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Stability of Fractured End of Femur in Young Dogs Affecting the Status of the Hip Joints Using Intra-Medullary Pinning

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Abstract: In the study, ten dogs were sourced from two litters and were randomly assorted into three experimental groups. The intra-medullary pinning of the femur of the young dogs was evaluated to know the status of the hip joints. Fractures were created on the femur of the experimental dogs and attempts were made to appose or align then using the retrograding and normo-grading techniques. Results showed that retrograding techniques with multiple intra-medullary pinning provided stability to the corrected fractured limb. The frequent follow up evaluations of the radiographic status of the hip and bones in managing femoral fracture repair by the intra-medullary pin fixation in young dogs was performed to determine when it is soonest and best to remove these pins.

Key word: Intra-medullary Pins · Femur · Hip Joint · Dogs · Status

INTRODUCTION

Intra-medullary bone pinning has become a very popular method of bone fracture repairs among clinicians all over the world since after the Second World War. It has an edge over other methods of repair because it is the most economical, the least laborious and can be applied, in some cases without opening through the entire tissues. It is a well-accepted common technique for repairing femoral fractures [1-4].

The effect of intra-medullary pinning on the status of hip joints in young dogs is necessitated by the fact that cases of femoral fractures are very common when there are more cars on the streets and more people are becoming interested in keeping dogs, either as watchdogs or as pets.

In Nigeria, many dog owners prefer to leave their dogs to move about the streets and come back home later in the day. The practice of chaining a dog down throughout the day does not appear humane to average Nigerian. Dogs are therefore more prone to automobile accidents, in such accidents; the pelvic limbs are more exposed to fracture because it is the pelvic limb, most of the time that is too late to escape the accidents. When a dog suddenly sees a car close to it, an attempt is made to escape, where the car is too close, the forelimb, head and the loin area escape leaving the hind limb which is then hit by the car, leaving the dog with either a fracture of dislocation depending on the impact of the collision [3, 5].

Since intra-medullary pin fixation has been recognized as the most economical method of reduction, because there had been reported cases of hip luxation following intra-medullary pinning in young growing dogs, it is pertinent to examine the possible effect or complications of intra-medullary pins on the coxo-femoral joint in puppies. In accordance with Wolff's law, the advantages of intra-medullary pin fixation include economic, faster, with decreased surgical exposure, easy implant-removal and minimal stress with protection of the bones to avoid loss of bone strength [3, 6]. This work aimed to highlight the effect of intra-medullary pin fixation method of repair particularly in young dogs.

MATERIALS AND METHODS

Animals: Ten mongrel breeds of dogs of average weight of twenty two kilogram body weight from two litters were acquired at six weeks old and kept in experimental animal kennels for another six weeks before commencement of experiment. Animals were supplied by their requirement of

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dogs feed formulation. The dogs were randomly assorted into three experimental groups, Group 1 contain four dogs that undergone Normograde Technique. Group 2 contain four dogs that undergone Retrograde Technique, while the control group contain two dogs with no consideration for sex.

A preoperative radiographic evaluation of the hip joints and femurs of experimental animals were carried out under general anesthesia. The epiphyseal growth plates were still open showing that the animals were still young and that the bones were still undergoing longitudinal growth.

Ethical approval on the care and use of animals was sourced from the ACUREC from Department of Veterinary Surgery and Reproduction, University of Ibadan, Nigeria.

Surgical Procedures: After the animals have been anesthetized using general anesthetic drugs using preanesthetic (Midazolam) and anesthetic (Ketamin-Xylazine), under aseptic preparation.

Fracture was created in the long bone used (left femur) using gigli wire, after opening through the skin with a longitudinal incision from the trochanter area to the condylar area anteriolaterally, then cut through the tensor fascia lata longitudinally and by retracting the belly of the vastus lateralis muscle and rectus femoris anteriorly and posteriorly respectively, The gigli wire is passed underneath the shaft of the bone and applying alternatively left and right pull on the wire against the bone from below, the shaft is sectioned transversely, the pins were inserted into the medullary cavity of the femur using the two techniques of pin placement. i.e.

Retrograding and Normograding Techniques: The pins were removed 28 days later. The other leg of individual animal in this experiment serves as its own control, since only one hind leg is treated, the other serves as a basis for comparison between the two legs in the radiograph.

Post-Operative Radiographic Evaluation: This was carried out for all dogs, including the non-operated controls after 52 days of operation. The ventro-dorsal view of the hip area was obtained for all the dogs. All the dogs involved in this experiment were kept as two dogs in each kennel within the same premise; Movements of the dogs were thus restricted with daily exercise during the course of feeding and cleaning the kennels. The exercise was by way of escaping into the small yard while cleaning was going on in the kennel and running round for a while before going back into the kennel for feeding. The runs were spacious enough for adequate exercise.

RESULTS AND DISCUSSION

All the operated animals did not show any evidence of sub-luxation in the hip joint of the treated limb while the opposite limb remained normal in the radiograph. It is therefore expected that the joint might proceed to complete luxation later in life; an observation which time does not permit to have. Evident from the radiographs, the changes in varying degrees were reduction in the size of the femoral head, narrowing of the neck, changes in angulation between the femoral head and the femoral shaft and rarely a faction of the femoral head.

Of all the complications generally was associated with the intra-medullary pins (i.e. Osteomyelitis, pin migration, threaded screw breakage, nonunion, mal-union, joint stiffness and sciatic nerve damage). Only, pin migration seemed associated with this experiment in two of the operated dogs.

Fig. 1: Radiograph of normal hip of a young control dog

Fig. 2: Radiograph of the hip of a young dog after intra-medullary pinning by normo-grade technique.

Fig. 3: Radiograph of the hip of a young dog after intra-medullary pinning by retrograde technique.

The results of this experiment confirm the report by Bojrab and Monnet [7] that, femoral pinning of diaphyseal femoral fractures in young dogs appear to alter the coxo-femoral joint. It has been proven, however, in this experiment that, it is neither the presence of fracture nor the position of the fracture in the femur that is important in producing these alterations, rather it is the presence of the intra-medullary pin in the femur, whether it is there to fix epiphyseal fracture, capital fractures, femoral neck fractures, femoral shaft fractures, supracondylar fractures, intercondylar fractures or no fracture at all. In the series of dogs in which the normograde techniques were used, no fractures were created, yet they produced the same result. Since these alterations have only been observed in young dogs, the suggestion of Fox [8] that the proximal exit of the pins through the femoral head markedly enhanced coxo-femoral luxation by inducing alterations in the development of the femoral head and neck is supported. The exit of the pins in the proximal end of the bone constitutes impedance to the epiphyseal growth plate hence the anatomical bony alterations. The gluteal muscle atrophy referred to by Black and Withrow [9] and the quadriceps contracture referred [6] are likely to be the effects of the alterations rather than the cause.

Once these anatomical bony alterations have been produced in a dog, it is doubtful that the aggressive regimen of physical therapy recommended by Fox [8] would be able to reverse these bony changes even when the quadriceps contracture has been reversed. The most acceptable suggestion of that author [8] therefore is that pins should be removed as soon as possible.

RECOMMENDATION/CONCLUSION

Veterinary surgeons should frequently evaluate the radiographic status of the hip and bones in managing femoral fractures repaired by intra-medullary pin fixation in young dogs as recommended for determining when it is soonest and besting time to remove the pins.

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