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SHORT COMMUNICATION

The Clinical Study of Conservative Management of Bicipital Tenosynovitis in Working Dogs

A Bochenska[1,4], A Kaniewska[2], A Pomianowski[1], T Monowid[1*], P Reichert[3] and Z Adamiak[1]

[1]Faculty of Veterinary Medicine, University of Warmia and Mazury, str. Oczapowskiego 14, 10-957 Olsztyn, [2]Kanvet Veterinary Physiotherapy Practice, str. Liliowa 37, 11-041 Olsztyn, [3]Department and Clinic of Traumatology and Hand Surgery, Wroclaw Medical University, Borowska 213, 50-556, Wroclaw, [4]University Centre of Veterinary Medicine UJ-UR al. Mickiewicza 24/28, 30-059 Krakow, Poland
*Corresponding author: monowid1@gmail.com

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A B S T R A C T

The paper depicts retrospective analysis of the conservative treatment in 10 working dogs with bicipital tenosynovitis. All dogs underwent clinical and X-ray examinations and their lameness was evaluated with 5 degree scale. All dogs were treated with ultrasound therapy protocol for 8 weeks. In 9 cases dogs returned to full mobility. In one dog single appliance of ultrasound protocol did not solve the problem. In that case the treatment was repeated resulting in full healing of the lameness.

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INTRODUCTION

The biceps brachii tenosynovitis is a common shoulder disorder in working dogs. The biceps brachii originates on the supraglenoid tubercle; passes across the shoulder joint, down the humerus in the intertubercular groove; and inserts on the proximal medial ulna and the proximal cranial radius. Its function is to flex and supinate the elbow, extend the shoulder, and passively stabilize the shoulder in neutral and flexed positions. (Sidaway *et al*., 2004).

Jumping will especially predispose patients to injuries of the shoulder. The amount of impact to the forelimbs is about 45 N/kg (Newtons per kilogram) body weight when landing after a hurdle jump, compared with about 25 N/kg sustained while running. Very often dogs tend to land on the same forelimb. The overload of the dominant limb predisposes it to the injuries. (Pfau *et al*., 2011).

Conservative treatment and rehabilitation could be efficient at early stage of disease. Therapeutic effects of ultrasound have been described in the literature for repairing damaged ligaments (Paliwal and Mitragotri, 2008). The mechanism of therapeutic action is based on two effects thermal and non-thermal (cavitation and acoustic streaming). Elevated temperatures result in several therapeutic benefits, for example increased flexibility of collagen-rich scar tissues as tendons (Aiyegbusi *et al*., 2012).

The non-thermal mechanism of ultrasound in tissue regeneration and soft tissue repair has been proved (Paliwal and Mitragotri, 2008). Additionally, therapeutic ultrasound could be used as a transdermal drug delivery (Han YI *et al*., 2015).

MATERIALS AND METHODS

Ten working dogs with lameness of the thoracic limb that were suspected of bicipital tendosynovitis development (Table 1). The lameness of the thoracic limb was presented over 2 – 3 weeks. The owners did not report any trauma, but all patients were intensively trained. The diagnosis was based on clinical and X- ray examinations. The X –ray was performed for lame and healthy limb to compare those and to exclude calcification foci and shoulder joint degeneration. Before visit to University Clinic the patients were treated for 1–2 weeks with nonsteroidal anti-inflammatory drugs (NSAIDs). Three dogs were administered with ketoprofen, five dogs were administrated with meloxicam and two dogs were administered with cimicoxib. The NSAIDs standard doses were used. After medication withdrawal the lameness recurred. The lameness scale was evaluated arbitrary as 0, 1, 2, 3, 4, and 5 when no lameness light, intermittent lameness with limb loading, explicit loaded limb lameness, severe lameness with a load of limbs, intermittent lameness without weight bearing the limbs and constant without weight bearing lameness were scored, respectively. All patients were also evaluated during trot.

The lameness after walking and exercise intensified. All patients exhibited pain on palpation of the biceps tendon. The flexion of the shoulder and pulling the leg

Table 1: Patients' description and their degree of the lameness

Breed	Age (Yrs)	Body weight (kg)	Type of work	The lameness scale [0 -5]	Duration of illness (weeks)
Rottweiler	1	45	Preparation for the police service	2	2
Cane corso	3	56	IPO - International Prüfungs Ordnung	2/3	2
Border collie	3	21	Frisbee	3	2
Border collie	4	17	Frisbee, agility	2	1
Border collie	2	16	Frisbee, agility	2	3
Labrador retriever	2	32	Custom's dog	3	2
German Shepherd	2	35	Police	2/ 3	3
Belgian Shepherd Dog	3	20	Frisbee	2	2
Belgian Shepherd Dog	4	22	Search dog	2	2
Mix breed	2	19	agility	2	2

backward with pressure on the tendon elicited pain and patients' resistance.

Treatment included therapeutic ultrasound, reducing uncontrolled activity, passive range of motion exercises and hydrotherapy. The parameters of the ultrasound procedure were: frequency 3 MHz duty cycle 1:2 pulsed, power 0.5 W/cm^2 for the first five procedures and 1 W/cm^2 for the last five procedures, duration 5 min. At the first six ultrasound applications the ketoprofen gel was applied. For ultrasound therapy the skin over the biceps tendon was clipped. Treatment protocol was developed basing on publications describing ultrasound physiotherapy's influence on tendons (Aiyegbusi *et al*., 2012).

Ten treatments of the therapeutic ultrasound were applied. The therapeutic ultrasound was used three times per week. The activity of the patients was controlled for 6 weeks. For the first 2 weeks short walks on the leash and resting were recommended. The next 2 weeks walks were gradually lengthened. The twice a week underwater treadmill sessions started after 4 weeks of therapy. First two sessions lasted 10 minutes, next three lasted 15 minutes and the last three continued for 20 minutes. The time of treadmill sessions was 5 minutes shortened if any of the fatigue signs or lameness exaggeration the day after were noticed in patient. Throughout the therapy passive range of motion exercises for affected limbs' all joints were performed.

RESULTS AND DISCUSSION

All of the patients showed lameness reduction for at least one degree at first 2 weeks of treatment. After 3 weeks of treatment the flexion of the shoulder and pulling the leg backward with pressure on the tendon was painless. At the end of the treatment no lameness was reported. In one dog (the heaviest dog in the group, cane corso breed, weight 56 kg) the bicipital tenosynovitis returned after four months. In that case the treatment protocol was repeated with success.

The biceps brachial tendon is important for shoulder joint stability. (Sidaway *et al.,* 2004) Shoulder problems may result from repetitive stress in working, sporting, or overweight dogs, particularly those of large and giant breeds. Repetitive stress induces damage in the tendons and ligaments, including partial tears, dystrophic mineralization, chronic tenosynovitis, peritendinous adhesions, and contractures. The clinical syndromes reported in the literature include bicipital tenosynovitis. (Marcellin-Little *et al*., 2007) The diagnosis at early stage of the disease and the rapid treatment implementation is an important element of conservative therapy's success. If significant mineralization of the biceps muscle tendon sheath occurs, surgery is necessary (Adamiak *et al*., 2004). Healing of the tendons especially those surrounded by the synovial sheath takes a longer time because of minimal blood supply. Tendons also need time to achieve the appropriate tension for flexibility. In this case the therapeutic ultrasound is useful. Therapeutic ultrasound increases protein synthesis including that of collagen which is essential for repairing mechanisms in cells. During the inflammation phase of the healing process, (Jeremias Jr. *et al*., 2011) ultrasound can activate immune cells migration to the site of the injury. In all cases, we achieved positive outcomes, all patients returned to training. This cases suggest that therapeutic ultrasound therapy can improve efficiency of conservative treatment and prevent functional complications. Ultrasound therapy at 0.5 W/cm enhanced the biceps tendon healing in dogs. Applied in the early stages of the disease such treatment allows patients to return to full performance without a surgical procedure. Our report shows that conservative treatment could bring satisfying results.

Author's contribution: AB and AK conceived and designed the study. AB, AK, TM executed the treatment procedures. AP and ZA qualified patients for the study and controlled progress of the therapy. P Reichert revised treatment procedures and study assumptions. AB and TM written the manuscript.

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