Pain

Its Diagnosis and Management in the Rehabilitation of Horses

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KEYWORDS

• Equine • Pain • Analgesia • Musculoskeletal • Rehabilitation
• Interventional therapy

KEY POINTS

- Pain recognition in the horse is assisted by use of evolving observational and objective measures, including composite pain scales and gait analysis technology.
- Pain modulation may be provided to the horse using pharmacologic, manual, and interventional therapies.
- Pain recognition, modulation and consistent monitoring may help to provide specifically tailored rehabilitation programmes that can optimize return to athletic function.

INTRODUCTION

Assessment of acute or chronic injury must include determination of pain related to tissue damage to facilitate development of an appropriate treatment and rehabilitation plan. The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.[1] Assessing pain in the horse is complex and dynamic, and techniques regularly used to assess pain in humans and other species do not readily transfer to the horse.[2,3] Recent interest has resulted in increasing knowledge and availability of objective measures for pain evaluation in horses.[4–8] Following a brief review of pain physiology, the focus of this article is on the tools available for the diagnosis and management of musculoskeletal pain and their consideration in developing rehabilitation protocols.

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BRIEF REVIEW OF PAIN PHYSIOLOGY

The perception of pain is highly complex and multifaceted, relying on differential processing of noxious stimuli by specialized neural pathways depending on the type and intensity of signal.

- Nociceptors are sensory receptors that transduce and encode signals in response to noxious stimuli from chemical, thermal, and mechanical sources.[9]
- Nociceptive stimulation triggers action potentials within high-threshold afferent neurons (unmyelinated C-fibers or weakly myelinated Aδ-fibers) whose cell bodies are located in the dorsal root ganglia.[10]
- Nociceptive stimuli are projected through central pain signaling neurons in the spinal cord to the higher brain centers where pain is perceived by the animal.
- Excitatory glutamate receptors and inhibitory GABAergic and glycinergic receptors[11] are considered the primary dorsal horn nociceptive pathway neuropeptides.
- Transmission of nociceptive signals from the peripheral nerve through the spinal cord is subject to modulation by alternate input, intrinsic neurons, and controls emanating from the brain. For example, nociceptive input can be modulated by increasing afferent input from nonpainful stimulus (eg, rubbing area of wound following touching a hot stove).[12]
- In people the somatosensory cortices are associated with sensory pain perception, and the cerebellum is involved in the processing of responses to noxious stimulation.[13,14]
- Descending neural pathways are broadly considered inhibitory and are modulated by concentrations of endogenous opioids, cholecystokinin, neurotensin, acetylcholine, cannabinoids, α_2-adrenergic agonists, and serotonin, propagating inhibitory signals from the higher centers to the peripheral tissues.[15]
- Local and neural effects at the site of injury result in upregulation of vasoactive compounds and neuropeptides.[10] These compounds and neuropeptides, in turn, stimulate epidermal and immune cells, leading to vasodilation, plasma extravasation, and smooth muscle contraction.

Although the complexity and plasticity of the pain pathway provides challenges in pain recognition, advances in diagnostic technologies and knowledge of targets for therapeutic modulation have improved our capacity to provide pain relief. Treatment approaches are likely to differ further depending on the nature of the pain state, which broadly may be categorized as acute or chronic.

Acute Pain

This pain generally follows injury wherein the withdrawal from noxious stimulus alone fails to prevent tissue damage and results in activation of the afferent nociceptive pathway.[10] The response generated by the body is intended to facilitate removal of injured or damaged cells, eliminate foreign material, minimize further damage, and provide an environment for tissue regeneration. Heat, swelling, redness, and loss of function are caused by actions of chemical substances (eg, bradykinin, cytokines, prostaglandins), result in inflammatory pain and may cause primary hyperalgesia.[9] If uncontrolled, the inflammatory process may result in exacerbation of the pain state following removal of the insult. Hence, the common goal with acute injury is to limit the inflammatory response, which in turn is likely to reduce discomfort.

Chronic Pain

Chronic pain is considered maladaptive when pain resulting from an acutely painful episode persists beyond the expected period of tissue healing. This maladaptive state