Haemangiosarcoma of the scapula in three dogs

Three cases of haemangiosarcoma in the scapula of the dog are reported. Two cases were euthanased soon after diagnosis, due to the presence of metastases, while the third was treated surgically and recovered well. However, seven months after surgery, this dog was re-presented with a cervical spinal problem which was presumed to be a metastatic lesion.

V. ERDEM AND M. J. PEAD

Journal of Small Animal Practice (2000) **41**, 461–464

Department of Small Animal Medicine and Surgery, The Royal Veterinary College, University of London, Hawkshead Lane, North Mymms, Hatfield, Hertfordshire AL9 7TA

Correspondence to M. J. Pead

INTRODUCTION

Haemangiosarcoma (angiosarcoma or malignant haemangiosarcoma) (Ng and Mills 1985) of the bone is a neoplasm characterised by the formation of irregularly anastomosing vascular channels lined by one or several layers of atypical endothelial cells which have an anaplastic, immature appearance (Alexander and Patton 1983). Haemangiosarcoma occurs more frequently in the dog than in other species (Brown 1985). Despite being a common tumour in general, haemangiosarcoma related to a bone is a less prevalent, although not rare, presentation (Quigley and others 1965, Alexander and Patton 1983, Palmer 1993). The incidence ratio of flat bone haemangiosarcoma to long bone haemangiosarcoma has been reported as 57 per cent to 43 per cent (Bingel and others 1974). Haemangiosarcoma of bone is rare in humans (Bingel and others 1974).

This report describes three cases of haemangiosarcoma apparently arising primarily in the scapula. The scapula is not commonly affected by primary bone tumours, and chondrosarcoma is the type of tumour most commonly associated with this bone (Jongeward 1985).

CASE HISTORY

Case 1

A 13-year-old female collie cross was presented with a two- to three-week history of diarrhoea and tenesmus/dysuria. On presentation, the dog was bright and alert, although clinical examination revealed some abdominal pain on palpation and a grade 4/10 lameness on the right foreleg, which could be localised to the shoulder. The dog objected strongly to manipulation of the leg and was admitted for investigation. Haematological and biochemical analysis was unremarkable. Moderate elevations of urea and creatinine indicated a degree of renal failure.

Further investigation included radiography and endoscopy. A lateral abdominal film was within normal limits, but a lateral thoracic view showed a single 3 cm diameter aggressive osteolytic lesion in the proximal right scapula. A second lateral film confirmed the presence of two nodular soft tissue densities within the caudal/dorsal lung field; their appearance was consistent with secondary metastasis.

In view of the painful nature of the tumour and the poor prognosis indicated by the metastasis, the dog was euthanased.

Case 2

An 18-month-old male neutered lurcher was presented with right forelimb lameness. There was a history of symptomatic treatment for a presumed racing injury, atrophy of the muscles over the scapula and bruising of the right chest wall.

On examination, the dog was in good overall condition, but very depressed. The animal was 4/10 lame, with a large painful mass over the proximal right forelimb and areas of subcutaneous swelling and bruising over the chest wall caudal to this mass. The mucous membranes were pale, and routine haematological analysis showed a regenerative anaemia and severe thrombocytopenia. Prothrombin time and activated partial thromboplastin time were both within normal limits. Serum biochemical analysis showed low albumin and globulin levels, consistent with blood loss. Smears from fine-needle aspirate biopsy were mostly of red blood cells, although there were a few clumps of epithelial cells. No diagnosis could be made from these smears. The dog's packed cell volume continued to fall overnight to 16 per cent, so a blood transfusion was given and the dog's

condition stabilised enough for general anaesthesia to be safely induced.

Radiographs of the right scapula showed extensive destruction of the dorsal aspect of the blade of the scapula and surrounding soft tissue swelling. Chest radiographs also suggested a possible mediastinal extension of the lesion. Presented with evidence of the extent of the lesion and the secondary haematological derangement, the owners elected not to pursue with further diagnostic procedures and requested euthanasia.

The main pathological findings at postmortem examination were a diffuse, spongy, blood-filled swelling of approximately 10 cm in diameter around the right scapula, with associated intramuscular haemorrhage along the neck, and both sides of the chest, up to the last rib. The lungs were more consolidated than normal, and there were many raised nodules approximately 0·5 cm in diameter. The scapula and muscle layers showed haemorrhages and neoplastic invasion by cells which were elongated and spindle-shaped, with hyperchromic ovoid nuclei. The nodules in the lungs contained diffusely arranged spindle-shaped cells, which had plump oval nuclei and a lightly eosinophilic cytoplasm. The pathological diagnosis was anaplastic haemangiosarcoma of the scapula, with local invasion of the surrounding musculature and metastasis to the lungs.

Case 3

A three-year-old female neutered dobermann-boxer cross was presented with a three-week history of progressive lameness of the right forelimb. The lameness had initially been associated with a pruritic right pododermatitis. At the time of presentation, the pododermatitis was resolving under treatment with cephalexin (Ceporex; Schering), methylprednisolone (Medrone; Pharmacia & Upjohn) and topical povidone-iodine, but the lameness was worsening. Manipulation of the shoulder elicited pain and there was a swelling in the area of the proximal part of the infraspinatus, which was painful on direct palpation. The dog was anaesthetised and radiographs of the shoulder/scapula and chest were obtained (Figs 1 and 2).

The radiographs showed an expansive bone lesion at the proximal aspect of the body of the right scapula. There was bone destruction and mineralisation of the adjacent soft tissue. There was no evidence of pulmonary metastasis, and a preliminary diagnosis of a primary bone tumour was made. A Jamshidi needle biopsy of the lesion was taken, but the results were inconclusive, although the report noted the possibility of a sarcoma or haemangiosarcoma.

Seven days later, partial scapulectomy was performed on the dog using a technique similar to that described by Trout and others (1995). The scapula was divided halfway along its length, and a well-encapsulated mass was removed with the proximal portion. Multiple locking loop sutures in 2/0 PDS (Ethicon) were used to appose rhomboideus, serratus ventralis and supra, infra and subscapularis muscles, with the trapezius closed over the rhomboideus/supraspinatus muscles. A penrose drain was left in position for 48 hours.

Histopathological examination of the excised portion of the scapula revealed an unorganised cellular proliferation, with a moderate number of mitotic figures, characteristic of a haemangiosarcoma. The tumour was also present between muscle fascicles outside the bone, causing compressive damage.

Ten days postsurgery, the dog was using the leg and no longer required analgesics. Six months later, the dog was re-examined and was found to have proprioceptive deficits in both the fore- and hindlimbs ipsilateral to the original surgery. Radiographs showed no sign of regrowth at the site of the scapulectomy. However, a cervical myelogram showed localised intramedullary swelling at the level of the fifth cervical vertebra. It was presumed that these abnormalities were related to metastatic disease; either invasion from a tumour remnant along the nerves of the brachial plexus, or a true metastasis via the spinal vasculature. Chest radiographs also showed a small nodule in the left cranial lung lobe. It seemed likely that this indicated metastatic spread. The dog was in no pain at this stage and the owners decided against further treatment. The animal was subsequently euthanased due to worsening ataxia.

DISCUSSION

In this study, a collie cross, a lurcher and a dobermann-boxer cross all had a confirmed diagnosis of a haemangiosarcoma of the scapula. Boxers, Great Danes and German shepherd dogs are the breeds most commonly affected by haemangiosarcomas in general (Bingel and others 1974, Alexander and Patton 1983, Brown 1985, Ng and Mills 1985, Srebernik and Appleby 1991, Holt and others 1992, Straw 1996). In a large case study of haemangiosarcomas of bone (Bingel and others 1974), the same principal breeds also featured. However, none of these breeds feature in the present case series. The mean age of dogs with bone haemangiosarcoma has been variously reported as 9·1 (Ng and Mills 1985) and 8·2 years (Liu and others 1977). However, in the present report, two of the dogs were young adults (1·5 and three years old), which emphasises the possibility that bone haemangiosarcoma, like haemangiosarcomas at other sites, can occur at almost any age (Brown 1985, Ng and Mills 1985).

Although osteosarcoma is the most prevalent primary bone tumour, chondrosarcoma is the next most common and has an increased incidence in the flat bones (Liu and others 1977, Alexander and Patton 1983). In addition, chondrosarcoma has been associated with the proximal scapula (Jongeward 1985). Thus, there is an expectation that a tumour involving the proximal scapula is most likely to be an osteosarcoma or a chondrosarcoma. The diagnosis of the present cases in a relatively short period of time, during which no

other scapula tumours were seen, does not concur with this expectation and leads to the conclusion that haemangiosarcoma should be strongly considered as a differential diagnosis in this area. This is of obvious importance if excision surgery is contemplated, as chondrosarcoma may be less metastatic and locally invasive, and is therefore easier to remove with a suitable margin.

In general, haemangiosarcoma can produce a variety of clinical signs, from weakness and weight loss to sudden death from tumour rupture, depending upon the location and size of the primary tumour. Although case 2 had some of the generalised signs of the problem, all three dogs were presented with a lameness that was non-specific and difficult to localise initially . Once the scapula was defined as the area of concern, it was possible to establish the presence of a bone lesion by radiography. However, case 2 was radiographed a number of times before a diagnosis could be reached. The difficulty of defining such lesions on a lateral view of the scapula should be noted (Fig 1), and the craniocaudal view of the scapula may therefore be useful in assisting with the diagnosis in this area (Fig 2). Confirmation by needle or bone-needle biopsy may also be difficult due to the undifferentiated nature of the lesion, and the large lytic, necrotic and haemorrhagic spaces within.

Haemangiosarcomas have been treated with surgery, surgery and immunotherapy, surgery-immunotherapy and chemotherapy (Brown 1985). Complete excision is the only effective therapy, with a mean survival time of eight to 12 months (Brown 1985). As the tumour is highly metastatic, investigation must be directed towards establishing that there are no obvious secondary tumours before surgery (Brown 1985, Straw 1996). Similar considerations apply to bone haemangiosarcoma, and amputation is the most appropriate excision to ensure a wide surgical margin (Straw and Withrow 1993).

FIG 1. Lateral view of the right scapula (case 3). The lesion is difficult to define because of the way the contralateral limb has been positioned to avoid superimposition. The rim of the lesion is marked by white arrows, and an impression of a lytic area can be seen with this rim

FIG 2. Craniocaudal view of the right scapula (case 3). The presence of a lesion is easier to detect as the reactive new bone can clearly be seen raised from the normal profile of the scapula

Partial scapulectomy is a logical surgical procedure for a proximal scapula mass if limb function is to be preserved. The procedure has previously been advocated for scapula chondrosarcomas (Straw 1996). The tumour and a surrounding margin of tissue can be excised. The difficulty relates to the removal of tissue to ensure a suitable margin while retaining appropriate insertions for the extrinsic musculature of the limb to maintain limb function. In the proximal scapula the principal problem is that the insertion of the serratus ventralis muscle is mostly removed and so the muscular sling which supports the body between the forelimbs is compromised. The serratus is difficult to repair as its elevated face holds sutures poorly. In case 3, the dorsal musculature was closed to the top of the scapula and the borders of the serratus tacked into position. It seems that the fibrous union in this area is enough to preserve limb function judging by the good use the dog made of the limb postoperatively.

The impact of scapulectomy on treatment and postoperative progress is dependent upon the residual locomotor function, and the extent to which a clean margin of tumour excision can be achieved. Case 3 was able to use the limb well and without pain for six months after partial scapulectomy, and other authors have also reported good limb function after this procedure (Trout and others 1995). It is clear that the procedure represents a viable limb-sparing alternative to forequarter amputation, as the limb remains useful and comfortable despite the loss of insertion of much of the extrinsic musculature. In a series of three osteosarcomas and two fibrosarcomas treated in

this way there was no evidence of regrowth of the osteosarcomas at the excision site (Trout and others 1995), which was also true for case 3. Although it would seem likely that this procedure might not provide a good margin of excision, these cases show that it is possible to gain such a margin, providing the extent of the tumour is evaluated carefully before surgery. Therefore, scapulectomy appears to be a very real option for removal of locally invasive sarcomas in this area, and palliation of metastatic sarcomas along similar guidelines to those for more established limb salvage procedures (Straw and Withrow 1993).

Conclusions

Haemangiosarcoma of the proximal scapula should be considered in the differential diagnosis for a dog of any age with an osteolytic lesion in this area. Partial scapulectomy has the potential to allow resection of lesions in the proximal scapula and still permit reasonable limb function.

References

ALEXANDER, J. W. & PATTON, C. S. (1983) Primary tumours of the skeletal system. *Veterinary Clinics of North America: Small Animal Practice* **13**, 181-195

BINGEL, S. A., BRODEY, R. S., ALLEN, H. L. & RISER, W. H. (1974) Haemangiosarcoma of bone in the dog. *Journal of Small Animal Practice* **15**, 303-322

BROWN, N. O. (1985) Hemangiosarcomas. *Veterinary Clinics of North America: Small Animal Practice* **15**, 569-575

HOLT, D., WINKLE, T. W., SCHELLING, C. & PRYMAK, C. (1992) Correlation between thoracic radiographs and postmortem findings in dogs with haemangiosarcoma: 77 cases (1984-1989). *Journal of the American Veterinary Medical Association* **200**, 1535-1539

JONGEWARD, S. J. (1985) Primary bone tumours. *Veterinary Clinics of North America: Small Animal Practice* **15**, 609-641

LIU, S. K., DORFMAN, H. D. & HURVITZ, A. I. (1977) Primary and secondary bone tumours in the dog. *Journal of Small Animal Practice* **18**, 313-326

NG, C. Y. & MILLS, J. N. (1985) Clinical and haematological features of haemangiosarcoma in dogs. *Australian Veterinary Journal* **62**, 1-4

PALMER, N. (1993) Bones and joints. In: Pathology of Domestic Animals, 4th edn. Eds K. V. F. Jubb, P. C. Kennedy and N. Palmer. Academic Press, San Diego. p 136

QUIGLEY, P. J., DE SARAM, W. & DAWSON, I. M. P. (1965) Two cases of haemangiosarcoma of the radius in the dog. *Veterinary Record* **77**, 1207-1209

SREBERNIK, N. & APPLEBY, E. C. (1991) Breed prevalence and sites of haemangioma and haemangiosarcoma in dogs. *Veterinary Record* **129**, 408-409

STRAW, R. C. (1996) Tumors of the skeletal system. In: Small Animal Clinical Oncology, 2nd edn. Eds S. J. Withrow and E. G. MacEwen, W. B. Saunders, Philadelphia. pp 287-315

STRAW, R. C. & WITHROW, S. J. (1993) Limb-sparing surgery for dogs with bone neoplasia. In: Textbook of Small Animal Surgery, 2nd edn. Ed. D. Slatter. W. B. Saunders, Philadelphia. pp 2020-2026

TROUT, N. J., PAVLETIC, M. M. & KRAUS, K. H. (1995) Partial scapulectomy for management of sarcomas in three dogs and two cats. *Journal of the American Veterinary Medical Association* **207**, 585-587