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# MUSCLE GROUPS THAT ENSURE THE DYNAMICS OF THE HIP JOINT IN DOGS

The study of regional muscle dynamics is important for understanding the mechanism of production of hip joint pathology, also bringing a valuable perspective to the diagnosis and treatment of hip dysplasia.

The hip joint is one of the most robust joints of the body, sensitive to load, especially if there are axial abnormalities, combining stability with mobility, due to the combination of a very strong joint capsule and its ligaments.

Anatomically, the hip joint is a typical synovial joint, spheroidal (enarthrosis) with three axes of movement equivalent to three degrees of freedom, very important in statics and locomotion, in which the following movements occur: flexion – extension, abduction – adduction, internal rotation – external rotation and by combining them – the circumduction movement. The length of the femoral neck and the angle of the neck-diaphysis make the movements of flexion, extension, abduction and adduction to be associated with rotation. Thus, the geometry of the hip allows movement in all directions.

The basis for understanding its pathology is the perfect knowledge of the internal structure, the interpretation of joint anatomy and biomechanics, dividing the structure of the joint into the following components:

- ***articular surfaces or bone-joint hip***: the femoral head (presents the dimple of the femoral head); acetabulum (with articular surface and acetabulum fossa); the eyebrow of the acetabular cavity with an acetabular fibrocartilaginous burette (which jumps over the acetabular notch forming the transverse acetabular ligament that transforms the respective notch into a hole);
- ***ligament hip with means of joining / intra-articular structures***: the joint capsule – is very strong, represented by acone-shapedsleeve with a large insertion base on the hip and a small base on the femur. The tensor muscles of the articular capsule are represented dorsally by – m. deep gluteus, ventral – internal obturator, caudal – m. gemelli and medial skull – iliopsoas muscle.

Pericapsular ligaments are soft tissue structures, with a role in the connection between bone surfaces. The capsular ligament is simple and has no special reinforcements. The ligament of the femoral head, which is inserted in the center of the femoral head and at the bottom of the acetabular cavity, is covered by a synovial membrane. It contains nourishing support but does not contribute significantly to joint stability.

- ***muscular hip with extra-articular structures, movement***: the 27 muscles that cross the hip joint ensure both triplan mobility and joint stability, being ensured by three categories of factors. Bone factors represented by: baking of joint surfaces and obliquity of the articular axis, ligament factors and muscle factors. In the resort the balance is maintained by the antagonism between abductors and adductors. Muscle analysis should be done according to the spatial orientation and in relation to the axes of rotation at the hip.

Flexion and extension are performed in the sagittal plane, around a transverse axis that passes through the great trochanter and the dimple of the round ligament. Flexion-extension movements are associated with rotation; flexion with slight internal rotation and extension with slight external rotation. The main extensors of the hip are represented by the group of caudal muscles of the thigh – m.biceps

femoris, m. semitendinosus, m. semimembranosus; of the deep muscles of the pelvis – internal obturator, gemelli, quadriceps femoris, sartorius. The flexion of the joint is made by the medial muscles of the thigh.

Abduction and adduction – is performed in the frontal plane, around an antero-posterior axis which are met by part of the deep muscles of the pelvis and caudomedial muscles of the thigh. These movements are associated with rotation. Due to the anatomical features, the animal's possibilities to perform ample abduction movements of the pelvic limb are relatively limited, the adduction being prevented by the gluteus muscles.

Circumduction – is the combination of all movements, their summation.

The analysis of many works and studies in the field serve as a basis for understanding and evaluating musculoskeletal deficiencies, involving not only the hip but also the pelvis, providing an overview of anatomical and biomechanical knowledge, which are in strict accordance with the knowledge of kinematics, load of static and dynamic time, and mechanical forces acting on the hip joint.

In conclusion we can say that bone structures are light enough to allow movements with low energy consumption, rigid enough to build levers suitable for muscle strength and strong enough to withstand normal loads without breaking. Knowing the degree of mobility in the above joint or the value of the force of a muscle to perform the movement of a segment is absolutely necessary both in establishing a functional diagnosis and in evaluating the effectiveness of treatment in hip diseases.