# Spinal osteoarthritis

A Retrospective Study of the Evolution of Orthopaedic Injuries in 70 Dressage Horses

1/4

- The Accuracy and Reliability of the Photometric Method-A New Noninvasive Tool for Assessing Frontal Lower Limb Alignment
- Physiotherapy Intervention Improves Clinical Outcomes and Quality of Life in Elderly Patients with Osteoarthritis: A Prospective Cohort Study
- Relationship between vitamin D and osteoarthritis
- Potential Applications of the CRISPR-Cas9 System for Research and Treatment of Osteoarthritis
- Impact of Obesity on Treatment Response in Patients With Chronic Inflammatory Disease Receiving Biologic Therapy: Secondary Analysis of the Prospective Multicentre BELIEVE Cohort Study
- When can lumbar fusion be considered appropriate in the treatment of recurrent lumbar disc herniation? A systematic review and meta-analysis
- Effect of Pain Reduction and Functional Improvements Following a Noninvasive Biomechanical Intervention for Gait Rehabilitation on Healthcare Claims: An Observational Study

Spinal osteoarthritis, also known as facet joint osteoarthritis or degenerative disc disease, is a common condition that affects the joints and discs of the spine.

## Classification

Spinal osteoarthritis, also known as facet joint osteoarthritis or degenerative disc disease, can be classified based on various factors such as the location of the affected joints, the severity of degenerative changes, and the presence of associated symptoms. Here's an overview of some common classification systems used for spinal osteoarthritis:

#### Location:

Cervical Osteoarthritis: Involves degenerative changes in the facet joints and intervertebral discs of the cervical spine (neck region). Thoracic Osteoarthritis: Involves degenerative changes in the facet joints and intervertebral discs of the thoracic spine (mid-back region). Lumbar Osteoarthritis: Involves degenerative changes in the facet joints and intervertebral discs of the lumbar spine (lower back region). Severity:

Mild: Mild degenerative changes, such as mild narrowing of joint spaces or minimal osteophyte formation, with minimal or no symptoms. Moderate: Moderate degenerative changes, including moderate joint space narrowing, osteophyte formation, and mild to moderate symptoms such as intermittent back pain or stiffness. Severe: Severe degenerative changes, with significant joint space narrowing, extensive osteophyte formation, and marked symptoms such as chronic back pain, stiffness, and functional limitations. Associated Symptoms:

Radiculopathy: Symptoms of nerve compression or irritation, such as pain, numbness, tingling, or weakness radiating into the arms (cervical radiculopathy) or legs (lumbar radiculopathy). Myelopathy: Symptoms of spinal cord compression, such as difficulty walking, balance problems, weakness, or changes in bowel or bladder function. Axial Pain: Non-radiating back pain localized to the affected

area of the spine, often exacerbated by movement or prolonged sitting or standing. Imaging Findings:

X-ray: Imaging modalities such as X-rays may reveal characteristic findings of spinal osteoarthritis, including joint space narrowing, osteophyte formation, facet joint hypertrophy, and vertebral endplate sclerosis. Magnetic Resonance Imaging (MRI): MRI can provide detailed visualization of soft tissues, including intervertebral discs, facet joints, and spinal cord or nerve roots, allowing for the assessment of degenerative changes, disc herniation, spinal stenosis, and other spinal pathologies. Classification systems for spinal osteoarthritis may vary depending on the specific context or research criteria. Clinicians often use a combination of clinical evaluation, imaging studies, and patient-reported symptoms to diagnose and classify spinal osteoarthritis and develop an appropriate treatment plan tailored to the individual patient's needs.

#### Pathogenesis

Osteoarthritis (OA) is a degenerative joint disease characterized by the breakdown of cartilage in joints, leading to pain, stiffness, and loss of function. The pathogenesis of osteoarthritis involves complex interactions between mechanical factors, biochemical processes, and genetic predispositions. Here's a brief overview of the key factors involved:

Cartilage Degradation: The primary feature of OA is the breakdown of cartilage, the smooth tissue that covers the ends of bones in a joint. This degradation occurs due to an imbalance between cartilage synthesis and degradation. Factors such as mechanical stress, inflammation, and oxidative stress contribute to the degradation of cartilage matrix components like collagen and proteoglycans.

Mechanical Stress: Excessive mechanical stress on joints, either from obesity, repetitive use, or joint misalignment, is a significant risk factor for OA. Mechanical stress can lead to cartilage damage directly through wear and tear and indirectly by triggering inflammatory and catabolic pathways.

Inflammation: Low-grade inflammation within the joint is a key component of OA pathogenesis. Inflammatory mediators such as cytokines (e.g., interleukin-1 $\beta$ , tumor necrosis factor-alpha) and enzymes (e.g., matrix metalloproteinases) contribute to cartilage breakdown and synovial inflammation.

Synovial Changes: The synovium, the membrane lining the joint capsule, undergoes changes in OA. Synovial inflammation and thickening occur, leading to increased production of inflammatory cytokines and enzymes that contribute to cartilage degradation.

Genetic Factors: Genetic predisposition plays a role in OA development. Certain gene variants associated with cartilage structure, inflammation, and joint function can increase the risk of developing OA. However, genetic factors alone are not sufficient to cause OA, and environmental factors also play a significant role.

Metabolic Factors: Metabolic factors such as obesity, insulin resistance, and dyslipidemia are associated with an increased risk of OA, particularly in weight-bearing joints like the knees and hips. These factors contribute to systemic inflammation and altered joint mechanics.

Overall, osteoarthritis is a multifactorial disease with contributions from mechanical, biochemical, genetic, and environmental factors. Understanding the underlying mechanisms involved in OA pathogenesis is essential for developing effective strategies for prevention and treatment.

Transferrin receptor-1 (TfR1) plays important roles in controlling cellular iron levels, but its role in osteoarthritis pathology is unknown. Wang et al. aim to investigate the role of TfR1 in OA progression and its underlying mechanisms.

TfR1 expression in cartilage during OA development were examined both in vivo and in vitro. Then IL-1 $\beta$  was used to induce chondrocytes degeneration in vitro and TfR1 siRNA was used for observing the effect of TfR1 in modulating iron homeostasis, mitochondrial function and degrading enzymes expression. Also the inhibitor of TfR1 was exploited to analyze the protective effect of TfR1 inhibition in vivo.

TfR1 is elevated in OA cartilage and contributes to OA inflammation condition. Excess iron not only results in oxidative stress damage and sensitizes chondrocytes to ferroptosis, but also triggers c-GAS/STING-mediated inflammation by promoting mitochondrial destruction and the release of mtDNA. Silencing TfR1 using TfR1 siRNA not only reduced iron content in chondrocytes and inhibited oxidative stress, but also facilitated the mitophagy process and suppressed mtDNA/cGAS/STING-mediated inflammation. Importantly, we also found that Ferstatin II, a novel and selective TfR1 inhibitor, could substantially suppress TfR1 activity both in vivo and in vitro and ameliorated cartilage degeneration.

The work demonstrates that TfR1 mediated iron influx plays important roles in chondrocytes degeneration and OA pathogenesis, suggesting that maintaining iron homeostasis through the targeting of TfR1 may represent a novel therapeutic strategy for the treatment of OA  $^{11}$ 

#### **Osteoarthritis pain**

Osteoarthritis pain refers to the pain and discomfort experienced by individuals with osteoarthritis, a degenerative joint disease characterized by the breakdown of cartilage in the joints. Osteoarthritis commonly affects weight-bearing joints such as the knees, hips, and spine, as well as the hands.

### Diagnosis

X-rays: A common first step to identify bone changes such as bone spurs (osteophytes) and joint space narrowing. MRI (Magnetic Resonance Imaging): Provides detailed images of soft tissues, including discs and nerves. It is particularly useful if there is suspicion of nerve compression or herniated discs. CT Scan (Computed Tomography): Offers a more detailed view of bone structures if needed. Bone Scans: May be used to detect areas of high bone activity or damage, which can indicate OA or other conditions. Laboratory Tests:

Blood Tests: While there are no specific blood tests for OA, they can help rule out other conditions like rheumatoid arthritis or infections that may cause similar symptoms. Joint Fluid Analysis: If there is a question of joint effusion or another condition affecting the joints, fluid may be extracted for analysis to check for inflammation or other markers.

The pain experienced in osteoarthritis can vary in intensity and may be described as aching, stiffness, or soreness in the affected joints. It often worsens with movement or after prolonged periods of

inactivity. Other symptoms of osteoarthritis may include joint stiffness, reduced range of motion, swelling, and the development of bony enlargements called osteophytes.

#### Treatment

Spinal Osteoarthritis Treatment.

Spinal osteoarthritis surgical treatment.

1)

Wang W, Ma Z, Feng X, Ren J, Sun S, Shao Y, Zhang W, Yang X, Zhang J, Jing X. TfR1 mediated iron metabolism dysfunction as a potential therapeutic target for osteoarthritis. Arthritis Res Ther. 2024 Mar 16;26(1):71. doi: 10.1186/s13075-024-03304-x. PMID: 38493104.

From: https://neurosurgerywiki.com/wiki/ - **Neurosurgery Wiki** 

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=spinal\_osteoarthritis



Last update: 2024/11/05 19:42