Surgical Technique for Knee Osteoarthritis Induction in New Zealand White Rabbits

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INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease that affects both humans and animals. It is characterized by the progressive deterioration of the cartilage an underlying bone. Surgical techniques are often used in animal models of OA to study the disease progression.

OBJECTIVES

The purpose of this study is to identify the surgical technique for knee osteoarthritis induction in New Zealand White Rabbits.

METHODOLOGY

Thirty-three New Zealand White rabbits (NZWR) weighing about 2.5 kg to 3.5 kg were chosen. Both foreleg knee joints were destabilized by anterior cruciate ligament transection (ACLT). Subsequently, medial and lateral partial meniscectomy and scraping both cartilage of tibial condyles was done.

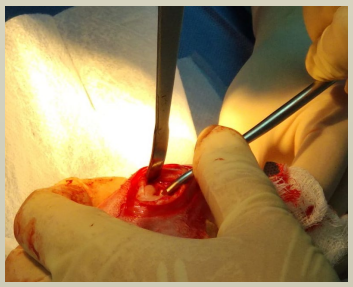

Figure 1: *The cartilage of tibial condyle was scraped by using periosteum.*

RESULTS

Osteoarthritis induction was successfully created in all 33 rabbits, evidenced by radiograph as early as 3 weeks. Radiographic images at 6 and 12 weeks showed consistent progression to moderate and severe osteoarthritis. Post surgical survival rate was 100%.

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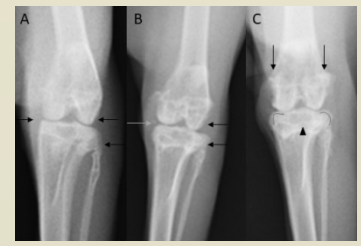

Figure 2: *Progression from mild to marked osteoarthritis at 3, 6 and 12 weeks post-surgical induction. Arrows mark periarticular bone formation, joint space narrowing and subchondral sclerosis.*

DISCUSSION

NZWR are widely used in knee osteoarthritis studies because OA development in this species closely mimics the disease pathophysiology in humans. The combination of ACLT with partial meniscectomy ensures the formation of post traumatic osteoarthritis model by causing joint destabilization and inflammatory damage.

As opposed to humans, rabbits have higher loading pressure in the lateral compartment of the knee joint. To imitate human knee OA which commonly involves the medial joint compartment, partial meniscectomy of the medial meniscus is important. Furthermore, as rabbit articular cartilage is known to be capable for regeneration, partial transection of both parts meniscus guarantees the formation of OA in the animal model.

CONCLUSION

The surgical induction of knee osteoarthritis via ACLT combined with medial and lateral partial meniscectomy is a successful technique with a consistent result.

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