

CHAPTER 13

REVISION OF A TOTAL HIP REPLACEMENT IN A SNOW LEOPARD

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In August 1983, Cheyenne (CHEYENNE 81, an eight-year old male snow leopard underwent surgery for a total hip replacement on the left side (Paul et al., 1985). Surgery was performed as treatment for severe bilateral hip dysplasia which interfered with this leopard's ability to breed (Leninger, 1983).

Cheyenne, a captive born snow leopard, arrived at the Calgary Zoo in 1976 at eighteen months of age. He was introduced to the female Irlna (SEATTLE 8) in 1978, and the pair were compatible, but no breeding was observed during subsequent years.

In May 1983, Cheyenne developed a left hind leg lameness. Radiographs which were taken indicated bilateral hip dysplasia. Since clinically the cat showed signs of left hind leg lameness, and bone fragments were visualized radiographically in the left joint, the surgery was performed on the left side. The hip replacement which was used consisted of a femoral component made of vitallium and a socket made of a high molecular weight polyethylene which were anchored in place using bone cement. Cheyenne recovered from the surgery and was walking normally within four weeks. Breeding occurred during January 1984, and one female cub was born in the spring. Two further litters have been born since that time.

Beginning in January 1986, shortly after breeding season, Cheyenne again showed an intermittent left hind lameness. Radiographs taken in April 1986 showed the development of radiolucency around the acetabular implant. The cement which had been used to anchor the implant in position had crumbled allowing loosening of the artificial acetabulum.

The acetabular implant needed to be replaced, and a new one was provided by Techmedica, Inc. of California. Radiographs of the snow leopard's pelvis as well as the femoral head which had been removed during the August 1983 surgery were forwarded to Techmedica, and a custom designed acetabular implant made of titanium, a lightweight but durable metal, was produced. The new implant which was computer designed and manufactured specifically for this snow leopard, utilized bone ingrowth technology. The implant design included several mesh areas on the bone-facing surface to allow bone to grow into the implant and anchor it in place without the use of bone cement. Bone screws would hold the implant in place until the bone had a chance to grow into the socket. Once the titanium implant was in place, a polyethylene liner would be snapped into position.

On May 3, 1986, the 45 kg snow leopard was anesthetized with 700 mg. of ketamine delivered intramuscularly via blowdart. When the cat was recumbant, he was placed on 1.5% Isoflurane via a face mask until his jaw tone was relaxed enough to allow endotracheal intubation.

During the initial gas anesthesia period, the cat became severely hypotensive. The anesthetic gas was turned off. Following intubation and 100% oxygen therapy, the snow leopard's blood pressure returned to normal, and he remained stable for the duration of the seven hour procedure. Blood gases were taken hourly, and the results showed a persistent hypocapnia.

A craniolateral approach to the hip was made, and the previous acetabular implant was exposed and removed. Also, all detectable bone

cement was removed. After removal of the implant severe bone loss, particularly of the dorsal rim of the acetabulum, was noted. The loss of bone presented problems with the placement of the new implant. There was only enough bone present to support the placement of four of the five stabilizing screws into acetabular bone. When the liner was snapped in and the femoral component was positioned, the artificial Joint was not particularly stable, and joint dislocation became a possible complication. Recovery from anesthesia was uneventful.

Cultures taken from the hip Joint during surgery yielded moderate growth of *Staphylococcus epidermidis*, and based on the sensitivity results, the cat was begun on a course of one gram of cephalosporin T.I.D. For the first twenty-four hours after surgery the medication was given intramuscularly and thereafter was given orally with food.

Within three days of surgery the leopard's hip had dislocated.

A second liner was designed providing much more dorsal support, and this was placed during a surgery on May 10, 1986. Anesthesia for this surgery proceeded uneventfully. The snow leopard was hypocapnic throughout the procedure. The Joint was entered via the previous approach, and the new liner was placed. The cat's recovery from the second surgery was rapid. Cultures taken from the hip joint during the second surgery yielded *S. epidermidis* and *Pseudomonas maltophilia*. Based on sensitivity results, the antibiotic treatment was changed to 960 mg. of trimethoprim-sulfa twice daily for six weeks. Within two months Cheyenne was walking and jumping easily around his enclosure.

CONCLUSIONS

Revision of a total hip replacement is necessary in a high percentage of human patients who are particularly active. Excessive physical activity is recognized as a major factor in loosening of an Implant (Hayes et al., 1979). The leaping, jumping and climbing activities of snow leopard place unusual stress on the hip joint, and eventual breakdown of a cemented implant, as occurred in this case, is not unexpected. Revision of the hip replacement using bone Ingrowth technology should help to eliminate this problem.

Hip dysplasia is a rare problem in domestic felids but has become a recognized problem in captive snow leopards (Paul et al., 1985; Karkkainen et al., 1984). Total hip replacement surgery now presents a treatment for this disease.

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