



The Management of Pain In Animals on The Clinic Floor

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ABSTRACT

Most animals presented for veterinary care are suffering or will suffer from some pain during restraint, clinical examination, samples collection, diagnostic imaging, parenteral drug administration or clinical procedures et cetera. The Veterinarian is ethically, morally and professionally enjoined to recognize and alleviate such pain. Although most studies on animal pain have been focused on mostly post surgical pain in dogs and cats, animals afflicted with most common external or internal, infectious and non-infectious disease conditions also suffer from pain. Identifying animals in pain alone is difficult except if a Veterinarian with a penchant for the management of pain in animals actively looks out for it in patients. The measurement of pain in animals poses even more difficulties for the Veterinarian than its identification mainly because animals are unable to communicate the locations, the temporal occurrence and the severities of the pain they feel just as they don't of other clinical manifestations. Therefore, animals in pain rely on their owners, handlers or keepers et cetera who actually don't know how or where it hurts them to provide such details to the Veterinarian. To complicate matters, the use of validated pain assessment scales in animals is fraught with serious limitations except to some less extent, for the visual analog and the simple descriptive scales which seem applicable in real clinic situations. A multi-modal mode of management in which opioids, non-steroidal anti-inflammatory drugs, local anesthetics, α^2 -adrenergic agonists, NDMA receptor antagonists and ketamine delivered through a variety of routes, at varied dosages and regimens, is advocated for pain management in animals. The need to regularly review the state of the patient vis-à-vis the need to modify the treatment module and regimen cannot be over emphasized when and if a clinical case is under consideration. This may involve the change of medications, the addition of more medications, the reduction in the number of medication, changes in dosages and the regimen in use from time to time. This discuss is aimed at the general Veterinary practitioner who is presented daily with different species and breeds of animals suffering from varieties of clinical conditions or which will undergo a variety of clinical procedures capable of causing pain in the course of veterinary health care delivery in diverse clinic settings.

Key words: Pain. Animals. Identification, Assessment. Management. Veterinarians.

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INTRODUCTION

Definition of Pain

Pain is the perception of unpleasant sensations or noxious stimuli and emotive experiences associated with actual or potential tissue damage, or described in terms of such damage [1, 2, 3, 4] by apparently all vertebrates. In animals, pain is better defined as an aversive sensory experience caused by actual or potential tissue damage that elicits protective, motor and vegetative reactions which result in learned and avoidance behaviors which may modify species-specific, including social, behavior- it being sensory and aversive in character [5]. Pain encompasses such phenomena as stress, distress, and suffering et cetera although they defer from one another in fine details [6]. In plain terms, pain is simply the means by which any pathology or ailment in the body initiates and sustains its stress response mechanisms, down-grades and degenerates the body's defenses and eventually leads to fatality. Animals experience pain when they suffer from most medical conditions, are traumatized surgically or non-surgically or are psychologically and/or emotionally disorientated [7]. An often overlooked cause of pain in animals is their use in various experimental procedures or in teaching students [6, 8]. Physiological, otherwise known as adaptive pain actually serves as a warning to the animal or human that there is some damage or potential damage to his/its tissues which needs to be avoided or prevented if practicable. Avoidance is usually impracticable in cases of internal pathologies.

Distress, stress and psychological distress are more refined aspects of pain that are very difficult to define and/or handle clinically in animals when compared with pain of infectious, physical, chemical or thermal origins [6]. Such pain types, though rare, are not infrequently

encountered in intimately kept animals such as dogs, cats, West African Dwarf Goats (albeit other goats breeds), parrots, peacocks, local hens et cetera than is ordinarily recognized. Such animals often exhibit behavioral changes such as depression, idiopathic anorexia, altered sleep patterns, reclusiveness, unprovoked vocalization or aggression, downgraded body keeping functions resulting in unkempt appearances especially in cats, rodents and birds when humans or other animals with which they share close social relationships are away for long periods of time. Also, animals may be distressed and/or become psychologically disorientated when they deliver still-births. Such animals may go searching for their expected neonates hysterically and obviously distressfully hours after the still-births may have been cremated or buried (personal experience).

Pain turns from being physiologic and protective to destructive or pathological when its intensity and/or duration is/are beyond that required for protective or informative purposes. Any pain that induces observable behavioral changes in animals that may require veterinary attention is pathological or destructive. It requires proper identification, measurement and adequate management in order to alleviate or minimize all degrees and categories of animal suffering associated with it to a level tolerable by the animal. If untreated or inadequately and/or improperly treated such pain will degenerate into maladaptive states such as hyperesthesia, allodynia, chronicity and suffering [6]

A Few Definitions

An understanding of a few general definitions relating to pain is beneficial for some understanding of the subject and is critical for the proper and adequate management of pain in

both animals and humans. Such include:-

Superficial Pain: Pain arising from the stimulation of nerves on the skin.

Deep or Visceral pain: Pain arising from noxious stimulation of pain nerve endings in deeper body tissues such as muscles, joints, tendons and ligaments, abdominal or thoracic organs.

Fast or first pain: Acute pain caused by the stimulation of and conduction by small myelinated nerve fibres.

Slow or Second pain: caused by the stimulation and conduction of impulse by small un-myelinated nerve fibres usually of chronic pain

Acute Pain: This is pain of recent occurrence. Such pain could be severe, moderate or mild in intensity. It serves principally to alert the body of damage or potential damage to its tissues and the need to avoid a situation in which it is occurring.

Chronic Pain: This is pain that has outlived its acute phase and its physiological warning functions to the patient. It could be severe moderate or mild. Patients suffering from chronic pain may not show autonomic responses to such pain and the primary cause, if any, may not be easily identifiable or amenable to treatment. It is usually has no definite temporal onset. Some forms of chronic pain involve some physical alterations in the central nervous system which are capable of maintaining the painful state without reinforcement by repeated application of the initial causes. Most chronic pain are moderate to mild in nature but usually develop flares of severity depending on several factors such as the weather, usage etc. In general chronic pain appears to be a suffusion of feelings

of usually more than 6 months duration and has no definite boundaries. It degrades living, disrupts sleep to a state of distress bordering on suffering [6, 14, 16].

Maladaptive Pain: Severe or moderate persistent pain of long duration (more than required for normal of a particular pathology) that disrupts sleep and normal living, ceases to be protective and instead downgrades health and functional capacity [24]. Hyperesthesia, allodynia and in some sense chronic pain fall within the criteria of maladaptive pain. It is caused by certain physical changes in the spinal cord or the thalamus or other parts of the brain such that these centers become spontaneous pain generators so that pain may be felt even without any noxious stimulation.

Hyperesthesia: This refers to the higher but disproportionate pain response to a given level or intensity of a pain stimulus due to the sensitization of sensory nerves by certain chemicals notably serotonin, bradykinin and other kinins at the site of nociception. These body chemicals lower the threshold required for the generation of nerve impulses.

Allodynia: The feeling of pain caused by a stimulus that normally would not cause pain such as slight stroking in a cat with long standing polyarthritis or in a dog with long standing poorly managed spondylosis.

Neuropathic Pain: Pain which originates directly from the central nervous system without any peripheral stimulation.

Fantom Pain: is the expression of signs of pain relating to a part of the body that is no longer in existence such as an amputated limb even without the application of a noxious stimulus.

Wind-Up Pain: Is a heightened sensitivity to pain stimulus that results in altered pain thresholds peripherally and centrally. In such cases, pain is felt in areas of the body unrelated to the source of pain.

Such finer characteristics of pain such as crampy, aching, sharp, dull, biting, pinching, burning, gripping, piercing etc which are often used in discussions of pain in humans, are very subjective and are very difficult to detect in most cases of pain in animals because animals are non-verbal and therefore do not tell where or particularly HOW it hurts [12].

Difficulties with the Identification and the Measuring Pain in Animals

The processes involved in the identification and measurement of pain in animals as described by several workers [9, 10, 11, 12, 13] are rather complicated, cumbersome and time consuming especially for the veterinarian in general practice with no special interest in pain and its management. The scales validated for the identification of pain in animals such as the Glasgow (long and short forms, Colorado, the UNESP-Botucatu Multidimensional Composite, Colorado State's and several others [12] are very difficult if not impossible to apply at most veterinary clinic settings such as on the veterinary clinic floor, farm, sporting arenas, animal shows or exhibitions and during veterinary home visits or home calls except if the veterinarian has some special interest in pain in animals, or if a veterinary health care facility (VHCF) concerned is a large establishment

such as a Veterinary Teaching hospital with a large number of trained staff some of whom are engaged in some pain research or studies [9]. The validated pain scales are difficult to apply clinically because of restricted clinic-time in completing just a typical pain scoring format for one patient, lack of interest or knowledge of most veterinarians in pain, the species-specific nature of the scales which requires that the veterinarian be familiar with so many scales, the fact that the treatment of pain on the whole does not seem to attract any direct financial benefits and the overriding subjective nature of all the measuring scales in non-self reporting subjects be they animals or humans [9, 14]. Similar limitations in the applicability of several pain measuring scales in human clinics have also been reported [14]. Therefore a more pragmatic, practice friendly and easy to apply approach by which animals in pain could be easily identified and their pain measured is required. It may be easy to detect animals in pain if the anthropomorphic axiom "whatever causes pain in humans also causes pain in animals" is adopted as a guiding principle or, if it is assumed that any animal submitted or taken-in for veterinary care as a result of behavioral changes or for some elective surgery is suffering, or will suffer from pain in the course of receiving the necessary veterinary attention [7].



Fig 1a



Fig 1b

Fig. 1a shows West African dwarf goats (WADGs) suffering from chronic trapanosomosis with severe purulent ocular discharges (a). and another WADG suffering from Peste de petitis ruminatum (PPR) with severe depression, unusual stance, ocular discharges and lordosis (b). Both exhibited easily discernable changes in behavior validated for pain and were adjudged to be in moderate to severe pain. The administration of acetaminophan (paracetamol) intramuscularly followed by xylazine at a dose of 0.05mg.kg^{-1} for three days improved the demeanor and other behaviors such as eating in these animals remarkably.

In some of such animals the changes in several behaviors validated for pain may be easily and clearly discernable (fig. 1), while in some others such changes though present may be difficult to detect or elicit and lastly some animals may not exhibit any behavioral changes even though the anamnesis is suggestive. [9]. These patients may be categorized as being in severe, moderate or mild pain respectively and their treatment designed accordingly. In addition, surgical procedures carried out in designated regions of

the body have been associated with certain severities of pain (table 1). The Veterinarian may extrapolate this to medical conditions in different parts of the body. However, that an animal does not show overt signs of pain on the treatment floor even though it had been submitted for veterinary attention because it had exhibited some pain induced changes in some behaviors should not however justify it being denied the benefits of pain management [17].

Table 1. Pain potentials of selected surgical procedure

Severe pain	Moderate to severe pain	Mild to moderate pain	Mild pain
Thoracotomies and intra-thoracic surgeries.	Major abdominal surgeries	Minor incisions, ear cropping and tail docking	Anal sac expressions
Major orthopedic surgeries such as femoral, hips and vertebral column/spinal surgeries	Minor orthopedics such as of the tibia and radius,	Vascular catheterization	i.v and i.m. <i>injections, fecal sampling</i>
Acute abdomen, peritonitis, intussusceptions, gastric dilation and/or torsion acute abdomen	Neutering or C/section (Ovariohysterectomy)	Biopsy, orchidectomy	Venupuncture
Trauma and burns	Teeth extraction, Zeeps procedure for otitis media	Lumpectomy, de-beaking of layers or peacking birds.	Nail clipping.de-beaking of chicks,, tumor sampling.

Adopted from Zaki, 2013 (26).

The severity of pain in such patients may be assessed by the application of the Visual analog or the simple descriptive scale (VAS or SDS) which appear to be more applicable in most practice settings than the more elaborate numerical scales [7, 9, 10]. In this way animals in pain are quickly identified, the severity of pain quickly determined. In doing this, it is acknowledged that in practical terms, it may never be possible to know with exactitude the level of pain animal patients actually experience [6, 16]. Indeed, it has been advocated that the Veterinary profession may fare better managing pain in animals if the science of the identification and especially the measurement of pain are not allowed to detract from the act of managing pain in animal patients [14].

The use of a recently introduced instrument – a pain gauge – for the detection and probably measurement of the severity of pain in animals by veterinarians and clients may circumvent these constraints. The instrument which detects and assesses pain just as a rectal thermometer detects pyrexia in animals and may indeed be a “pain-o-meter”!! [16], Its use is currently limited to the United States. The wider use of this instrument may well provide numerical indices suggestive of pain and its severity in animals and man in the near future [12]. This

may lead to a better understanding and management of pain generally.

Benefits of Appropriate and Adequate Management of Pain in Animals.

Sick animals in which pain has been properly identified, measured and adequately managed are better amenable to handling clinically and are less likely to injure hospital personnel, hurt self and/or destroy hospital equipments when they are handled for more intensive and better clinical examinations and procedures than patients that are in acute or chronic pain [8, 9]. They are highly likely therefore to receive well thought out management strategies for their primary pathology. They thus return more speedily to normal physiology such as body/rectal temperature, heart and respiratory rates and rhythms, and behaviors eating, urinating, defecating, mobility, grooming, locomotion, vocalization and interaction with other animals and humans. All of these make them respond better to surgical and/or medical management strategies targeted at the pain-initiating pathologies [10, 12]. This results in quicker recovery rates, shorter hospital stay, less cost of treatment to the client and the veterinarian which could translate to a higher profit margin for the practice and a better client - Veterinarian relationship. The proper and

adequate management of the pain in the terminal ill could also delay euthanasia in intimately kept pets or those trained to care for physically disabled humans or for animals used for security or guard, or service animals which cannot be so easily replaced [14]. Preventing and managing pain are fundamental to quality and compassionate veterinary care and therefore pain should be integrated into all patient evaluation and care [7]. Unfortunately however, pain is specifically managed in only a very few veterinary health-care facilities (VHCF) the world over today [17, 20] mainly because of a long standing and significant knowledge deficit about pain generally among Veterinarians the world over [19]. In fact as late as 1998 Veterinarians trained in the United States of America were taught to ignore pain in animals [23].

Categories of Pain-Patients Encountered in Practice.

Veterinarians are presented with animal patients in pain and not pain in their animal patients!! Irrespective of the strategies employed in the detection and scaling of pain itself, animal patients presented with painful conditions fall basically into two categories with respect to their temporal presentation and management. These are:

1. Animals in which pain is absent when they are first presented for veterinary attention. These include cases for elective surgical procedures such as elective orchidectomy, ovariectomy etc, chicks or laying birds for debarking etc in which pain is absent but expected following veterinary attention. Such pain is usually acute in nature and may be of varied severity depending on the procedure, the part of the body involved, the degree of tissue invasion caused by the procedure, the fineness of the procedure and the organ involved. Other factors that may affect the severity of pain in such patients are the age, sex and the species of animals involved [6, 25]. It is the veterinarian's responsibility to anticipate or preempt that such animals would be in pain following veterinary intervention and to make efforts clinically to prevent or modulate the intensity of such pain

downwards. Table 1 above summarizes the pain potentials of commonly executed surgical procedures in animals.

The acuteness or chronicity and severity of pain in a given patient in this category usually vary in the course of treatment of any of such cases be they medical or surgical depending on how effective the initiating treatment had been. Thus a case which started off as an acute and moderately severe pain may become chronic and severely painful as a result of post management complications such as infection, self trauma, improper activity or use of an injured part, or re-operation etc.

This changing nature of the pain status of pain patients over time requires that a patient that is being treated for pain including those in categories below is continually re-assessed and the treatment protocol adjusted from time to time to meet the existing demands at any point in time until the resolution of the case. This may mean changing the drugs or their dosages and schedules of administration.

A typical example was a case of an elective orchidectomy in a two year old Rottweiler cross which was carried out rather poorly. The preemptive pain assessment was acute mild post operative pain. Four days (96 hours) after the orchidectomy, the dog was represented with. This time it was very aggressive, barked very loudly and uncontrollably, bared its fangs without provocation, charged at clinic staff, had bulging and red eyes, tense stance and foamed at its mouth. All these were signs of severe pain [10, 12].

2. Cases with pre-existing pain.

These may be animals presented with clinical conditions that are themselves surgical in nature in which some degree of pain already exists. These include trauma cases such as road traffic accidents, falls from heights, gunshot wounds and animal fights etc. The pain status of such patients may change in the course of veterinary attention due to post surgical or post medical interventions (fig2).

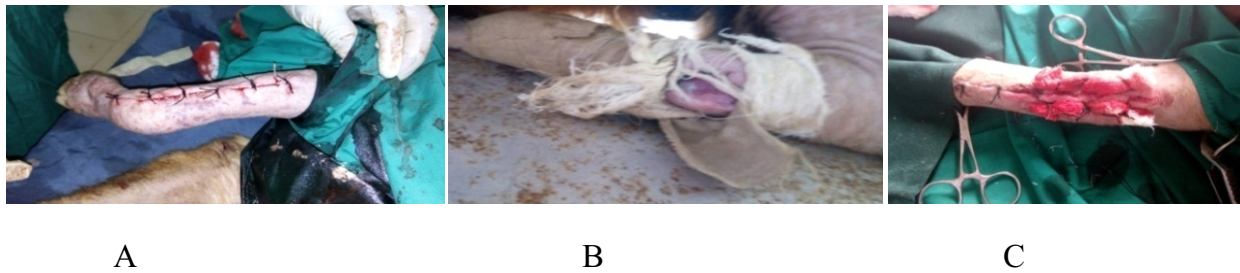


Fig 2. Mutilation of the Surgical Site Due To Change of the Pain Status

A compound tibia fracture repaired by internal reduction and intra-medullary pinning (A) in a dog with a pain assessment of acute moderate pain. On the fourth post operative day the dog mutilated its surgical site (B) and the pain assessment changed to acute severe pain. After re-operated (c), the pain assessment remained acute severe pain as a result of repeated noxious stimulation till the third day post re-operation when the assessment downgraded to acute moderate pain.

. They may on the other hand be

I. patients with internal pathologies such as hepatic abscesses, pyloric obstructions, bleeding gastric ulcers, oesophageal foreign bodies, splenic or gastric torsion and or vulvulus, intussusceptions etc which may require some surgical intervention. In such cases, the pre-existing pain is expected to continue post operatively in a more or less severe manner.

ii. animals afflicted with some systemic medical ailments of bacterial, viral, fungal, parasitic or nutritional origin which are associated with some degree of pain. These include infectious pneumonias, parasitic infections such as trypanosomosis, babesiosis, coccidiosis etc parasitic enteritis such as ancylostomiasis in dogs or haemonchosis in ruminants etc.

3. Occasionally animals suffer from emotional or psychological distress as when the close human associates of a dog or a cat go on a holiday leaving it behind or when a pregnant cow, doe, bitch or queen et cetera suddenly delivers still-births. Such animal patients usually exhibit obvious signs of emotional pain and distress such as unusual aggression, idiopathic anorexia, depression and lack of self caring functions (particularly cats). They may continue to search hysterically for their still-

births which would have been buried or cremated. In the cases of pets left behind as the entire family holidayed, they also exhibit sudden changes in the afore-mentioned behaviors at the return of their human associates.

Pain Types and Management Protocols

The pain management strategies for the three main categories of pain patients described above are presented below as illustrations only. Irrespective of the category of pain seen in any patient, the simultaneous use of two, three or four drugs with each limiting the eventual severity of pain experienced by the patient is preferred over the use of excessive high doses of any one drug. Drugs used in this fashion are said to be used in a multi-modal fashion. Table 2 gives a summary of the type of drugs that need be kept to achieve this purpose by a clinician or a veterinary health care facility.

1. Cases of Elective Surgery such as Ovariohysterectomy (OVH).

Patients in this category are given a potent analgesic such as an opioid or an NSAID preemptively as an integral part of a balanced anesthetic protocol before the commencement of the surgery or intra-operatively [23, 28]. Such patients are administered intravenous fluids through which opioids and or NSAIDs are administered if and as required throughout

the course of the surgical procedure. This way the patient is anesthetized with lower doses of anesthetic agents, remains in a reasonable stable plane of anesthesia all through the procedure and recovers from anesthesia in a relatively painless state devoid of trashing. The choice of the analgesic to use to achieve this level of analgesia depends on what is readily available, the experience and knowledge of the surgical team and the pain management protocol adopted by the Veterinarian or the Veterinary Health Care Facility (VHCF). This

protocol is preferred to the administration of analgesics after the patient has recovered from anesthesia. The analgesic regimen thereafter will vary from one patient to the other depending on the induction analgesic drug employed in terms of its duration of action and the necessity for additional doses and frequencies and the changing pain status of the patient. The patient may be placed under some light sedation at various periods while under the effects of analgesics during the period of hospitalization and

Table 2. Classes of Drugs Required For Pain Management In Animals

Drug types	Acute severe pain	Acute moderate pain	Acute mild pain
Opiods	Morphine* Pethidine* Buprenorphine* Oxymorphone	Buprenorphine* Oxymorphone	Tramadol*
Local Anaesthetics	Lignocaine* Bupivacaine*	Lignocaine Bupivacaine	Lignocaine Bupivacaine
NSAIA/(NSAID)	Caprofen Ketorolac* Piroxicam* Firocoxib Deracoxib	Diclofenac* Piroxicam ^x kaprofen	Acetaminophen i.m* Aceclofenac ^x
α^2 -adrenergic agonists	Xylazine* Detomidine Madetomidine	Xylazine*	Xylazine*
NMDA receptor antagonists	Ketamine*	Ketamine*	Ketamine*
Others such as pro-gabapentin.	Amandantine Pro-gabapentine ◇ Heat, cold, physical, management, acupuncture, electrical stimulations, neutraceuticals	Gabapentine Pro-gabapentin	Pro-gabapentine

***Legend:** items that are available in pharmaceutical markets locally.

Note: One or a maximum of three drugs in a group need be kept by for the management of most types and severities of pain in a multimodal or balanced analgesic fashion. In practice, two or three (one from any group of drugs) of these drugs are used on the same patient simultaneously so that one drug inhibits the transduction, another its transmission along the nerve fiber, another its amplification at the dorsal horn nucleus and another its transmission along the ascending spino-thalamic tracts and another its perception or interpretation at the thalamus, hypothalamus, its cognition at the cerebral cortex (if any in animals) or its transmission along the descending thalamo-spino somatic tract. This makes it possible to use smaller doses of each drug at any one time in a patient to manage pain. The actions of the individual drugs do not just summate but each drug action synergizes with the effects of the other drugs used so that the net effect is more than the sum of the individual effects of all the drugs used. Since sub -doses of each drug are used, the chances of the patient developing toxic effects or being over-dosed of any one drug in the cocktail is reduced or remote. Drugs used in this fashion are said to be used in a “multi-modal” fashion. Two, three but not more than four drugs may be used in this fashion in a given condition in any one patient.

local anesthetics may be employed to desensitize areas amenable to such modes of therapy. This includes for instance desensitizing the perineum with a caudal epidural analgesia following

surgeries around the perineum such as the repair of a perineal hernia or extirpation of anal sacs. If an opioid was the induction analgesic employed, it may be followed by the administration of a suitable NSAID within two hours for morphine or pethidine; or 6 hours for buprenorphine and subsequently every 12 hours during the immediate post operative period. Analgesic medication should continue as long as there are signs of pain in the patient. Most NSAIDs have a relatively long onset of

action in the range of 12 to 20 minutes if administered intramuscularly but long durations of action of about 12-20 hours [27, 28]. On the basis of these time frames, pain can be managed in such ways that the patient is always under some analgesic cover. In virtually all cases, the continuous administration of NSAIA analgesics through a Continuous Rate infusion (CRI) intra-operatively ensures that such patients recover from anesthesia in a pain-free state and under adequate analgesic cover.

In some cases at the University of Abuja Teaching Hospital, the terminal stages of most surgical procedures such as the suturing of short lengths of skin incisions have been carried out under very light anesthesia provided the patients were under adequate analgesic cover without too much objectionable patient responses. Such patients recover from anesthesia almost immediately they are moved to the recovery quarters - a situation which lessens the time and efforts expended on the post operative observation of the patient.

An animal in pain, especially acute or moderate pain, should not be sedated or tranquilized without adequate analgesic cover. Frequently, animals so managed self mutilate the surgical sites and the resultant pain is usually more severe than that prior to or following the initial surgical procedure as was in the case presented in figure 2 above.

2. Patients presented with pre-existing pain.

Animals in this category include those that have suffered trauma such as automobile accidents, falls from heights or malicious hits or kicks and have broken bones or fractured internal organs; a proptosed or ruptured eye ball, acute infectious otitis media, a fractured tooth or horn, painful or impacted anal sacs such as in hemorrhagic anal sacculitis, dislocated joints,

neoplasms such as osteosarcomas et cetera (fig 3). Such animals though presented in varying severities of pain are usually seen in the acute or occasionally in the chronic phases of pain and are fractious. Management involves appropriate restraint techniques to prevent further injuries or damage to the animal and to

ensure safety of the veterinary personnel and hospital facilities.

Such patients require an urgent and rapid relief from pain. Where practicable, the clinical examination should be concluded and some working diagnosis arrived at before analgesics are

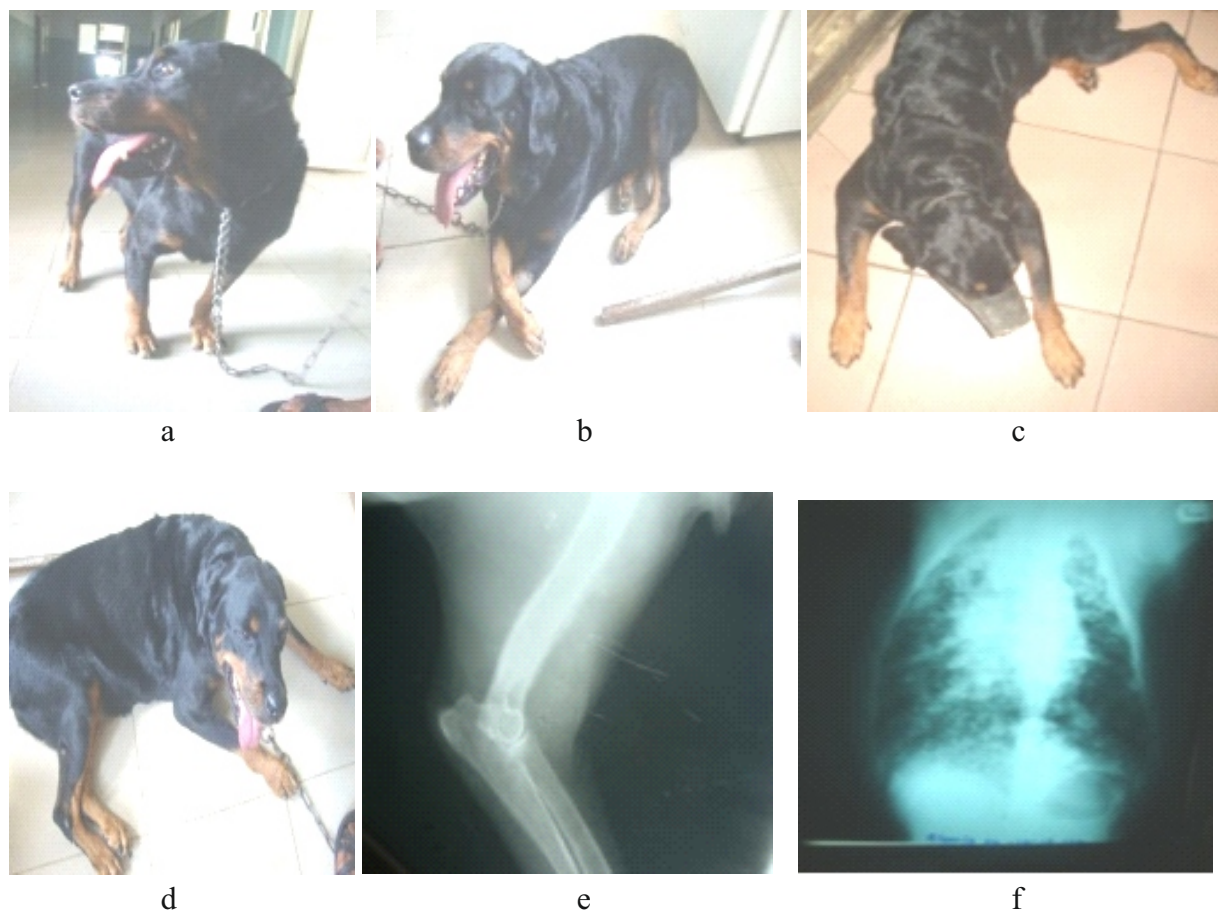


Fig 3. A 7-years old dog Rottweiler dog with physical signs of aggressively worsening pain (Figs 3a to 3d). due to progressive osteosarcoma with radiographic signs of skip (e) and pulmonary (f) metastases.

administered to avoid the masking of subtle pain signs in internal pathologies such as hepatitis, cystitis, nephritis, metritis, gastrointestinal pathologies, spinal injuries, hip dislocations etc. Frequently however, excessive handling of such patients especially security or service dogs before establishing some pain relief may result in disastrous consequences such as bites on hospital personnel or handlers, damage to hospital facilities and not infrequently further injuries to the patient.

Where physical restraint is impossible or hazardous, such animals may be sedated or tranquilized with xylazine (detomidine or medetomidine – α^2 adrenergic agonists). The α^2 adrenergic agonists are preferred to most other sedatives/tranquilizers because of the ease with which they are administered and their ability to induce adequate tranquilization in most cases within a very short induction period. The incidence of emesis following the use of

xylazine, detomidine or medetomidine could be a deterrent to their use in dogs and cats especially those with full stomachs.

Cases that have been sedated with α^2 adrenergic receptor agonists such as xylazine, detomidine or medetomidine may be administered an opioid such as morphine, pethidine, oxymorphone, buprenorphine or a systemic NSAID such as ketorolac, piroxicam, diclofenac etc immediately following the administration of the α^2 -adrenergic agonists. Either way, the effect of the NSAID wears in before their effects wane thus guaranteeing that the patient is constantly under some analgesic cover [29]. Thereafter, the NSAID is administered once daily for about five to seven days post-operatively. The inclusion of local anesthetics or other medications such as gabapentine in the drug cocktail will depend on availability of these adjunct medications and the specific nature of the patient's pain, its response to earlier medications and the experience of the attending Veterinarian. In some cases, the frequencies and doses of the medication may need adjustments to suit the state of pain in the patient.

3. Animals presented with internal or systemic conditions of bacterial, viral and parasitic origin such as pneumonias, Trypanosomiasis, Babesiosis, mange, kirichi of cattle, hookworm infection, hepatitis, distemper, nephritis, peritonitis et cetera also experience a lot of pain although they are essentially medical in nature. This is evident from the clinical signs seen in such patients. In addition to the treatment of the primary conditions, these patients should be vigorously managed against pain which may vary in severity from mild to severe. Most animals suffering from these conditions benefit from the addition of analgesics to the medications against the primary conditions. For instance, the benefits of using analgesic in the management

of equine colic of most origins have long been established in veterinary practice the world over.

Patients with emotional or psychological distress are best managed with sedatives and tranquilizers for three to four days. In one such case with severe still-birth distress was successfully managed with xylazine for the first twenty four hours followed by the administration of diazepam for two days.

Several non-pharmacological modes may be added to pharmacological modules for pain management. The easiest of these are gentle and careful handling of sick animals which includes affording the patient the opportunities to know of one's presence, the application of cold or warm/hot compress to painful sites such as painful joints and providing a stress-free housing facilities, providing watering and feeding sources close to the patient or in locations to which the patients can gain access without undue stress, providing a dry well aerated accommodation, timely removal of wet beddings and fecal drops and urine soaked beddings and closer interactions with households or care givers et cetera.. Others include nutritional support, acupuncture, chiropractic and several others, most of which are hardly available in developing economies [6, 16, 27].

DISCUSSION

It is generally agreed that all vertebrates feel pain like humans do [32] because they possess the same or similar neural pathways, neurochemicals and mechanisms for pain's transduction, transmission, modulations, central appreciation/cognition and effectors like humans. But unlike humans, animals are non-verbal, are unable to appreciate the causes/reasons for, the durations of, soothing or petting words to the effect that remedy would be provided after a traumatic experience or post-operatively and the final terminations or purposes for the pain they feel. These hardly recognized features of animal-pain may indeed

make animals feel pain or more intense pain where humans do not or experience less severe pain [6, 9, 14, 16, 22]. For instance while a human will appreciate why he/she is fitted with a discomforting appliance like a Plaster of Paris cast or an Ehmer apparatus, is thankful for it and bears the pain resulting there-from willingly, a cat or a horse would not but rather suffers severe pain, albeit more intense pain than its human counterpart. Its response to such pain may result in self mutilation or outright destruction of the appliance etc.

Unfortunately, the identification, scaling and management of pain in animals have been focused disproportionately on pre-emptive and post operative pain in hospitalized dogs and cats [10, 11, 12, 33]. In developing economies, most Veterinary practitioners are in general practice. They seldom see sick animals, including pets, in conditions similar to those on which most of the validated assessment protocols are based and therefore find these scales rarely applicable. As enjoined by the Veterinary Oath, the general veterinary practitioner also manages pain in farm animals such as birds, cattle, sheep, goats, pigs; laboratory, zoo, game animals and wildlife for which there are no existing pain assessment scales. On the clinic floor, farm or clients homes, the veterinarian has to make on-the-spot decisions as to whether pain relief should be given to a group of birds suffering from, say, acute coccidiosis with severe malaena, to debeaked chicks or mature birds, to a dog that has been tail docked or neutered or to a sheep after a rumenotomy with all the variables including the owners' consent to payment of bills in mind [16, 34].

Unfortunately, pain is either not managed at all or, is at best, improperly and inadequately managed as a clinical entity in most veterinary health care centers in most parts of the world but particularly in developing economies today. For instance only a small proportion of

Veterinarians in Canada and Great Britain used analgesics in their animal patients specifically to manage pain as lately as 2000 [12]. It was therefore not a surprise that in a recent survey about the attitudes of Veterinarians in Nigeria towards pain and its management in animals, one respondent opined that "pain has no place in animals" [35]. Other contributory factors to this abysmal neglect of animals in pain are among others, the stoic nature of animals themselves which enables them to conceal that they are in pain especially from possible predators, the fact that most animals in pain may not exhibit behavioral changes which veterinarians expect to see in them overtly or even at all, and poor the familiarity of Veterinarians with the use and control of analgesics especially the opioids in animals [12, 23, 32]. Not to wonder though!! Until recently, pre-terms, neonates, infants some of whom were subjected to severe invasive procedures and the cognitively impaired were similarly poorly managed for pain because of similar reasons [16, 32].

Identifying animals in pain may be achieved, if the veterinarian assumes that any animal requiring veterinary care is a potential pain patient, consciously looks out for pain in all such patients, takes cognizance of salient points in the case history suggestive of changes in behavior and then relies on clinical evidence of changes in alertness, unusual vocalization and aggression, posture, gait, and facial expression and the sensitivity to palpation of different parts of the body, of most patients. For clinical purposes, the severity of pain may be determined using the visual analog scale (VAS) or the simple descriptive scale (SDS) or by assessing how easily discernable the signs of pain are in the particular patient and hence classify their pain status as mild, moderate or severe respectively [9]. While these methods of assessing pain may appear grossly short of the ideal, they are actually more applicable in field

/clinic practice settings than the more detailed pain scales such as the Numerical Rating Scale, the Behavioral and physiologic responses scale and even the University of Glasgow Pain scale short form etc which are certainly more scientifically based but would appear better applicable and suited for research or for use in large veterinary health care facilities. In reality, it may be too presumptive to think that it will ever be possible to determine how much animals, non-verbal as they are, really feel pain. It has thus been advocated that for practical and professional purposes, veterinarians should be more interested in the art of alleviating pain than in its science [16] or else they will continue to be criticized for the non- or under treatment/management of pain in animals.

Failure to manage pain in cases of surgical and non surgical trauma is considered inhumane and bad medicine. However, internal medical conditions of infectious, parasitic, nutritional and management origins etc in animals often go untreated for pain even though their sufferers exhibit overt behavioral changes attributable to and validated for pain. For example, animals suffering from such conditions as trypanosomosis and babesiosis would benefit from the management of their pain as humans suffering from plasmodial malaria or flu do but are not routinely managed for pain. Indeed that an animal does not exhibit overt signs suggestive of pain, or that the veterinarian is unable to detect signs of pain which he/she had pre-judiciously expected to see in such animals is no fault of the animals and therefore should not be regarded as a good reason for denying such animals treatment/management against pain.

Opioids remain the traditional first line drugs for the management of pain in humans and animals. Their wide range of potencies, varying onsets and durations of action and serious side effects makes their usage difficult by seldom or

infrequent users. The NSAIDs are now widely used in veterinary practices around the world and appear to be easier and safer to use than the opioids for pain management in animals provided the patients are normovolaemic, have normal renal and hepatic functions and are not on any other NSAIDs or corticosteroid therapy and do not suffer from especially gastric ulcers [4, 19, 27].

All the NSAIDs have long durations of action (12-24 hours), high analgesic potency with some like meloxicam, the -coxibs, and ketorolac as good as some opioids. Some NSAIDs (unlike opioids) are administrable orally by clients at home. However, when NSAIDs are administered orally, the patient should be monitored closely for haematemesis, melaena, vomiting or abdominal pains all of which are attributable to gastric irritation and/or ulceration. In such cases the NSAID should be immediately withdrawn.

The application of local anesthetics especially along recent incision lines, in regional and epidural anaesthesia, the epidural administration of xylazine or morphine [36] and the inclusion of the NMDA receptor antagonists in different combinations in the drug cocktail for the management of pain would reflect a multimodal approach to the management of pain. Other possible combinations of medications are also possible and effective. Although several protocols may be advocated for different pain-types [37] there are no standard multimodal drug combinations for pains. The veterinarian has to determine, based on his/her clinical assessment of the case and experience, what combinations of drugs are best for each case.

Other modalities for pain management which may be combined with drug therapies as part of the multi modal mode of management of pain include the use of hot or cold compress as

the case may be (acute or chronic pain respectively), the application of hot rubs, nutritional therapy including weight loss and use of glucosamines and chondroitins, exercises like walk-outs, use of infra-red lamps (actinotherapy) and housing the animals in stress-free environment with easy access food, water and utilities are all useful in the management of pain in animals in a more comprehensive manner [16,27].

The timely, adequate and appropriate management of pain can enhance the finances of a practice provided too much time is not spent on its measurement. The morbidity, prognosis and the discharge rates of most, especially surgical and trauma, cases are substantially improved by the inclusion of pain management in the management of clinical conditions. The extra cost of pain management may be billed separately or included in the overall bill for the management of cases.

The major drawbacks to appropriate and adequate pain management in animals, i.e. the non-availability of appropriate medications such as the opioids to the veterinarian and the serious knowledge deficit about pain among veterinarians in developing economies even today [35], should be urgently addressed.

Ideally, pain management should be planned for by the animal-health-care facility or the veterinarian in practice and its protocol in a particular VHCF properly documented and enforced. It should not be undertaken on an ad hoc basis otherwise the unit or veterinarian will be found wanting each time a patient in pain is presented [16]. Facilities such as water bottles, heating pads, bandages and medications (see table 2) required for alleviating pain should be readily available. The unit or veterinarian must cultivate a deliberate policy for the mandatory search for pain in any patient that is presented with a history suggestive of a behavioral

alteration or one that will be subjected to a procedure known to induce any measure of trauma and therefore pain.

The large numbers of animals suffering from pain encountered daily in the veterinary treatment centers provide a large population of pain subjects for clinical research on pain the results of which would appear to be more easily applicable or translatable to human pain patients than those obtained from induced pain in experimental animals. Two recent advances in the study of pain in animals – the development of a pain gauge [17] and the management of chronic pain by the “deletion” of chronic pain transmitting neurons as a potential remedy for the treatment of chronic pain in humans [38, 39] are vivid examples of how trans-species research in pain and other areas such as cancer research hold immense promise for animal and ultimately human benefit.

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