

Case report

# Lumbar discectomy in a human-habituated mountain gorilla (*Gorilla beringei beringei*)

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## Abstract

The authors report a case of a human-habituated mountain gorilla, Alvila, resident at the San Diego Zoo, who was found to have a herniated intervertebral lumbar disc after being attacked by the gorilla troop's silverback male gorilla. Ultimately, the gorilla required surgical intervention for her disease and made a full recovery. To our knowledge, this is the only known case of spine surgery. A 36-year-old female human-habituated mountain gorilla (*Gorilla beringei beringei*), resident at the San Diego Zoo, was noticed by caregivers to walk with a substantial limp after being attacked by the gorilla troop's silverback male gorilla. Magnetic resonance (MR) imaging of her lumbar spine revealed a large herniated disk at the L1-2 level on the right. This finding appeared to correlate well with the gorilla's symptoms. The gorilla underwent a lumbar discectomy under loupe. Post-operatively the gorilla did very well. The right leg weakness was immediately improved post-operatively. The gorilla continued to "crutch walk" initially, swinging on the upper extremities and not bearing weight on the lowers. However, by 2 weeks the limp was no longer noticeable to the zoo caregivers. The wound healed well and there was no evidence of wound infection or CSF leak. The gorilla was reunited with her troop and has reintegrated well socially. With 10 months of follow-up, the gorilla continues to do well. This is the only known case of spine surgery in a gorilla. For best surgical results, one needs to consider the similarities and differences between the gorilla and human vertebral anatomy. We believe that careful pre-operative planning contributed to the good early post-operative result. Ultimate assessment of the long-term outcome will require additional follow-up.

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## 1. Introduction

The mountain gorilla is the largest of the extant primates, a group that includes monkeys, lemurs, orangutans, chimpanzees, and humans. An adult male gorilla can grow to approximately 170 cm in body length and females can grow to approximately 150 cm in body length. The male gorilla weighs 300–500 pounds (136–227 kg) while the female weighs 150–200 pounds (68–91 kg). Life expectancy

is about 35 years in the wild and up to 50 years among human-habituated animals [4]. Gorillas are peaceful, family-oriented, and plant-eating animals (Table 1).

Gorillas are quadrupedal and ambulate most of the time in a stooped position using their knuckles to support part of their weight. Along with chimpanzees, they are the only animals able to "knuckle walk". In this posture, the gorilla's back and spine is in an almost horizontal plane parallel to the ground. As such, it is very unusual for a gorilla to develop degenerative disc disease since their intervertebral discs are not subjected to as much compressive force as the bipedal human vertebral spine. In addition, the gorilla's spinal musculature is substantial compared to humans, further reducing

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Table 1  
General information about african mountain gorilla (*Gorilla beringei beringei*)

Class	Mammalia
Order	Primates
Family	Hominidae
Genus	<i>Gorilla</i>
Species	<i>Gorilla beringei</i> (eastern gorilla)
Subspecies	<i>Gorilla beringei beringei</i> (mountain gorilla)
Height	Male 170 cm in body length, female 150 cm
Weight	Male 300–500 pounds (136–227 kg), female 150–200 pounds (68–91 kg)
Life expectancy	35 years in the wild, up to 50 years in zoos
Gestation	8.3–9 months
Number of young at birth	1, rarely 2
Size at birth	4–5 pounds (1.8–2.3 kg)
Age of maturity	13 years for male, 10 years for female
Range	African continent only, mainly along the equator
Habitat	<i>Gorilla beringei</i> live higher in the rain forests, mountain slopes, and bamboo forests

the force sustained by the vertebrae and intervertebral discs [6].

We report a case of a human-habituated mountain gorilla, Alvila, resident at the San Diego Zoo, who was found to have a herniated intervertebral lumbar disc after being attacked by the gorilla troop's silverback male gorilla. Alvila was the first gorilla born at the San Diego Zoo. Four generations of her family still reside at the San Diego Zoo and the San Diego Wild Animal Park. Ultimately, Alvila required surgical intervention for her disease.

## 2. Case report

A 36-year-old female human-habituated mountain gorilla (*Gorilla beringei beringei*), resident at the San Diego Zoo, was noticed by caregivers to walk with a substantial limp after being attacked by the gorilla troop's silverback male gorilla. Upon further examination, it appeared that the animal suffered from right proximal lower extremity weakness. The caregivers noted the limp and, as a result, the overall decreased physical activity of the gorilla. Symptoms persisted for several weeks without improvement after which time the gorilla underwent barbiturate sedation and examination and testing. In addition to routine phlebotomy testing and dental examination, the gorilla underwent plain radiograph imaging of her spine (Fig. 1) as well as magnetic resonance (MR) imaging of her lumbar spine. The gorilla was found to have a large herniated disk at the L1-2 level on the right (Figs. 2 and 3). This finding appeared to correlate well with the gorilla's symptoms and, as such, the gorilla was prepared for surgery.

At operation, endotracheal intubation was performed and general anesthesia induced after the gorilla was sedated with barbiturates. A left femoral central venous line was placed. The gorilla was positioned prone on an adjustable radiolucent



Fig. 1. Anterior–posterior (AP) plain radiograph of the lumbar spine in the gorilla. Note there are only 4 lumbar vertebrae. At this level the size of the vertebrae are very similar to human vertebrae.

Kambin frame, which placed the spine into relative kyphosis (Fig. 4). The hip portion of the frame was narrowed and the chest portion widened to accommodate the gorilla's frame. A localizing plain lateral radiograph was obtained with a spinal needle in place in order to identify the operative level. The skin of the dorsal thoracolumbar area was shaved, prepped with Betadine, and draped in a sterile fashion. A linear incision was made with a 10-blade scalpel through the skin. The subcutaneous layers were divided with Bovie electrocautery (Fig. 5). Dissection was carried out through the subcutaneous fat down to the thoracolumbar dorsal fascia. The spinous processes were palpated. A subperiosteal dissection of the paraspinal musculature was carried out along the L1 and L2 spinous processes on the right, exposing the right facet joint. The spinal canal was narrow at this level. In order to access the disk space, a high-speed pneumatic drill was used to remove the inferior portion of the L1 lamina, the facet, and the superior portion of L2. The bone was noted to be hard and thicker than expected. The dissection spared the spinous process, the interspinous ligaments, and the entire facet complex

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