Discospondylitis in dogs: a review

The patient with back pain is one of the most common presentations in general practice. Discospondylitis is defined as an infection of the intervertebral disc with involvement of the surrounding vertebral bone. The lack of specificity of the clinical signs and the extended list of differential diagnoses makes it challenging to recognise. Severe complications can arise in later stages and therefore an early diagnosis is crucial. Although still not completely clarified, understanding its pathophysiology may help to better identify this condition. Clinical signs may be as vague as lethargy, inappetence or pyrexia, but neurologic deficits may be present in advanced stages. Blood and urine can be cultured to isolate the infectious agent but image guided aspiration of the affected site is preferred. Treatment relies on appropriate antibiotic therapy following culture and sensitivity testing but surgery may be necessary in some cases.

Key words: Neurology, spinal pain, spine infection, intervertebral disc, discospondylitis

Introduction

Discospondylitis is described as an infection of the intervertebral disc and adjacent cartilaginous vertebral endplates and vertebral bodies, usually causing destruction and proliferation of the affected bone. It occurs most commonly as a result of bacterial infection and less commonly secondary to fungal infection (Moore 1992; Burkert et al. 2005; Schatzberg and Nghiem 2012). Dogs are more commonly affected than cats. Larger breeds, such as Great Danes, Labrador Retrievers, Rottweilers, German Shepherd Dogs, Doberman Pinschers and English Bulldogs appear to be overrepresented. Young to middle aged adult dogs seem to predominate and males have been reported to be twice as likely as females to be affected (Burkert et al. 2005).

Pathophysiology

The pathophysiology of discospondylitis has yet to be fully clarified. Although a cause-and-effect relationship is rarely identified, it is largely believed that infection most commonly arises from haematogenous spread of microorganisms to the intervertebral space, vertebral endplates and body. The source of microorganisms is variable but the genitourinary system, skin, heart valves and oral cavity are thought to be the most common primary sites of infection, leading to secondary bacteraemia (Moore 1992). The primary infection is often clinically silent and is thus difficult to recognise. (Tipold and Stein 2010; Harris et al. 2013). Discospondylitis has also been associated with direct inoculation of microorganisms, either iatrogenically (intra-operatively during spinal surgery or after epidural injection attempts) or as a result of penetrating wounds, regional abscession or migration of foreign material such as plant awns (MacFarlane and Iff 2011; Dewey and da Costa 2016). Association with recent non-spinal surgery such as neutering has been reported (Packer et al. 2005; Finnen et al. 2012). In humans, the main cause for isolated discitis is iatrogenic inoculation of microorganisms during surgical procedures under suboptimal conditions. In cases where both pyogenic spondylitis and discitis are present, the most common underlying cause is haematogenous dissemination of bacteria (Esendagli-Yilmaz and Uluglu 2015).

Anatomy

In animals, the intervertebral discs (IVD) are fibrocartilaginous, with a soft gelatinous centre (nucleus pulposus) surrounded by a highly organised fibrous tissue ring (annulus fibrosus). Each disc is located between two adjacent vertebrae and is avascular (Bezuidenhout 2013; Evans and de Lahunta 2013) (Figure 1). In humans, the inner region of annulus fibrosus has been shown to be vascularised during the foetal and early postnatal period and this vasculature may persist up to 20 years of age. This allows bacterial
deposition into the disc itself with secondary diffusion to the adjacent tissues (Nerlich et al. 2007; Principi and Esposito 2016). To the author’s knowledge, this has not been shown in animals, where the disc seems to be mainly nourished by blood vessels from the surrounding structures. Nevertheless, in humans, most of the haematogenous infections of the disc space are the result of dissemination from infected adjacent bone (Esendagli-Yilmaz and Ulucoglu 2015). The same is believed to happen in animals.

The vertebrae are supplied by the vertebral artery, intercostal artery, or lumbar artery, and this arterial supply ends in a capillary bed in the vertebral endplates. This is especially dense near the bone-disc interface adjacent to the nucleus pulposus compared to the interface adjacent to the annulus fibrosus. (Crock and Goldwasser 1984; Thomas 2000). The blood flow within the vertebral endplates is slow, allowing diffusion of nutrients into the nucleus pulposus of the IVD. Bacteria and other organisms can therefore reach the nucleus pulposus using the same route. The slow speed of the blood flow allows bacterial colonisation and, in combination with the poorly vascularised nature of the IVD, infection within these structures is more difficult to treat (Adamo and Cherubini 2001). The hypothesis of a septic emboli carried in the arterial blood from a distant focus that can therefore reach the nucleus pulposus using the same route. The slow speed of the blood flow allows bacterial colonisation and, in combination with the poorly vascularised nature of the IVD, infection within these structures is more difficult to treat (Adamo and Cherubini 2001). The hypothesis of a septic emboli carried in the arterial blood from a distant focus that can therefore reach the nucleus pulposus using the same route. The slow speed of the blood flow allows bacterial colonisation and, in combination with the poorly vascularised nature of the IVD, infection within these structures is more difficult to treat (Adamo and Cherubini 2001).

Clinical Signs
Discospondylitis is a well-recognised spinal disease, usually characterised by a slowly progressive onset. It can however be easily misdiagnosed as clinical signs are non-specific and often undetected by owners in the early stages of the disease. In a study of 23 dogs diagnosed with this condition, most of the clinical signs were systemic and thus nonspecific, such as pyrexia, lethargy and inappetence (Harris et al. 2013). Focal signs of paraspinal hyperesthesia, a hunched stance and reluctance to move are often seen, although spinal pain can be initially misinterpreted as abdominal pain (Sykes and Kapatin 2014). In more advanced stages, spinal cord dysfunction may occur; probably due to extradural compression secondary to abscess formation, soft tissue reaction and, in more severe/chronic cases, vertebral subluxation resulting in ataxia and paresis (Tipold and Stein 2010).

Diagnosis
Presumptive diagnosis of discospondylitis is based on the patient’s medical history and on both physical and neurological examination. The main clinical feature suggestive of this disease is spinal pain (Tipold and Stein 2010). However, several other neurological diseases can present with spinal pain and likewise some non-neurological diseases can mimic spinal pain, such as polyarthritis and polyomyositis, abdominal and pelvic conditions (pyelonephritis, pancreatitis, prostatic abscesses), hip pain and even bilateral cranial cruciate ligament rupture (da Costa 2012), making this clinical sign very non-specific. Adult large breed dogs with spinal pain should raise even higher suspicion of this disease, considering the reported incidence in larger dogs. A correct diagnosis is achieved once there are visible structural changes on imaging and the causative agent is isolated, ideally from either the IVD itself or from the blood (Shaoyin et al. 2014). Equally, detection of concurrent infections can potentially be indicative of a concomitant problem. Thoracic radiographs, abdominal ultrasound and echocardiography (for possible endocarditis) should be considered (Sykes and Kapatin 2014).

Clinical pathology
General haematology and serum biochemistry are often unremarkable. Leucocytosis with mild to moderate, immature neutrophilia may occasionally be seen. Lymphopenia may be present (Dewey and da Costa 2016). The most common biochemical abnormality is mild hypoalbuminenaemia and hyperglobulinaemia (Sykes and Kapatin 2014).