Relationships between pathology and pain severities: a review

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Abstract

The relationships between pathology severity and pain severity are reviewed using the literature available for humans. The aim is to help veterinary radiologists, physicians and pathologists recognise the disorders in which severity of a lesion is likely to be related to the severity of pain or to incipient pain. Specific features or lesions within the following conditions showed a relationship with pain score, which was usually assessed with a visual analogue scale: inflammation; pancreatitis; ileitis; mucositis; fasciitis; synovitis; arthritis; lower back pain; disc herniation; sciatica; scoliosis; myalgia; cancer; arteriosclerosis; skin ulcers; mastalgia; skin and oral neuropathies; endometriosis; hepatopathy and chronic pulp diseases of the teeth. As experience with magnetic resonance imaging grows, there will be further opportunities to look for quantitative relationships in humans between pathology and pain severities. This information will be useful to veterinarians and other people working with animals in evaluating pain in animals in their care.

Keywords: animal welfare, correlation, disease, human, pain, pathology

Introduction

Disease is arguably the single most important cause of suffering in animals. That suffering includes pain, which is one of the more difficult features of suffering to recognise in animals simply from their behavioural signs. Veterinarians and researchers sometimes strive to appreciate the severity of pain an animal is experiencing or has experienced by examining lesions in the live animal or at post mortem. However, this often calls for assumptions about the quantitative relationship between the severity or extent of a lesion and pain severity. Those assumptions may be valid for some conditions and not for others. For example, in some conditions there might be a threshold in lesion severity at which pain emerges, and more severe forms of the lesion do not necessarily add to the pain. Conversely, as necrosis progresses, pain can sometimes become less pronounced, for example in gangrene (Gregory 2004).

With the advent of radiography, Doppler ultrasonography, magnetic resonance (MR) imaging, arthroscopy and many other organ and tissue examination procedures, it has become possible to examine lesions in living people and track the lesions as they change. This has allowed research clinicians in human medicine to cross-relate the development and decline of lesions with the presence of reported pain. The relationships have been examined in both cross-sectional and longitudinal studies, and pain assessments have often been made with the VAS (visual analogue scale).

This review brings together cases where quantitative relationships between pain and pathology severities have been established in human medicine.

Materials and methods

Over 90 papers have been included in the review. They were identified by following up lead references and by searching through PubMed. Papers were selected if they reported quantitative relationships between pain and a lesion which were statistically significant. The statistical methods used for evaluating the quantitative relationships relied on gradations of pain and gradations of the lesions, and included linear regression, multiple linear regression, logistic regression, Spearman’s rank correlation, Pearson’s rank correlation, and Kendall’s $\tau$ correlation. Qualitative relationships based on ungraded associations, such as a $2 \times 2$ matrix, or a biserial correlation coefficient, were not included. For example, in the study by Elias et al (2008), a correlation of 0.77 was cited for the relationship between bone marrow oedema and pain at the ankle. This was a qualitative relationship based on an analysis of four outcomes; pain vs no pain and bone marrow oedema vs no bone marrow oedema, and a phi ($\phi$) correlation coefficient was derived.

Pain has usually been evaluated with a visual analogue scale (VAS), but other systems such as the Likert scale, WOMAC-pain scale (Western Ontario McMaster Osteoarthritis), Constant and Murray score, ASES (American Shoulder & Elbow Surgeons’) score, D’Abigné and Postel grade and Ritchie Articular Index were included, all of which were based on pain severity assessed by the affected individual. In the VAS system, the subject is asked to enter a line on a scale which usually extends from 0 to 10, where 0 corresponds to ‘no pain’ and 10 is ‘unbearable pain’ or ‘the worst possible pain’. Descriptors are used at the two extremes, but there are...