney were observed. The wall of the bladder was diffusely thickened due to the epithelial hyperplasia. Plentiful desquamated epitheliums were observed from the bladder mucosal (Fig. 2a and b) and numerous polymorphonuclear neutrophil were observed filling bladder mucosal (Fig. 2c).

Corresponding Author: Hong Wang, Kunming Institute of Zoology, Chinese Academy of Sciences, 650223 Kunming, P.R. China
Vesical calculi have been reported in cynomolgus monkeys (O’Rourke et al., 1995; Renlund et al., 1986; Stephens et al., 1979). Furthermore, a lot of vesical calculi cases have been reported in human being (Benkaddour et al., 2006; Gurdal et al., 2003; Koide et al., 1982; Mustafa and Wadie, 2007; Segarra et al., 2001; Seth et al., 2002; Washington et al., 2008). Many reasons can cause calculi formation in animal bodies. Vesical calculus appears to be definitely associated with obstruction of bladder neck contracture, prostatic enlargement, stricture of the urethra or diverticulum of the bladder (Adsan et al., 1996).

In the presented case, researchers presume that supersaturated urine leads to nucleation and subsequent growth of crystals which obstructed the bladder outlet of the rhesus monkey and the bladder outlet obstruction further deteriorated the inflammatory response.

Meanwhile due to bladder outlet obstruction, calculi and inflammatory cell were interactional to aggravate the calculi symptom, the bladder inflammation and the urinary infection. This case revealed that the vesical calculus is composed of urate. Previous reports revealed that the composition of bladder calculi were calcium carbonate or oxalates, phosphates, carbonates, ammonium salts, magnesium and calcium (Faltas, 2000; Stephens et al., 1979). The most common type of vesical calculus in adult humans is composed of uric acid. Less frequently, bladder calculi are composed of calcium oxalate, calcium phosphate, ammonium urate, cysteine or magnesium ammonium phosphate (Douenias et al., 1991; Hammad et al., 2006). Pediatric calculi are composed mainly of ammonium acid urate, calcium oxalate or an impure mixture of ammonium acid urate and calcium oxalate with calcium phosphate (Kamoun et al., 1999).

CONCLUSION

The adult male rhesus monkey presented here had a vesical calculus which was entirely composed of urate.
The alone calculus was elliptical with 5.23 g weight and 2.1 x 1.8 x 1.5 cm² in size, the surface of the calculus was regular and yellowish colour. Meanwhile, there are no urine in the bladder and large areas of hemorrhages in the bladder wall. The bladder was significant erosions, erythema and edema.

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REFERENCES


