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Practical review of self-mutilation in horses☆

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Abstract

Self-mutilation in horses includes biting, stomping and kicking, rubbing, and lunging into objects. Based on the author's clinical experience, three distinct types of self-mutilation are proposed and described. Type I represents normal behavioral response to continuous or intermittent physical discomfort. Type II, seen in stallions and geldings, can be recognized as self-directed intermale aggression. The behavior includes the elements and order of the natural interactive sequence typical of encounters between two stallions, except that the stallion himself is the target of his intermale behavior. Type III involves a more quiet, often rhythmically repetitive or methodical behavioral sequence of a stereotypy, for example nipping at various areas of the body in a relatively invariant pattern, stomping, or kicking rhythmically against an object. The prevalence of the various types of self-mutilation in horses is not known. In one survey, results suggested that self-mutilation of one form or another has been observed in as many as 2% of domestic stallions. Among and between stallions, self-mutilation varies in frequency and intensity, and can reach levels that are fertility and/or life threatening. Careful evaluation of the horse's behavior is often necessary to distinguish the specific type. Type I self-mutilation, where physical discomfort is the root cause, can be eliminated by relieving the discomfort. For Types II and III, understanding of intermale interactive behavior of horses and the environmental factors that may trigger or exacerbate the self-mutilative form, can be useful in guiding humane management or behavior modification. Pharmacologic interventions may be a useful adjunct to management and nutritional changes.
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1. Introduction

Self-mutilation (also known in the literature as self-injurious behavior, self-aggression, and autotomy) has been described in a wide variety of domestic or captive species, including humans and domestic animals. Common examples of self-injurious behavior in humans include hair pulling, fingernail or finger biting, or lip or buccal biting, skin or scalp scratching, head banging, or deliberately inflicting friction or thermal burns, cuts, or other non-lethal wounds (DSM-IV-TR, 2000; Hawton et al., 2002; Winchel and Stanley, 1991). Common forms of self-mutilative behavior in domestic and captive mammals include licking and chewing limbs or tails, flank sucking, nail biting, face pawing, and hair licking or pulling (Luescher et al., 1991). Self-mutilative behavior in horses includes biting (e.g., abdomen, flanks, groin, shoulders, limbs, or chest), stomping and kicking, rubbing, and lunging into objects (Houpt, 1983; McDonnell et al., 1987). A common form known as flank-biting typically includes biting at the abdomen, flank, or hind limb while kicking and/or striking out, and vocalizing in sharp squeals or barking grunts. Episodes of such flank-biting also often include spinning, in a manner similar to tail chasing in a dog or cat. Episodes of self-mutilation in horses, as in other species, can vary from quietly and methodically repetitive as in a quiet stereotypy, to violently explosive. Among and within stallions, self-mutilation varies in frequency and intensity, ranging from cosmetically value-limiting to levels that are fertility and/or life threatening.

2. Types of self-mutilation

2.1. Type I self-mutilation

Self-mutilation in horses can be classified into at least three distinct types. Likely the most common form (Type I) is simply normal behavioral response to intense or chronic unrelieved physical discomfort. Physical discomfort alone, particularly in the abdominal area, can evoke self-injurious behavior. The classic behavioral signs "colic," or of labor in brood mares, involves turning the head back toward the flanks, either looking or sometimes nipping at the flank, and sometimes lifting, stretching, or kicking out with limbs. In some instances the behavioral response to physical pain includes more violent episodes including spinning, kicking, bucking, and self-biting of the flank, abdomen, shoulder, or chest. Examples of physical problems that have been diagnosed as the root cause of violent self-mutilation behavior in stallions are listed in Table 1. In some instances the discomfort appears intermittent, is challenging to distinguish from other types of self-mutilation due to exacerbation by sexual excitement or frustration, and may go undiagnosed for years, particularly in stallions (Bedford et al., 2000; Dallmeyer et al., 2006).

When physical discomfort is the cause of self-mutilation in horses, the intensity may vary in association with work. In some cases the most explosive episodes may commence during work. With time, horses with such work-related experience may begin to appear anxious, agitated, or may even begin self-mutilation in apparent anticipation for work. In contrast, in other cases of physical discomfort, work may seem to be a sufficient distraction from the discomfort, and the self-mutilative behavior may not occur during or in anticipation of work. In some of these horses, there may be a pattern of increased self-mutilation immediately following work. In these situations it is common for managers to expect the cause is primarily psychological. For example, in the case of self-mutilation before, during, or after work, it is not unusual for handlers to complain that the horse is self-mutilating to express unwillingness to work. In cases where the self-mutilation does not occur during work, however, the self-mutilation is often attributed to

Table 1
Examples of physical discomfort causing self-mutilation in stallions

Urogenital discomfort
Scrotal hernia
Testicle in the inguinal ring
Testicular torsion
Penis bending over on itself within the sheath
Penile lesions (squamous cell carcinoma)
Testicular and scrotal lesions
Bladder disease
Urethral lesions
Uroliths
Nephroliths
Seminal vesiculitis
Abdominal/pelvic discomfort
Impactions
Jejunal abscess
Adhesions
Gastric ulcers
Pelvic fracture
Epiploic foramen entrapment
Other causes of discomfort
Skin allergies
Parasites
Peripheral neuropathy
Aortic iliac thrombosis
Myopathy
Limb pain

"stall boredom," or the horse's desire to get out to exercise or work. Self-mutilation resulting from physical discomfort may also be provoked or exacerbated by social or handling situations. Stallions, for example, may appear to be "set-off" in thwarted sociosexual situations, such as another stallion or a mare passing within sight or sound, yet physically separated by a barrier. Again such observations are commonly interpreted by managers as indication that the events are the primary cause of self-mutilation rather than possibly exacerbating or secondary psychological factors. Another reason that physical causes are sometimes not considered is that a horse in the midst of an explosive episode of self-mutilation, whether pain-related or not, is often described by witnesses as exhibiting bizarre animal behavior reminiscent of severe neurotic repetitive behavior or psychotic rage behavior of humans. It should be mentioned that aggression in rabies can be self-directed. Usually the rapid progression of other signs, including generalized aggression and altered mentation, point to the suspicion of rabies.

2.2. *Type II self-mutilation*

A second type of self-mutilation (Type II) is what can be recognized as self-directed intermale aggression. This type occurs in stallions and geldings. The behavior includes the natural behavior elements and order of the interactive sequence typical of encounters of stallions at liberty, except that the stallion himself is the target of his own behavior (McDonnell, 2003; McDonnell and Grogan, 2006). Under natural herd conditions of horses, when stallions meet one another, they display a highly stylized and ritualized aggressive and investigative interaction. The stallions stand

parallel to one another, head-to-tail. In a collected posture and animated style, they investigate each other's flank area, usually sniffing and nipping at the flank and genitals. The stallions typically squeal and kick, usually in response to nips or bites. They may also spin, buck, stomp, and romp, going around one another in circles. The sniffing of each other's flank and genital area, and of each other's voided feces is associated with and appears to be a trigger for the posturing, nipping, and biting. In natural settings, the intermale sequence occurs in various social settings with varying intensities and degrees of ritualization or spontaneously frank intensity of aggression, depending upon the age, social status, and relationship of the males involved. For example, among bachelor stallions with an established social hierarchy, the behavior can appear playful and sporting, as if "just going through the motions." When the social hierarchy is less stable or status distinct, the intermale greeting interaction tends to be more intense and seriously aggressive (McDonnell and Haviland, 1995). Among harems stallions, the greeting posturing encounters among are generally more serious and intense, but similarly vary toward ritualized depending upon social conditions and established or new relationships. These intermale sequences also occur in a juvenile playful form among pre-pubertal colts or when a colt interacts with a mature stallion (McDonnell and Poulin, 2002). The most common setting for intermale posturing of this type occurs when stallions meet over a communal stud pile. The sequence then includes sequential elimination marking behavior, and generally settles into a ritualized posturing form (McDonnell, 2003; McDonnell and Grogan, 2006). Type II self-directed intermale aggression among domestically managed stallions appears to vary similarly in intensity and ritualization of aggression.

It is common for episodes of flank-biting to commence with elimination marking and investigative sequences such as sniffing of feces of his own or of other stallions in shared turn-out facilities, or sniffing of his own groin. Oily body residues of self or other stallions on stall walls, fences, doorways or in trailers can similarly trigger episodes. Our clinic has been aware of cases of self-mutilation that appeared to have begun when a young stallion was first exposed without possibility to escape from the feces or oily residues of another stallion, for example during transport in a trailer or van. Episodes of Type II self-mutilation may be reliably provoked by the sight or sound of other stallions, or upon turn-out into a paddock used by other stallions. The author has observed several self-mutilating stallions whose episodes were set-off when they were exposed to their own reflection in glass or water. Similarly, tape-recorded sounds of their own vocalizations or those of other stallions reliably provoked the onset of episodes of flank-biting.

Type II self-mutilation is usually reported by managers as having developed gradually over a period of at least weeks or months. It has been observed as early as the first year of life, and sometimes is observed in yearling colts in an apparently playful form. The self-mutilation behavior or the tendency for the behavior typically continues for the life of the stallion.

Dodman et al. (2004) have suggested that self-directed aggression in horses appears similar to Tourette's Syndrome in humans. Parallels cited as support for the equivalency are similarities in certain behavioral elements (self-biting, vocalization, head turning tics, striking out with a limb), as well as a male predilection and familial tendency, unrelenting course, exacerbation by stress, amelioration by absorbing activities, unimpaired performance, preoccupation with environmental boundaries, and occasional precipitation by trauma (Dodman, 2004).

2.3. Type III self-mutilation

A third type of self-mutilation (Type III) involves a more quiet, often rhythmically repetitive or methodical behavior, for example nipping at various areas of the body, stomping, or kicking against an object. This type appears similar to the more classic equine weaving or pacing or

rhythmic head bobbing stereotypies, in that the horse appears as if it "has nothing better to do," the behavior takes on a fixed methodical sequence that often occurs on a predictable schedule. The author has observed stallions that had elaborate fixed patterns of biting, for example from flank to shoulder to chest to opposite shoulder to opposite flank and on. One stallion that was closely observed over a period of several weeks had daily episodes that occurred at the same place in the pasture at the same time of day for the same length of time, just as some horses walk the perimeter of their stall in very complex and fixed pattern day after day.

3. Analysis of self-mutilation

Stereotypies occur in a variety of forms in all captive wild and domestic animal species, and are a common feature of human psychopathology, as well as developmental and neurologic disorders (DSM-IV-TR, 2000). Subadequate environment and nutrition appear to be the major factors leading to stereotypies in domestically confined animals. In horses, the classic stereotypies include cribbing, weaving, pacing, stall-circling, and head-bobbing. Certainly, in cases in which a physical root cause is not apparent, self-mutilation fits this definition of a stereotypy. The performance of a stereotypy, no matter what the initial precipitating cause, is self-rewarding as endorphins are released (McDonnell, unpublished), that are believed to be positive reinforcement sufficient to sustain the behavior as a habit. It is possible that cases of self-mutilation for which no contemporary physical cause can be found and that do not appear to be self-directed intermale aggression, may have started during a period of physical discomfort or stress, but then become a lingering ritualized stereotypy form of the behavior.

The term "obsessive–compulsive disorder," or OCD, had been applied to Type III self-mutilation and other stereotypies in horses as it has in other animals species. OCD in humans has two distinct components. One component is the compulsive repetitive behavior, such as repeatedly checking to see if the stove has been left on. The other component is the accompanying obsessive thoughts or worries, such as concerns about a fire. Often the thoughts or worries are related to the compulsive behavior and logically appear to drive this behavior. The nature and complexity of animal cognition is unknown, so this label of obsessive–compulsive behavior is likely too elaborate to apply to horses. Some authors now avoid the anthropomorphic attribution by simply using compulsive behavior (Luescher et al., 1998) or repetitive behavior (Mills, 2005).

The prevalence of the various types of self-mutilation in horses is not known. In a survey of stereotypies (Luescher and McKeown, 1998) self-mutilation was reported for approximately 2% of domestic stallions. Types of self-mutilation were not distinguished in that survey. Self-mutilation apparently has not been reported in wild or feral horses, suggesting that domestic environmental factors play an important role.

4. Treatment and management

4.1. Physical device treatments to reduce self-mutilation

Traditionally, most initial intervention strategies for self-mutilation of any type in horses have involved various methods of physical restraint such as neck cradles, side poles, hobbles, or short tethers to inhibit the motor pattern. Grazing muzzles, bibs, and protective wraps and boots have been used to prevent injury. Alone, these methods of physical restraint and protection from injury rarely reduce the apparent motivation and continued attempts at self-mutilation. Whether the cause is physical discomfort or behavioral, when the horse is effectively restrained from performing one

behavior, another self-injurious behavior may emerge. For example, if biting the flank is physically blocked with side poles, then the stallion may start biting the chest. If biting is prevented with a muzzle, the horse may then start kicking out violently or lunging into walls. But while evaluating and treating possible physical causes of discomfort, it is usually worthwhile to creatively work at reducing risk of serious injury. Restraints require careful construction and monitoring to avoid creating rub sores or other irritations from the repeated attempts to work against the restraint. The wounds from restraints then often become the focus of attention and self-inflicted complications. For self-biting, a soft rubber grazing basket muzzle is often a helpful tool. The horse is not thwarted from throwing the head back to the flank or abdomen, but the basket inhibits a substantial grab of flesh and the soft rubber prevents damage that might result with rigid material. The horse often also displaces the aggression by grasping onto the rubber of the muzzle itself, perhaps dissipating some of the motivation to bite. The persistent horse can sometimes work a small nip of hair or skin through the basket of the muzzle, but usually not enough to cause serious harm. The grazing muzzle allows the horse to drink normally and to quite effectively eat hay and grass through the openings, but at a slower rate. So another benefit is that the grazing muzzle usually significantly prolongs the duration of grazing or eating hay, which is for many animals an effective distracter from Types II and III self-mutilation. Protective blankets, felt boots, and padded enclosures that allow the behavior but reduce injury are likely a more humane approach than hobbles, neck cradles, or other physical restraints.

4.2. Punishment to reduce self-mutilation

It is not uncommon for managers' first intervention strategy to be punishment in the form of verbal reprimand, physically striking, or electric barriers or shock collars to suppress self-mutilative behavior of horses. Punishment of self-mutilation of any type is usually counterproductive. Punishment generally increases anxiety which adds to overall discomfort, which tends to increase the frequency and intensity of self-directed aggression. Therefore, for most cases of self-mutilation, punishment is considered inhumane.

4.3. Social, feeding, and work distractions to reduce self-mutilation

Clinical impression is that for Types II and III self-mutilation, typically the most effective management changes are those that seem to provide motivation for a substitute behavior or a strong distraction. For a stallion, self-mutilation can sometimes be relieved significantly if the stallion is placed in a large pasture with one or more mares. In this situation, the stallion typically becomes occupied with the normal behaviors of a harem stallion—herding, investigating, and protecting his mares. Those harem-maintenance behaviors seem to distract from the self-directed aggression. If nutrition is from natural forage only, grazing and resting may fully occupy the remainder of the stallion's time budget. Of course, this is not often a plausible solution for the intensively pampered breeding or busy performing stallion. There may be difficulty and danger in removing and returning a harem stallion from his mares. Most stallions will resist leaving their mares, at least at first. But to the extent that the stallion can be distracted socially, in some cases pasturing with mares may reduce self-mutilation. Horses appear to find meaningful social companionship from animals of other species. Donkey, miniature pony, or goat stall or pasture companions are sometimes useful social distractions. Chickens and rabbits have also been used, sometimes with good success. With chickens as stall companions for self-mutilators, it seems that some horses seem reluctant to move around the stall because it evokes scurrying and fluttering of

the chicken. With both rabbits and chickens, some stallions also seem distracted by their effort to avoid stepping on the companion.

Another effective distracter for many Type II or Type III self-mutilators is feeding behavior. A change in diet from one heavy with grain or concentrated formulations to one of grass and grass hay only (without any grain or richer forage) can often lead to a reduction in frequency and intensity of self-mutilation episodes. The horse may spend most of its time budget eating and resting, with seemingly no spare time for anything else, including self-mutilation. A grazing muzzle similar to the one described earlier, can effectively prolong foraging time. The all grass-no grain diet may have other benefits for behavior. Research in horses and other grazing species suggests that grain meals predispose an animal to stereotypies and increase the rate (Davidson and Harris, 2002; Gillham et al., 1994). Anticipation and/or ingestion of highly palatable meals appear to alter brain neurochemistry, for example by influencing endorphin production (Dum et al., 1983) and by altering the dopamine system in a manner that affects repetitive motor behavior (Park and Carr, 1998). Both from research and from horse management experience, it is known that infrequent, highly palatable, calorie dense meals, increase the risk of behavior problems and that high forage diets tend to reduce the risk of behavior problems (e.g., Cooper and McGreevy, 2002; Clegg et al., 2008).

Work also appears to be an effective distracter from Type II and Type III self-mutilation. For the self-directed intermale aggression type of self-mutilation, the behavior is almost never seen during work. Moderate work also stimulates appetite. A stabled horse that is fed *ad libitum* grass and grass hay and that also works 1–2 h/day, will usually approach the natural time budget and pattern of alternating periods of eating and resting typical of horses under natural foraging conditions. An intense breeding schedule can sometimes reduce and sometimes increase the frequency and intensity of self-mutilation. Type II or III self-mutilation is usually not seen during a breeding session.

4.4. Gelding stallions to reduce self-mutilation

For Types II and III self-mutilation, castration has been anecdotally reported to eliminate self-mutilation. Importantly, there also have been numerous cases for which castration did not reduce or eliminate self-mutilation. Some, but not all, of these geldings were subsequently found to be Type I self-mutilation, and so it is understandable why castration was not effective. For some of these geldings for which castration did not significantly reduce self-mutilation, the self-mutilation clearly did appear to be Type II or III. As with other stallion-like behaviors, removal of androgens does not always eliminate the behavior. Perhaps temporary suppression of reproductive function (Stout and Colenbrander, 2004) would be useful in evaluating the potential benefit of surgical castration. Although full fertility may not return, the benefits of the evaluation may be judged worthwhile. Also interesting in this regard are anectdotal reports of geldings whose initial onset of self-mutilation occurred immediately following castration. Based on owners' descriptions of how the behavior developed, it is tempting to speculate that trauma-induced attention to the groin and to genital odors may have initiated the onset of self-directed intermale aggression.

4.5. Medications to reduce self-mutilation

Pharmacologic aids in some cases have appeared helpful in relieving Types II and III self-mutilation. Long-acting tranquilizers such as fluphenazine may be effective, via the mechanism

of sedation. The tricyclic anti-depressants such as imipramine and clomipramine have been found clinically useful for locomotor and self-mutilation stereotypies in horses (McDonnell, unpublished) and other domestic animals (Seskel and Lindeman, 2001), and are believed to work via their effects on serotonergic systems known to mediate compulsive behavior. More recently developed selective serotonin re-uptake inhibitors, such as fluoxetine, are also used widely for treatment of stereotypies and other behavior problems in small animal behavioral medicine (Luescher, 2004), but apparently have not been used in horses. The nutritional supplement l-tryptophan, the precursor of serotonin, has been clinically effective in reducing self-mutilation and locomotor stereotypies in horses (McDonnell, unpublished). Anecdotally, progesterone treatment has been useful in some cases, possible through anti-androgenic or generally calming properties. The author's clinical experience suggests that in most cases none of these medications alone or in combination is likely to completely eliminate Type II or III self-mutilation. The particular choice depends on the severity and nature of the self-mutilation. In combination with management changes, medications are often judged to be a valuable part of the plan. The tendency is for the potential of drugs to be over-estimated, such that clients prefer treating with medications rather than effort and time into detailed diagnostics. An important concern if medications are used early in the evaluation is that many of these medications may help a horse to cope with physical discomfort, so may effectively mask the symptoms and delay diagnosis of a physical cause of discomfort.

4.6. Other interventions to reduce self-mutilation

For stallions and geldings whose Type II or III self-mutilation seems to be triggered by male odors and feces, steps can be taken to reduce the olfactory stimulation. Odor masking preparations can be applied to the nostrils, the horse can be bathed frequently, and feces and oily residues can be removed from stalls and pastures. Sometimes, the sight or smell of another stallion seems to provoke episodes. Housing changes can often be found that reduce the frequency and severity of self-mutilation. Long-term video surveillance of the horse can often reveal events and situations that provoke the behavior (McDonnell, 2005). Often these stimuli can be simply and inexpensively eliminated or modified. For example, occasionally it is found that self-mutilation only occurs in thwarted goal situations that induce anxiety, for example at feeding time when the grain cart approaches, or in anticipation of breeding as other stallions are going to and from the breeding shed. The horse's management can often be modified so as to eliminate such exacerbating or provoking environmental events.

For reasons that are not well understood, simply housing a stallion with Type II or III self-mutilation in a tie-stall can effectively eliminate self-mutilation in some cases. One possible explanation is that tie-stall housing reduces exposure to feces and male odors.

In the author's clinical experience, no one treatment or management intervention alone is likely to satisfactorily reduce Types II and III self-mutilation. Clinical impression is that the cases for which the greatest relief has been achieved have involved simultaneously implementing as many the treatment steps as possible. It is worth spending some time developing a custom plan based on everything that can be learned about the pattern of behavior in that particular horse, and to then implement planned interventions simultaneously. While it is then difficult to evaluate effectiveness of individual interventions, clinical experience has taught us that major change all at once is often more effective in interrupting self-mutilation than a systematic step-wise approach.

5. Summary

In summary, there are at least three distinct types of self-mutilation in horses, with implications for successful clinical intervention or management. Careful observation of the horse's behavior is often necessary to distinguish the specific type. For Type I, where physical discomfort is the root cause, the behavior can be eliminated by relieving the discomfort. For Types II and III, understanding of intermale interactive behavior of horses and the environmental factors that may trigger or exacerbate the self-mutilative form, may lead to more humane management.

Conflict of interest statement

The author reports no financial or personal relationship with other people or organisations that could inappropriately influence or bias the paper entitled "Practical Review of Self-mutilation in Horses".

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