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Comparison of intraoperative outcomes in excision arthroplasty with or without partial tenotomy of deep gluteal muscle in dogs

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ABSTRACT

Background: Excision arthroplasty is a common surgical technique for treating coxofemoral luxation in dogs. Favourable outcomes have been reported in dogs up to 15 kg.

Aim: This study aimed to compare the intraoperative findings of two surgical approaches i.e., with or without partial deep gluteal muscle tenotomy in the excision arthroplasty in dogs.

Methods: A total of 15 dogs that were brought to the Veterinary Surgery Clinics at University Veterinary Hospital, Samsun, Turkey with traumatic coxofemoral luxation or femur head/neck fracture. A craniolateral incision was used to approach the craniodorsal aspect of the hip joint in all cases. Blunt dissection approach was performed for elevation of gluteal muscles in the first group. While myotomy of the superficial gluteal muscle and partial tenotomy of the deep gluteal was performed in the second group.

Results: Fifteen dogs (group 1: without tenotomy in 7 dogs; group 2: myotomy and tenotomy in 8 dogs) were diagnosed with coxofemoral luxation in 9 cases, femoral neck fracture in 5 cases and caput femur fracture in 1 case. Average body weight was 15.6 kg (3.5-26) and average age was 29.5 months (6-72). Partial tenotomy improved the exposure of joint capsule and femur neck.

Conclusion: The remnants of femoral neck after excision arthroplasty may contact the acetabulum and cause pain in the postoperative period. By applying the partial deep gluteal muscle tenotomy technique, surgeons can readily expose joint capsule, femoral head, femoral neck, and great and lesser trochanter.

Keywords:

Dog, deep gluteal muscle, excision arthroplasty

1. INTRODUCTION

Femoral head and neck excision (FHNE) is the most frequently executed and practically applied procedure in dogs (1). Indications for FHNE include aseptic necrosis of the femoral head, coxofemoral luxations, and degenerative joint disease (2-4). The surgical approach for FHNE was commonly performed with craniolateral incision (5). The ventral approach to the coxofemoral joint is rarely performed in veterinary practice (6). In addition, K-wire-assisted FHNE via the ventral approach is a recently described technique (7).

A previous study compared wedge resection, muscle interposition and standard FHNE techniques. The results of that study revealed that there is a slight benefit of having traumatic muscle interposition and wedge resection techniques but they are more time taking then FHNE procedures (8).

This study aimed to compare the intraoperative findings of two surgical approaches i.e., with or without partial deep gluteal muscle tenotomy in the excision arthroplasty in dogs.

2. MATERIALS AND METHODS

A total of 15 dogs were brought to the the Veterinary Surgery Clinics at University Veterinary Hospital, Samsun, Turkey, with traumatic coxofemoral luxation or femur head/neck fracture. Dogs with osteoarthritis of the hip joint were excluded from the study. History and signalment (breed, age, sex, body weight) were recorded. Physical and biochemical examination (complete blood count) was performed for all cases. A complete orthopaedic examination was performed. Dogs which met the inclusion criteria were randomly divided into two groups (Group 1 [n=7] and Group 2 [n=8]). Acepromazine (0.05 mg/kg, IV) was used for premedication. Induction with ketamine (10 mg/kg, IV) was performed 15 minutes after premedication. The patients were intubated, and anaesthesia was maintained with isoflurane (2%). Epidural analgesia with lidocaine 2% (4 mg/kg, IT) was performed. A constant rate infusion was administered to patients for pain management. The solution in 500 ml saline included ketamine (30 mg), morphine (12 mg) and lidocaine (150 mg) for dogs. The prepared solution was administered as an intra-operative dose of 10 ml/kg/hr and a post-operative dose of 2 ml/kg/hr for 24 hours. Surgery was performed in lateral recumbency using a craniolateral incision in both groups. A craniolateral incision was made for surgical exposure of the hip joint in groups 1 and 2. The skin incision was made over the greater trochanter and extended distally to the proximal third of the femur. An incision was made over the fascia lata. The biceps femoris muscle was retracted caudally, and an incision was made between the superficial gluteal muscle and tensor facia lata muscle. The tensor fascia late muscle was retracted cranially. The surgical approach was the same for each group up to this point. Blunt dissection was made to expose the femoral neck and the joint capsule in group 1; The superficial gluteal muscle, gluteus medius, and deep gluteal muscles were kept intact. In group 2, the superficial gluteal muscle was incised and retracted dorsally. A partial tenotomy of the deep gluteal muscle was performed using an electrocautery. Visible anatomic landmarks for excision arthroplasty were intraoperatively found and recorded for each group. These visible anatomic landmarks were the dorsal rim of acetabulum, joint capsule, femoral head, femoral neck, great trochanter, lesser trochanter, and trochanteric fossa. Excision arthroplasty was routinely done and closed in both groups.

3. RESULT AND DISCUSSION

A total of fifteen dogs included in this study met the inclusion criteria. The gender distribution is 5 females and 10 males. The most presented breed was a mix-breed (n=6), and following Terrier (n=3), Transylvanian hound (n=1), Rottweiler (n=1), German pinscher (n=1), Pekingese (n=1), Dogo argentino (n=1) and Labrador retriever (n=1). The median body weight was 12.7 kg (3.5-22 kg) in group 1 and 19 kg (13-26 kg) in group 2, while the median age was 25.4 months (6-60 months) in group 1 and 43.1 months (12-72 months) in group 2

Figure 1: Intraoperative view of anatomic landmarks in group 1 (A) and group 2 (B). Femoral head (Dotted line) and joint capsule (Blue arrow) (A). Femoral head (Black curve line), femoral neck (Green arrow and parallel black lines) and great trochanter (Blue T) (B).

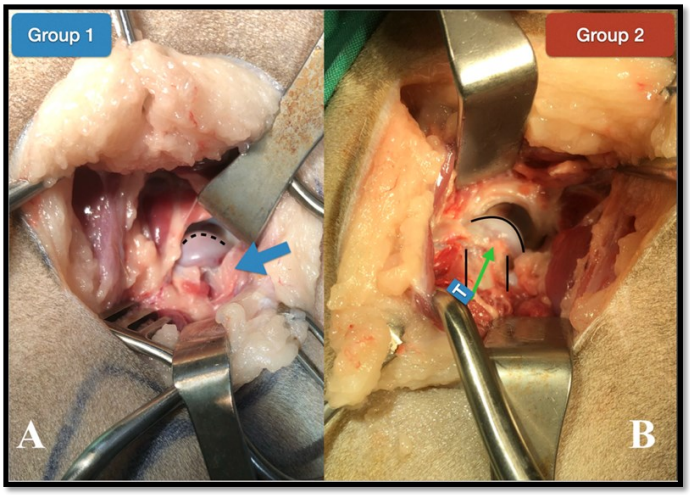

Table 1: Distribution of visible anatomical landmarks in both groups.

	Dorsal rim of acetabulum	Joint capsule	Femoral head	Femoral neck	Great trochanter	Lesser trochanter	Trochanteric fossa
Group 1	+	+	+	+	++	–	+
Group 2	++	++	++	++	++	++	++

++ = fully visible, **+** = partially visible, **–** = not visible

respectively. The motor vehicle accident was the most common in history (n=13) and followed high-rise in 2 cases.

The distribution of the lesions was coxofemoral luxation in 9 cases, femoral neck fracture in 5 cases and femoral head fracture in 1 case. The dorsal rim of acetabulum, joint capsule, femoral head, femoral neck, great trochanter, and lesser trochanter were distinctly visible anatomic landmarks in the case of group 2 when compared with group 1. (Fig. 1A and 1B) The great trochanter was fully visible and palpated anatomic landmarks for each group. Visible anatomic landmarks and their accessibility with surgical exposure were summarized in table 1.

Femoral head and neck excision was first introduced in treating septic arthritis in human medicine (9). In veterinary practice, this surgical procedure was adapted to correct hip joint problems. Partial tenotomy of deep gluteal muscle near the trochanter may allow better and fortified exposure to the coxofemoral joint. Also, it had been included in the literature as a simple and inexpensive method (10).

Approach to the coxofemoral joint was utilized with a craniolateral approach or ventral approach. The craniolateral approach is mostly the preferred technique (11). Limited exposure was achieved via ventral approach (11). K-wire assisted FHNE in ventral approach was recently described technique. According to the study, isolation and cut angulation of the femur neck were improved by k-wire assistance (7). Craniolateral approach was utilized for all cases. This study compared the approach to the coxofemoral joint with and without partial deep gluteal muscle tenotomy.

Damage to the iliopsoas muscle/tendon after routine FHNE has been reported in a cadaveric study. The iliopsoas muscle/tendon damage is potentially among the postoperative complications (12). However, there is no clinical study on this subject. Since wider surgical exposure will be provided when approaching the hip joint with deep gluteal muscle tenotomy, this method should protect the iliopsoas muscle/tendon more efficiently.

The remnant bones of the femoral head and neck after FHNE are primarily responsible for postoperative pain (13). This situation may directly affect the clinical outcomes. Certain anatomical landmarks must be visible intraoperatively for proper FHNE (10). Partial tenotomy of deep gluteal muscle revealed safe, more enhanced, and fortified exposure and access to certain anatomic landmarks when performed. In addition, the femur neck and dorsal rim of the acetabulum can be approached markedly.

4. CONCLUSION

The conclusion of this study described that, by applying the partial deep gluteal muscle tenotomy technique, surgeons could readily expose the joint capsule, femoral head, femoral neck, and great and lesser trochanter with minimal hazard to the coxofemoral joint. By using partial tenotomy of deep gluteal muscle technique, one can comfortably isolate certain anatomical structures, and the femoral neck can be cut properly in case of FHNE surgery. Also, future studies should investigate the presence of iliopsoas injury in the approach with deep gluteal muscle tendon tenotomy in FHNE surgery.

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Conflicts of Interest: The authors declared that there is no conflict of interest.

Ethic Statement: This work involved the use of non-experimental animals only (owned or unowned) and followed established internationally recognised high standards ('best practice') of individual veterinary clinical patient care. Ethical approval from a committee was not necessarily required.

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