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Stability of fractured end of femur in young dogs affecting the status of the hip joints using intramedullary pinning

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Abstract

In the study 10 dogs were sourced from 2 litters, and were randomly assorted into 3 experimental groups. The intramedullary pinning of the femur of the young dogs were evaluated to know the status of the hip joints. Fractures were created on the femur of the experimental dogs and attempts were made to oppose or align then using the retrograding and normograting techniques. It showed that retrograding techniques with multiple intramedullary pinning provide stability to the corrected fractured limb, and frequent evaluation of the radiographic status of the hip and bones in managing femoral fracture repair by intramedullary pin fixation in young dogs to determine when it is soonest and best to remove the pins.

Key Words: *Intramedullary pins. Femur. Hip joint. dogs. Status.*

Introduction

Intramedullary 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. The subject has been reviewed by several authors viz: [1] [2] [3] [4].

This work on effect of intramedullary pinning on the status of hip joints of 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 or dislocation depending on the impact of the collision. This fact is supported by [3] [5].

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

Material and Method

Included in this survey were the 10 dogs from 2 litters, acquired at 6 weeks and kept in experimental animal kennels for 6 weeks before commencement of experiment. Fed on dogs feed formulation.

The dogs were randomly assorted into 3 experimental groups, and 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.

(b) 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 rectors 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 from the dogs on day 28.

(c) Control: The 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.

(d) Post-Operative Radiographic Evaluation: This was carried out in all the dogs, including the non-operated ones after 52 days of operation. The ventrodorsal view of the hip area was obtained for all the dogs.

(e) All the dogs involved in this experiment were kept in kennels within the same premise, 2 dogs in each kennel. 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 to feed. The runs were spacious enough for adequate exercise.

Result and Discussion

All the operated animals did not show any evidence of subluxation 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.

The following changes were evident from the radiographs in varying degrees, they are: reduction in the size of the femoral head, narrowing of the neck, changes in angulation between the femoral head and the femoral shaft, rare faction of the femoral head.

Of all the complications generally associated with intramedullary pins, (i.e. Osteomyelitis, pin migration, threaded screw breakage, nonunion, mal-union, joint stiffness, and sciatic nerve damage) only pin migration can be associated with this experiment. This was shown in only two of the dogs operated.

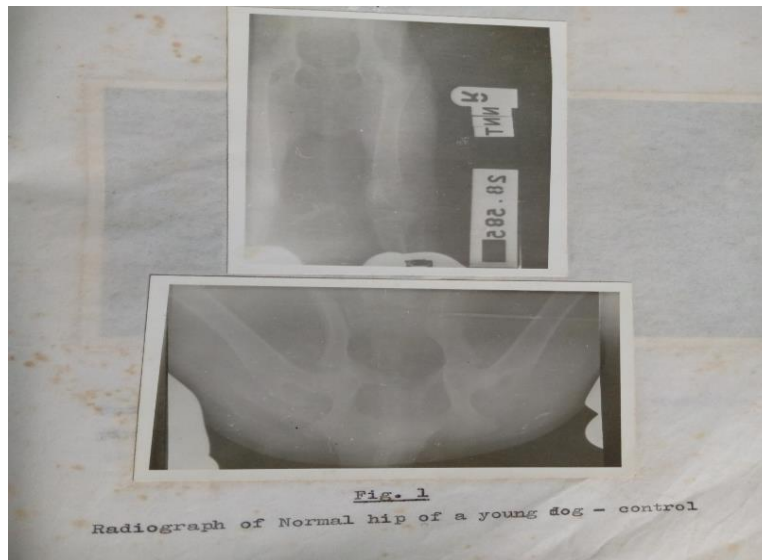


Fig 1: Radiograph of Normal hip of a young dog- control

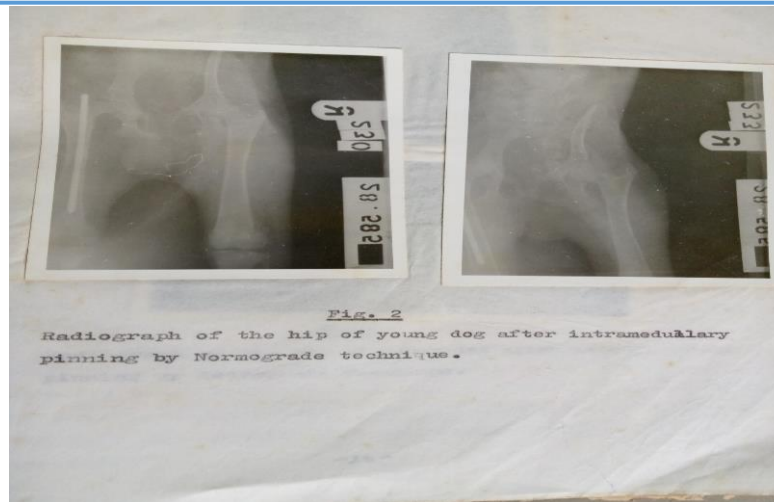


Fig. 2: Radiograph of the hip of a young dog after intramedullary pinning by normograde technique.

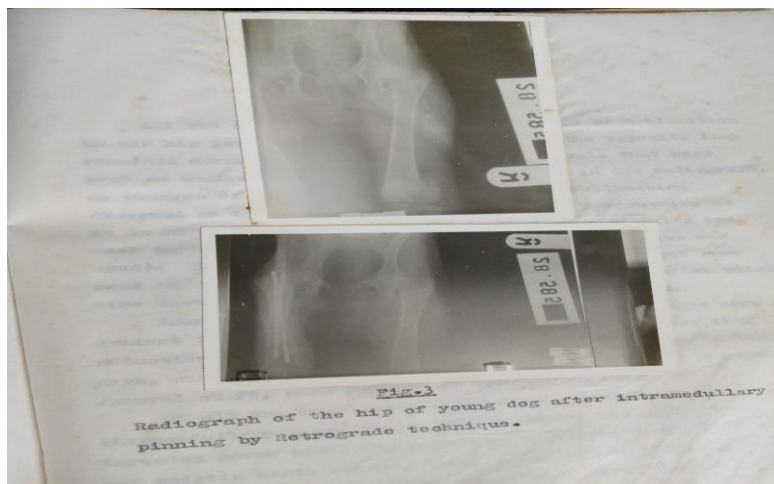


Fig. 3: Radiograph of the hip of a young dog after intramedullary pinning by retrograde technique.

The results of this experiment confirm the report by [7] that, femoral pinning of diaphyseal femoral fractures in young dogs appear to alter the coxofemoral 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 intramedullary 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 [8] that the proximal exit of the pins through the femoral head markedly enhanced coxofemoral 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 [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 [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 intramedullary pin fixation in young dogs as recommended by (Fox et.al.) determining when it is soonest and besting to remove the pins.

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