IMPLEMENTATION OF OSTEOCHONDRAL AUTOGRAFTING FOR THE TREATMENT OF OSTEOCHONDritis DISSEcANS OF THE CANINE STIFLE JOINT. A CASE REPORT

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Abstract

Clinical and radiological results of the application of a single autologous osteochondral graft for the treatment of osteochondritis dissecans (OCD) of the stifle joint in two dogs were described. It was found that the application of the osteochondral grafts with the osteochondral autograft transfer system technique in the treatment of stifle OCD in dogs was an effective therapeutic method. This study has also provided useful data for further clinical investigations.

Key words: osteochondral graft, dogs, stifle joint, osteochondritis dissecans.

Osteochondrosis is an orthopaedic disease characterised by abnormalities in the process of endochondral ossification of articular cartilage, disrupting the normal sequence of chondrocyte transformation into osseous tissue. The usual consequence of this pathological process is the separation of the affected articular cartilage, referred to as osteochondritis dissecans (OCD), following aseptic necrosis. Osteochondral defects are significant problems in dogs and are one of the reasons for pelvic limb lameness in these animals. Osteochondral autograft therapy has been reported to improve outcomes in human medicine when compared to other surgical and conservative treatment (5, 11, 13).

Since 2005, there have been few reports describing the attempts to treat experimentally articular cartilage defects, after surgical treatment of OCD of the canine stifle joint, with the use of osteochondral autografting (2, 6).

The purpose of this work is to assess clinical results of a single autologous osteochondral graft for the treatment of OCD of the canine stifle joint. Additionally, the application of the osteochondral autograft transfer system (OATS) technique in the clinical cases of stifle OCD in dogs was evaluated.

Material and Methods

Osteochondral cylindrical single autograft transplantation was performed in two dogs using OATS technique. Both dogs (seven-month-old Bernese Mountain dog and ten-month-old Golden Retriever) were presented to the Veterinary Clinic of the Surgical Unit with symptoms of pelvic limb lameness of unknown aetiology. The clinical examination revealed that in both cases the lesion was located in the left pelvic limb. Soft tissue swelling in the region of the left stifle joint, a narrower angle of flexion of the affected stifle limiting the motion, as well as thigh muscle atrophy were observed in both dogs. Radiograms of the stifle joints at the craniocaudal view showed subchondral filling defects within the lateral condyle of the left femoral bone (Fig. 1).

The surgical procedure was performed under general anaesthesia (atropine sulphate, Polfa, Poland, 0.05 mg/kg b.w., subcutaneously, and acepromazine, Vetoquinol F, 0.5 mg/kg b.w., intramuscularly). General anaesthesia was induced with xylazine (Rometar; SPOFA, Czech, 2 mg/kg b.w. intramuscularly), and ketamine (Narkamon SPOFA; Czech, 5 mg/kg b.w. intramuscularly). General inhalation anaesthesia was produced by the administration of a halothane-oxygen mixture (Narcotan; Léčiva, Czech) in a semi-closed system. Osteochondral autografting was carried out using the OATS (Arthrex, USA).

Surgical technique. The surgical procedure with the use of a single osteochondral autograft plug began by incising skin over the stifle joint on the lateral side, and next subcutaneous tissue, fascia lata, and articular capsule. Following the exposure of the articular cavity, the patella was dislocated medially. The autograft material was harvested with donor chisel from the lateral part of the femoral trochlea, in the non-weight-bearing area of the joint, laterally and cranially from the trochlear groove. The fragment for the osteochondral autograft transplantation procedure included articular cartilage with the subchondral layer,
and was cylindrical in shape. While obtaining the graft material, the harvesting knife was placed at a 90° angle with respect to the cartilage.

Then, making a quarter turn, the knife was driven into the articular cartilage and the subchondral layer, to a depth of 8 mm, by an oscillating (semi-rotary) motion. While pulling out the osteochondral cylinder, the knife was placed at a 90° angle with respect to the joint surface. The donor cavity was not filled, assuming spontaneous self-repair. Next, the damaged articular cartilage was excised and the graft recipient site was prepared (Fig. 2).

In order to do that, the recipient knife was introduced to a depth of 7 mm into the recipient part of the stifle joint. The recipient hole was gently smoothed and its depth was measured. Then, the osteochondral plug was inserted into the recipient site with a knife, to a depth of 7 mm (Fig. 3).

The graft was left proud (approximately 1 mm) and then tamped gently. Single osteochondral cylinders were transplanted in both dogs. Finally, the precision of graft placement was verified, and the recipient cavity was rinsed with Ringer’s solution. Soft tissues were closed with appropriate sutures. In the postoperative period, the dogs received the anti-inflammatory drug meloxicam (Polfa Poland) at a dose of 0.2 mg/kg b.w. for 5 d, and the antibiotic cefalexin (Ceporex; Schering-Plough, UK) at a dose of 10 mg/kg b.w. for 3 d.

![Fig. 1. Pre-operative radiograph with OCD lesion on the lateral condyle.](image1)

![Fig. 2. Intra operative view with OCD lesion in the centre.](image2)
Results

A clinical examination conducted in the post-surgery period revealed no inflammatory lesions in the region of the operated stifle joints. In the both treated dogs lameness resolved in consequence of the surgical treatment, after 4 and 11 weeks’ respectively. Within 12 months from the transplantation, the dogs were walking and running without apparent lameness. A radiological examination of the operated stifle knee, performed 12 months after the surgery revealed the evidence of integration of osteochondral plug with the maintenance of subchondral bone surface architecture without any signs of inflammation (Fig. 4). The owners of both dogs did not allow performing arthroscopic examination to estimate grafts incorporation.

Discussion

Different techniques are used today to treat OCD lesions in human medicine. In veterinary, surgical procedures involve the separation and removal of the affected fragment of articular cartilage. This can be done via arthrotomy or arthroscopy. Many authors share the opinion that the removal of the damaged cartilage should be followed by surgical treatment of tissue stimulation within the defect region (1, 3, 8). The stimulation is aimed at filling the defect with fibrocartilage. However, the newly formed fibrocartilage is less flexible and shock absorbing than hyaline cartilage. This fact implies a need to looking for a much more effective method of the treatment of articular cartilage defects. Such condition can be fulfilled by osteochondral transplantation.
In veterinary medicine, osteochondral grafts are implemented to treat articular cartilage defects in horses. Clinical observations carried out for several years in horses subjected to osteochondral transplantations showed that this surgical approach proved to be effective in the treatment of articular cartilage lesions (10). There are very few reports dealing with osteochondral grafting for the OCD treatment in dogs. Most of them are experimental ones (4, 7, 9, 12).

The results obtained in the study showed that the OATS technique is useful for the treatment of OCD lesion in young dogs. Clinical results obtained in this study are promising and indicate that osteochondral grafting can be successfully applied to treat articular cartilage lesions related to osteochondritis dissecans. Similar good results in the OCD treatment with OATS technique were presented by Fitzpatrick and O’Riordan (8). However, due to a small number of clinical publications concerning the treatment of the OCD lesion with osteochondral transplantation further studies are needed.

References