INFLAMMATION: FRIEND OR FOE?

STUDY OF THE INFLAMMATORY PROCESS

AND THE BENEFITS OF ALTERNATIVE

THERAPIES

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Study of the inflammatory process and the benefits of alternative therapies

Your horse comes in from the paddock limited in the movement of a limb. Upon palpation of the area, you notice heat, pain, and swelling; the classic signs. Yes, as horse owners we are well aware of the signs of inflammation. However, few of us understand the process, and we rarely think twice about treatment. The definition of inflammation according to Bailliere's Comprehensive Veterinary Dictionary reads;

> "…a localized protective response elicited by injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissue…"

The dictionary goes on to list 24 types of inflammatory responses, just an example of how such a complex body defense system has become generalized to 'swelling.' To effectively assess the modalities used to deal with inflammation we must first understand the inflammatory process. The body responds to injury by attempting to destroy, dilute, or wall off an irritating agent. An irritant may be a disease causing organism(s), toxins, chemical poisons, burns, mechanical injuries, or venom's and antigens. This response is the body's defense against disease causing organisms, and is an attempt to confine and destroy the irritant. The classic signs of inflammation are redness, swelling, heat, pain, and loss of function caused by an increase of blood flow to the affected area. This increase in circulation causes an expansion of seepage in interstitial spaces, radiant heat, pressure on the body's pain receptors, nerve irritation, and tissue destruction due to formation of fibrous adhesions. Histamine, released by the damaged cells causes dilation of blood vessels and increases the amount and quality of blood reaching the affected area. Following the release of histamine and related swelling, leaking capillary walls permit inflammatory cells to reach the irritated area. The initial dilation stretches walls of vessels making escape of fluid contents easier. Leukocytes, erythrocytes, globin, serum and other cells pass easily through gaps in stretched capillaries carrying antibodies and enzymes to site.

The exudates from the vascular system attempts to dilute the irritating substance. Excudate is the material made up of fluid, cells and cellular debris, which has escaped from the blood vessels. The excudate performs an infection fighting function as well as carrying antibodies and bringing heat tot the area. Heat or fever is one defense the body has to weaken infectious organisms. Bacteria are often destroyed by heat. As leukocytes arrive they attempt to remove the irritant. If the invading substance is bacteria or a foreign particle the leukocytes will phagocytize (eat and digest), the organisms. As a direct result of the inflammatory process, powerful enzymes and antibodies are delivered to the area to destroy and remove cells and debris while the presence of infection fighting elements begins the healing.

During the inflammatory response three major cells are involved; reticuloendothelial cells, leukocytes, and plasma. Reticulo-endothelial cells are found in the framework of the tissue. There phagocytic abilities absorb and digest foreign particles in the body. There are four major kinds of leukocytes involved in the inflammatory process. Neutrophils ingest foreign material, remove dead bacteria and

body cells, and secrete substances that promote inflammatory reaction, initiate and maintain fever. Basophils contain chemicals that cause vessels to dilate. Esinophils limit inflammatory response by opposing histamine. In addition to their primary function, esinophils are phagocytic and reduce the substances and bacteria. Lymphocytes, the most numerous cells, have the ability to reproduce at the site, become plasma, and participate in the immune reaction. Plasma cells produce antibodies at the site of inflammation to combat the invading organisms.

Inflammation can be grouped into two categories; acute and chronic. Acute inflammation arises suddenly and is characterized by hyperemia, exudative and alterative changes without proliferation. All three of these responses must progress rapidly. Chronic inflammation begins slowly and continues for a long period of time, with the presence of mature granulation tissue. The degree to which inflammatory reactions are judged may also be broken down into three categories; adequate, inadequate, and excessive. Adequate reactions are unable to defeat the infection and repair damaged tissue. Excessive reactions produce too much inflammatory response, and may cause damage by increasing pressure on the affected area leasing to pain, tissue destruction, excessive scar tissue production and loss of function. When the injurious agent is overcome by the defense system the clean up operation begins. Dead tissues and remaining fluid are absorbed into the blood and lymphatic systems. Damaged tissues are replaced with healthy tissues and the flow through the area is restored. Prominent Veterinary Surgeon Dr. Dan French gives us his insights;

“Inflammation and its role is soft tissue injury. From a pure medical perspective “inflammation” is a generalized non-specific tissue response to injury. Tissue injury may be defined as infectious, traumatic, thermal, or chemical. While the neurohormonal and cellular responses involved in the inflammatory process is extremely complex the response form and athletic injury perspective is rather crude. The principle purpose behind the inflammatory response is a locally protective one. This response is essentially “arming the troops for battle.”

However the type of battle the body prepares for will vary depending on the nature of the injury. The inflammatory response is characterized by the classic signs of pain, heat,

redness, swelling and loss of function. In extreme cases this protective response is effective, as in a broken leg or a sever sprain. Swelling will provide some limited stabilization and the pain ensures that the affected area is protected and not used. In more subtle athletic injuries particularly muscle injuries the inflammatory response is not necessary. Unfortunately the body can not distinguish this type of injury and advise the troops that preparation for full battle is not necessary. We therefore proceed from a treatment perspective to control inflammation by applying cold therapy and administering anti-inflammatory drugs such as phenylbutazone, flunixin (benamine) or ketoprofin (anafen) in acute stages. Once the inflammatory response has been brought under reasonable control we proceed to attempt removal of swelling and tissue edema via a variety of therapies to ultimately establish a return to function. This further reduces pain and discomfort and encourages the establishment of new circulation to assist in tissue healing.”

The inflammatory response may be controlled by several modalities. Several modalities will be examined to specifically deal with the body's inflammatory response to soft tissue injury.

Drug Therapy – Corticosteroids, hormones produced by the adrenal cortex, are commonly used as anti-inflammatory drugs. Corticosteroids block all aspects of the inflammatory reaction and remove the normal body response. Blockage of this body response will reduce outward signs of the injury; however it increases the body's vulnerability to invading organisms, infections, and retardation of healing. Wounds won't heal correctly if the inflammatory response does not take place, nor will they heal if the response is excessive. A veterinarian may use corticosteroids to modify the inflammatory response; however care should be taken by the average horseman to ensure no blockage of the body's response system takes place. Due to the body's inability to distinguish between critical and superficial injury, corticosteroids are useful in moderating the inflammatory response when superficial and non-critical injury takes place. Phenylbutazone, banamine and anafen are a few examples of commonly used corticosteroids.

Herbal Therapy – Herbal medicine is loosely linked with western pharmacology. Holistically the healing power of the entire plant is considered the benefit, whereas modern medicine separates the acting chemical, synthesizes it and uses it for a direct attack on disease. Herbal remedies do not attack the specific disease; they strengthen the body's healing potential to cure the disease. Herbal products have also been very successful in assisting with the inflammatory reaction. Many herbs have both anti-inflammatory and analgesic properties. Herbs don't work on the same level as anti-inflammatory drugs, instead of suppressing the inflammatory response they strengthen the abilities of those responses and make them more effective. Anti-inflammatory herbs are often combined with herbs that strengthen the circulatory system. Those that cleanse the tissues and eliminate toxins from the body also can be effectively combined to eliminate inflammation. Although very potent, herbal products take a longer period to be accepted into the tissue. In critical cases, herbal therapy may not give the relief needed to the tissue in the time frame desired. Given along side a drug treatment, herbal therapy may continue relief and shorten the time the animal is on the drug. Drugs affect the injured area immediately, and allow the herbal products to build in the body to a point that they can take over treatment. Examples of effective anti-inflammatory herbs include; Slippery Elm, St. Johns Wort, Willow, Devils Claw, Meadow Sweet, Comfrey, Chamomile, Celery Seed, and Echinacea. Herbal remedies should be combined with a balanced nutritional program; seeking the advice of a skilled Kinesiologist will take the guess work out of designing this program.

Heat Therapy – "Physicians are early as Hipporates used bags of heated water to treat…inflammations." Heat therapy is a very useful modality in the control of inflammation. With this therapy we are able to influence the stages of the reaction itself. Upon injury, hemodynamic and cellular changes occur. During the capillary vasodilation stage, increased blood supply increases the inter-capillary pressure. In conjunction with Hystamine, Bradykinin, proglandins and the stretched capillary walls, fluid escapes into the interstitial spaces creating edema. Through the introduction of heat therapy at this stage the body is able to sustain vasodilation and the increases of circulatory function, increase concentration of nutrients, waste, and toxin removal can be heightened and the repair stage may begin sooner. Heat therapy can moderate pain in two ways; system changes and neurological changes – the effects of

chronic pain. Through the application of heat therapy one can relieve spasming. Sprain or strain would be an instance in which this modality would be applied. “Gate control theory” can also be helped with heat. The “Gate Control Theory” is the body’s protecting device against pain. Pain signals may be lost before reaching the brain. Heat application can sufficiently overload pain transmissions. This theory may be applied to any chronic inflammatory response. Care should be taken in acute inflammations and any injury with an open wound to insure excessive fluid is not added to an already delicate area. Heat therapy must be applied at 40-45 degrees Celsius. Below this temperature there is no therapeutic effects, and above this temperature if it is too slow, the net temperature in tissue is negligible, and if the rise is too fast, the heat will build in tissues and pain will occur. A rule of thumb with heat therapy is it takes 15 to 20 minutes to reach tissue 1 to 2 cm deep.

Cold Therapy – In the acute stage of the injury cold therapy can be extremely beneficial, however there is a misconception of its effectiveness in the chronic stages. In the first stages of injury the vessels are signaled to dilate and an increase in circulation is stimulated. Cold therapy is very effective in treating this vasodilation and fever removal. Reduction of temperature will contract vessels and decrease permeability. Therefore limiting seepage of blood products into the interstitial spaces and controlling edema. Fever can be limited through this modality as well. Decreasing fever will benefit extremely well as will injuries with open wounds. Seepage from open wounds can be moderated with the arterial constriction the reduction in temperature begins. As with heat therapy, cold must be applied to the affected area for a minimum of 15-20 minutes to affect tissue 1 to 2cm deep. Care must be taken during application of cold therapy as blistering is easily caused on thin skinned areas. This modality has little effect on chronic stages of inflammation. Once the acute stage has passed, the body’s production of new fluid to the area greatly decreases. To help cleanse and detox the area the body must increase waste removal. To do so an increase in circulation is of great benefit. Cold therapy slows flow and contracts vessels in the effected area limiting waste removal. A soothing effect is still present; however heat therapy would be a wiser choice in chronic stages.

Magnetic Therapy – Magnetic therapy is a little understood, but effective way to treat the inflammatory response. Magnets themselves create a force with the capability to produce a state of hyperemia within the tissue that will accelerate, repair and relieve pain. The physiology of this therapy works on the same principles discussed in the section on heat therapy, and the application is used for similar instances. To briefly reiterate, an increase in circulation, fluids and waste removal moderates pain and heightens the repair stage. Magnetic force is so strong that it must be used with a degree of caution. Its ability to heal is so great that often the body can not deal with such an increase all at once. Magnets should not be left on an unsupervised animal for long periods of time without the animal having the ability to remove them. As the healing is magnified the pain and pressure in the affected area is also enhanced. This super-healing may become unbearable and the animal may need to alleviate the pain. One may find that chronic inflammations not alleviated by other modalities may be aided through magnetic therapy. Due to the super-healing potential, the magnet may be able to break through stubborn fibre laid down by the body in a severe reaction, and relieve edema caught deep in the tissue.

Massage Therapy – Massage is a tool that can be applied to the reduction of inflammation. Through massage the practitioner can affect both the circulatory system and the lymphatic system. By

stimulating the circulatory system the body can both increase the flow of new cells to the area and increase the removal of waste products from the area. During the acute stage of inflammation, massage can be utilized between the heart and the affected area to increase the circulation and stimulate function in the limb. Once the acute stage has subsided, massage can be used on the affected area to break down any fibre that has been deposited to splint the area, and to aid the body in removal of fluid and waste products trapped in the tissue. Working with the venous return system (venous blood carries waste back to the heart), a practitioner can effectively “milk” the area of edema and clear toxins to an origin site for removal. As well, by freeing the skin, facia, and deeper soft tissue structures massage can return function to the affected area. Massage stimulates venous return, and work on and around lymph nodes increases production and waste removal via the node itself.

Massage is very safe and effective method of decreasing inflammation and assisting in return of function. Massage is the one modality that may be applied to any instance of inflammation. The practitioner must take care during the acute stage not to re-traumatize the area by working directly on the injury, or pulling the tissue if previously broken.

In conclusion, the inflammatory response system of the body is an extremely complex and delicate one. The ability to destroy, dilute, or wall of an irritating agent is remarkable. The healthy body has the inherent ability to protect itself from invading organisms, cleanse wounds and heal injuries. Care must be taken in the assessment of the injury, to choose the appropriate treatment. The body’s ability to distinguish between critical and superficial injury is poor. As horse owners it is our job to assess the situation and choose an appropriate modality.

As discussed in this paper, there are several modalities available to us and a clear understanding of the process is needed to choose the most effective one. Drug, herbal, heat, cold, magnetic and massage therapy have all valid applications. The severity of the injury is often times the clue to the modality that should be chosen. Acute and chronic inflammations have different reactions and should be treated as such. As well the body’s response whether adequate, inadequate, or excessive will dictate the treatment utilized. A heightened knowledge of the modalities will make the assessment of what to apply easier. Alternative therapies not only give you a choice, but several paths to explore when treating inflammatory responses to injury. Not every case will act or react the same and a variety of treatments are invaluable.

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