

PHYSIOTHERAPY METHODS FOR IMPROVING MOBILITY IN ASEPTIC FEMORAL HEAD NECROSIS

METODE FIZIOTERAPEUTICE DE ÎMBUNĂTĂȚIRE A MERSULUI ÎN NECROZA ASEPTICĂ DE CAP FEMURAL

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ABSTRACT | REZUMAT

Aseptic necrosis of the femoral head is a type of noninflammatory necrosis that affects the femoral head in small dogs. To date, the cause of this necrosis is incompletely known, but it is assumed that the early action of sex hormones, as well as ischemia induced by vascular compression are the pathogenic agents. Currently, the only means of treatment is surgery, followed by physiotherapy. The study aims to observe the effectiveness of postoperative recovery of patients through the means and techniques of physiotherapy. Six Bichon dogs diagnosed with aseptic necrosis of the femoral head were included in physiotherapy protocols, after surgical intervention and healing of surgical wounds. Physiotherapy involved both the manual active and passive movements and special methods (electrostimulation and ultrasound therapy). The number of sessions required to achieve physiological posture and mobility ranged from 7 to 50. The physiotherapy had an essential role for restoring the functionality of the musculoskeletal system and the quality of life of the patients.

Keywords: dog, aseptic necrosis, femoral head, physiotherapy

Necroza aseptică a capului femural reprezintă un tip de necroză de natură neinflamatorie ce afectează capul femural al câinilor din rasele de talie mică. Până în prezent, cauza ce conduce la instalarea acestei necroze este incomplet elucidată, însă se presupune că acțiunea precoce a hormonilor sexuali și ischemia indusă de compresiunea vasculară ar fi agenții incriminați. La momentul actual, singurul mijloc de tratament este reprezentat de intervenția chirurgicală, urmată de fizioterapie. Lucrarea are ca obiectiv observarea eficacității recuperării postoperatorii a pacienților prin mijloacele și tehnicile fizioterapiei. Șase câini Bichon diagnosticați cu necroză aseptică a capului femural au fost incluși în protocoale specifice de fizioterapie, după intervenția chirurgicală și vindecarea plăgilor. Fizioterapia a constat în metode manuale (mișcări active și pasive) și speciale (electrostimulare și terapie cu ultrasunete). Numărul de ședințe de fizioterapie necesar pentru recuperarea posturii și mobilității fiziologice a variat între 7 și 50. Fizioterapia a avut un rol esențial în recuperarea funcționalității sistemului musculo-scheletic și a calității vieții pacienților.

Cuvinte cheie: câine, necroză aseptică, cap femural, fizioterapie

Orthopaedic diseases have an increased incidence and prevalence among pet dogs (1). Aseptic necrosis of the femoral head is an orthopaedic disease of a genetic nature, manifesting itself early and affecting several small dog breeds and especially the Bichon breed (2, 4). The only means of treatment are surgery, followed by physiotherapy (5, 6).

Electrostimulation is based on the use of electric current. Usually, three types of current are used: direct, direct alternating, and pulsatile. The first one, the direct current is unidirectional, flowing for a second or more. The second one, the alternative current, has the property of changing its direction at least once every second. The third one, pulsatile current (also known as

galvanic current) has been used to treat various injuries, for iontophoresis, but also in the recovery of damaged muscles, currently being used only in iontophoresis. It is no longer used for therapeutic purposes (3, 8). Ultrasound therapy involves the intervention of superficial thermal agents that penetrate the tissue at a depth of about 1 cm, but also deep thermal agents that can reach a depth of 3 cm or even more. The waves with which this type of therapy works, exceeding the upper limit of human hearing, are known as ultrasound. The 1 MHz frequency is the most commonly used as it is the middle choice between penetrability and appropriate heat treatment. The higher the frequency, the lower the penetrability. The frequency of 3 MHz allows the heating of the tissues to depths of 0.5-3 cm. Thus, probes with frequencies of 3 MHz are used for superficial lesions, and those of 1 MHz for deeper lesions (3, 6).

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MATERIALS AND METHODS

The research was carried out on six Bichon dogs diagnosed with aseptic necrosis of the femoral head. Radiography was used to establish a definite diagnosis (Fig. 1). After surgical intervention on necrotized femoral head and healing of surgical wounds, a detailed clinical examination of each patient was performed to establish the recovery program, based on the use of methods and devices specific to physiotherapy. As for the materials, they were chosen precisely as to be accessible to the therapist, as well as to the owners.

The main material used to recover patients was plastic glass caps. In addition to the manual methods of physiotherapy (involving the range of active and passive movements), special methods of physiotherapy (electrostimulation and ultrasound therapy) were also used. Table 1 shows the main characteristics of the current used for electrostimulation.

Table 1

The main characteristics of the current used in electrostimulation

Therapeutic objective	Type and characteristics of the used current
Relieving and reducing muscle spasm	Type of current: Premod Type of emission: Continuous Minimal frequency: 10 kHz Maximal frequency: 10 Hz Intensity: Variable
Development of muscle tone and mass	Type of current: VMS Type of emission: Continuous Stage duration: 200 μ sec Slope: 2 sec Frequency: 50 pps Intensity: Variable

The Intellect Vet (Chattanooga, DJO Global) device is based on two individual electrotherapy channels and a useful ultrasound probe with a frequency of 1 MHz and 3 MHz.

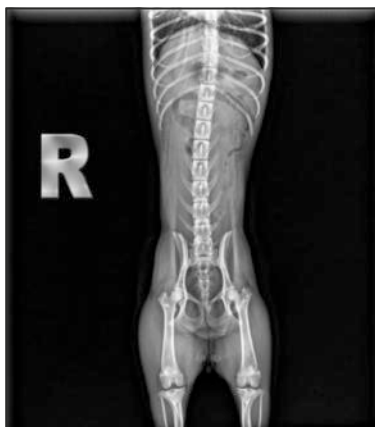


Fig. 1. Dog with aseptic necrosis of the left femoral head. Radiological aspect (R=right)

RESULTS AND DISCUSSIONS

In a previous study, it was observed that out of 2765 dogs and cats that were taken into account for research, 45 were diagnosed with orthopedic diseases, and physiotherapy intervention was essential (4). Ozone therapy could be also used to improve the healing process (9). Out of these, a significant proportion is occupied by orthopaedic pathology called *aseptic necrosis of the femoral head*, mainly affecting dogs of small breeds, currently having an unknown aetiology. Thus, out of a total of 45 dogs with orthopaedic conditions requiring physiotherapy intervention, six were diagnosed with *aseptic necrosis of the femoral head*, representing 40% of all orthopaedic cases. At the same time, out of the six dogs with this pathology, four were male (66.67%) and two females (33.33%). All the six cases diagnosed with this pathology were animals under two years of age, and more importantly, all dogs belonged to the Bichon breed.

Manual methods. Therapeutic exercises

These methods and exercises are aimed at restoring muscle mass and strength, as well as the balance needed to maintain the standing posture and achieve physiological movements, including after surgery (Fig. 2 and 3). The exercises implemented and used include a range of common activities: walking on the exercise band, climbing stairs, dancing (Fig. 4) (used especially for the exercise of the hind limbs), or wheelbarrowing (for the exercise of the forelimbs).



Fig. 2-3. Patients who underwent resection of the femoral head. Refusal of support on the affected limb before physiotherapy

For patients who have undergone femoral head resection surgery for aseptic necrosis of the femoral head, the most useful method (supplemented by special means of physiotherapy), which is intended to encourage the animal to maintain support on the affected limb is the application of a plastic cap or a coin to the healthy limb, followed by fixing it with an adhesive bandage (3). The method involves placing the cap or coin on the paw pads of the healthy limb, then fixing it with adhesive tape, thus obtaining the ideal device

to encourage weight support on the affected limb (Fig. 5). At first, some patients show visible discomfort (Fig. 6) created by the device, but gradually, through exercise, they get used to properly perform support on the affected limb, obtaining posture and correct standing position, as well as physiological movement on all the four limbs.



Fig. 4. Dancing used as a therapeutic exercise



Fig. 5-6. Applying the cap to the healthy limb and encouraging support on the affected limb. Visible discomfort

Special physiotherapy methods are essential tools in the process of physical recovery of patients with various orthopaedic and neurological conditions, including those who underwent resection of the femoral head, after which they remain with painful tenderness and muscle weakness. Thus, special methods complement the manual methods to ensure the therapeutic success and complete healing of the animal.

Electrostimulation

It is a method used in physiotherapy and is very effective in encouraging movement, increasing muscle strength and tone, structural improvement, pain control and speeding up the healing process. Although there are several types of current used, only the direct continuous current is still used in electrostimulation. It is essential to assess the illness degree of the patient in order to determine the intensity of the current applied, its duration, as well as the number of therapeutic sessions. At the same time, the preparation of the

patient for this form of treatment involves cutting the hair on the surface of the skin and cleaning it using alcohol, while removing the fats or other substances. This step is essential to reduce the voltage required for electrical pulses to penetrate the skin. The site is also ready for the application of conductive electrodes. The latter will be chosen in such a way as to fit the patient's size, without exaggerating it (Fig. 7 and 8). It is important to note that as the size of the electrodes decreases, the current density in the muscles will be higher, and thus the pain felt by the animal will be much exacerbated (7).



Fig. 7-8. Patients during electrostimulation

Ultrasound therapy aims, in addition to musculo-skeletal rehabilitation, to correct mobility induced by joint contracture, reduce pain, but also heal wounds or reduce muscle spasms (Fig. 9).



Fig. 9. Ultrasonography applied to a patient who previously had aseptic necrosis of the femoral head

Avoiding ultrasound therapy should also be considered if the patient has a cardiac pacemaker if they are pregnant or have tumours.

Contact with the eyes, heart or spine (if they have undergone laminectomy surgery) should also be avoided. Ultrasonography will be complemented by gel muscle massage with anti-inflammatory properties, designed to improve muscle mass and tone, and on the other hand, to enhance regional blood circulation, thus accelerating the healing process.

Once the therapeutic protocol has been established

and adapted to the patient's needs, manual and special methods and exercises will be repeated during the sessions. Initially, the therapist may make an approximation of the number of sessions required for complete recovery, but this number may change depending on how quickly the patient responds to therapy. From what has been observed so far, the number of sessions required to achieve posture and physiological mobility was variable, ranging from 7 to 50, depending on each patient. However, it can be confidently stated that the return to full muscle, bone, and joint function cannot be achieved only by surgery, but only after following a physiotherapeutic protocol.

CONCLUSIONS

The surgery cannot ensure the complete healing of aseptic necrosis of the femoral head, the physiotherapy playing an essential role for restoring the functionality of the musculoskeletal system and the quality of life of the patient. If this pathology manifests mainly among young animals (up to the age of two years), it can be considered gratifying that recovery is much easier and faster in this case compared to adult or even geriatric patients.

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