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# Differential diagnosis and management of pain associated with multiple vertebral hemangiomas.

## A case report

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### Clinical case

We present a case of a woman of 71 years of age with a history of epilepsy, mixed hyperlipemia, depressive syndrome and established osteoporosis, having had a previous Colles fracture on the left-hand side at the age of 52. She was following treatment with 750 mg/day of valproic acid, 40 mg/day of atorvastatin, 100 mg/day of trazodone, 20 mg/day of omeprazol, 35 mg weekly of riserdone and calcium and vitamin D supplements (550 mg/day of calcium element and 400 UI of vitamin D). For at least the last 10 years she presented with back pain, which improved only partially with rest and on occasion the pain, both dorsal and lumbar, woke her in the night. This pain had increased progressively in intensity such that it interfered with the basic activities of daily life. For this reason she was studied five years previously in another clinic without their arriving at a conclusive diagnosis. Nuclear Magnetic Resonance (NMR) of the spinal column had been carried out in which various lytic lesions were found, suggestive of metastasis in D6-D8. However, after an exhaustive examination, which included bone gammagraphy, computerised axial tomography (CAT), thoraco-abdominal mammography, tumour markers, proteinogram and thyroidal echogram, no primary tumour was found and only analgesic treatment was prescribed. 100 µg/hour every 72 hours of transdermic fentanyl, 575 mg (3 cp/day)

of metamizol and 300 mg/day of gabapentine was usually used.

She attended our clinic due to an increase in the intensity of these back pains, fundamentally in the last few months, without a clearly associated constitutional syndrome, nor previous trauma, or reduction in spirits. She did not have measurable fever, retained her strength and mobility, was able to walk without support and did not present sensory disturbances of any kind.

In the physical examination there was nothing noteworthy, except for pain on tapping the irradiated middle dorsal processes on the right-hand side, without palpable soft tissue mass. The neurological examination showed everything to be completely normal.

The analyses carried out showed discrete normochromic normocytic anaemia (haemoglobin 10.8 g/dL, haematocrit 31.7%, VCM 91.8 fL) with normal levels in the rest of the haemogram series and a velocity of globular sedimentation (VGS) of 35 mm (the second hour was not needed). The times of coagulation and biochemistry (which included the metabolism of iron, hepatic and lipid profile, proteinogram, thyroid hormones and levels of vitamin B12) were normal. The same was the case with the elemental urine analysis. A Mantoux test and blood tests for *salmonella* and *brucella* were carried out, all tests being negative. Similarly, levels of anti-streptolysin-O (ASLO) were less than 200.

The following imaging tests were carried out: 1. An X-ray of the thorax, with no mediastinal pathology apparent, with multiple bibasal pulmonary linear opacities in both pulmonary fields compatible with laminar atelectasis by hyperventilation. In the bone, in the simple spinal X-ray there was an affection in D6-D7-D8 with a partial collapse of vertebral bodies, and sclerosis, with erosions, of the surfaces of the vertebral end plates. 2. A CAT of the dorso-lumbar spinal column, where a lytic lesion was observed, with a well-defined border, in the right lateral section of the body of D8, with a drop of fat in its interior which suggests the possibility of vertebral hemangioma (Figure 1). There are also other images compatible with vertebral hemangiomas in D12 and L1, specifically, in the right lateral section of the vertebral body, surrounded by sclerosis (Figure 2). Notable is a mass of soft tissues, in the bilateral and pre-vertebral para-spinal space, in the coronal reformatting and in the axial cortex. 3. An NMR, in which were observed multiple hypersignal lesions, affecting essentially vertebrae D5 to D9, as well as D11, and, in the lumbar region, L4 and L5. There was, in turn, a significant affection on the bodies of D6, D7 and D8, with a low signal in sequences T1, and discrete hypersignal in sequences T2, with minimum increase in the pre-vertebral soft tissues and small right anterolateral epidural cuff, without producing compression in the low dorsal medulla. Also described were hyperintense images in sequences T1 and T2 in the vertebral bodies of L4, L2, D12 and D8 in the right half, which could be related to angiomas and/or lipomas (it was too long and exhaustive). 4. Bone gammagraphy with HDP-Tc-99m, which showed an increased deposit in vertebra D7 to D9, which could be considered as vertebral crushing, and in both sternoclavicular joints. Also found was hyperuptake in L4 and L5, with a possible central cold area in L5. The examination with gallium showed up some physiological activity, without evidence of points of hyperuptake coinciding with the deposits described in the study with HDP-Tc-99m. In conjunction, the examination resulted in a significant increase in osteoblastic activity in the signalled regions, with neither hyperemia nor accompanying signs of inflammation.

Before the new doubts were raised, regarding a previous diagnosis over five years ago, it was decided to carry out a bone biopsy of the vertebral bodies of L4 and D5. In the anatomico-pathological study enlarged bone trabeculae were observed with many cementation lines. Atypias were not observed. The medullar spaces were occupied by conjunctive tissue which was mostly loose and there were no infiltrators or tumorous cells. A microbiological study of the sample was also carried out (bacilloscopy, specific cultures for bacteria, mycobacteria and fungi) which equally gave negative results.

In summary, after the re-evaluation of the case, the overall picture of chronic back pain evolved over a number of years, and crushed vertebrae, were catalogued as multiple vertebral heman-

giomatosis, manifested above all by pain due to bone expansion and vertebral collapse.

Once the different therapeutic options were evaluated it was decided to opt for radiotherapy of D8 and D12 with a total dose given of 30Gy. With this the patient developed well, with a reduction in pain and in the dose of analgesia required.

## Discussion

Hemangiomas are benign tumours of vascular origin with scarce malignant metaplasia, but occasionally with aggressive behaviour. In reality they are not considered to be a true neoplasia, rather a congenital anomaly originating in the embryonic capture of the mesodermic tissue. These yolk sacs proliferate, giving way to masses which resemble neoplastic tissue.

Vertebral hemangiomas have an incidence of 11% in the general population. They correspond to 1% of the total bone neoplasias, their frequency increasing with age, they are generally diagnosed in adults or older people and are more common in women<sup>1-3</sup>.

They are often seen as single localised lesions in a single vertebral body, although they can also extend towards the posterior arch. Less frequently there are cases with an affection of a number of vertebral bodies. The thoracic region is usually the most affected. Only 0.9-1.2% are symptomatic. Of these, 54% give pain, and 45% have neurological manifestations which could be the medullar and/or radicular compression, generally sub-acute. However, the possibility of growth or extension of a vertebral hemangioma is extremely low, and because of this the tumour seldom break the cortex.

Differential diagnosis, above all in the case of multiple vertebral hemangiomas should be carried out with Paget's disease, bone metastasis, haematological tumours such as myeloma or leukaemia, and other tumours of vascular origin such as hemangioblastoma or hemangioendothelioma. The X-ray images are often diagnostic. However, since there are hemangiomas with different image patterns histological diagnosis is occasionally necessary<sup>2,3</sup>.

What stands out in our case is the initial diagnostic direction which was indicated in the first examinations carried out by another clinic. However, in our clinic it was felt that the passing of time, and the lack of data indicating a tumoral process, pointed towards the diagnosis of multiple hemangiomas.

A simple X-ray of a vertebral hemangioma offers an image which depends on the location. In the spinal column a pattern of vertical parallel striations is observed as a characteristic image, like the stripes in a "prison cell", which can resemble a honey comb. They are generally found in the lower thoracic region and do not cause growth in the vertebral body<sup>4</sup>.

In the CAT scan the thick bony trabeculae are seen in the images as highly characteristic "spines of bone", CAT being the tool which usually best defines the bone architecture and is the best method of imaging diagnosis<sup>5</sup>.

Figure 1. Spinal CAT. Axial Scan at the level of D8 in which is observed a lytic lesion with a well-defined border in the right lateral section of the vertebral body, which contains a drop of fat in its interior which suggests the possibility of vertebral hemangioma



Figure 2. CAT of dorsal spinal column. Coronal reformatting in which are observed lytic lesions with well defined contours, surrounded by sclerosis in many vertebral bodies, essentially in D6-D8, D10 and D13, compatibles with vertebral hemangioma



In the NMR they appear as images of voids or of hyperintensity related to the presence of adipose tissue, blood vessels and oedema. The possibility of changes in the spaces and the adjacent soft tissues when there are partial ruptures with haemorrhaging of these hemangiomas has been described. These images could suggest differential diagnosis, including vertebral osteomyelitis. NMR is essential in cases in which there is myelopathy since it is possible to image the nervous tissue and the compressive tissue, and in addition it acts as a prognostic study since the isointense images in T1 and the hyperintense images in T2 are associated with hypervascularity and an increase in the potential to medullar compression<sup>6</sup>.

The therapeutic options for cases of symptomatic multiple hemangiomas are: radiotherapy, endovascular embolization, infiltration of the vertebral body with ethanol, vertebroplasty or surgical procedures such as decompressive laminectomy and resection of the vertebral body if necessary<sup>7,8</sup>.

Embolization is a temporary method of diminishing the risk of haemorrhage, although there is a risk that with the nutritional artery being common with the vertebral artery, a medullar ischemia is provoked<sup>9</sup>. For this reason, an angiograph may help determine the nutritional blood vessels of the hemangioma and with this the viability of carrying out an embolisation without risk of compromising the medullar circulation.

Vertebroplasty can prevent the collapse of the vertebral body, but not destroy the vascular for-

mations; hemangioma, then, may follow an expansive process with the subsequent neurological symptoms and possible complications (pulmonary embolism, etc.)<sup>10-12</sup>.

Fernández et al.<sup>13</sup> evaluated the effects of radiotherapy (20-30Gy) in a group of 7 patients with symptomatic vertebral hemangiomas followed for an average of 19 months and found that the treatment was effective, with no relapse in 6 patients, and what's more, presented no toxic effects. More recently Heyd et al.<sup>14</sup> described 63 cases treated exclusively with radiotherapy (30.0 Gy), in which 57% had a complete remission of symptoms, 32% a partial remission, and in 11% they obtained no response. With this they concluded, equally, that radiotherapy is very useful in the management of the symptoms of these patients, although due to the time required to take effect, in those cases with neurological symptoms (medullar compression) surgical treatment should be indicated first, and subsequently radiotherapy, with the aim of preventing relapse. Although radiotherapy helps to obliterate the hemangiomas and produces an improvement in the painful symptoms, there have been cases described in which it can produce complications such as medullar necrosis or myelitis<sup>15</sup>.

The biological mechanisms by which the pain symptoms are seen to be diminished are controversial: they could be due to an anti-inflammatory effect, or to the destruction of the anomalous blood vessels by the phenomenon of vascular fibrosis<sup>1</sup>.

In another work, even more recent, the same authors present a more extended and up to date series of cases of vertebral hemangioma treated with radiotherapy (a total of 84 patients with 96 symptomatic lesions). The authors conclude that radiotherapy is an easy, safe and effective method of alleviating the pain associated with these lesions, showing that a total dose of at least 34 Gy was ideal for achieving the most satisfactory response. Among the secondary effects of the treatment were described cutaneous ulcerations and risk of carcinogenesis in 2.4% of patients<sup>1</sup>.

Embolization, alcoholisation and vertebroplasty of multiple vertebral hemangiomas are risky, and the absence of neurological compromise discounts surgery as the first choice, for which reason radiotherapy was the treatment opted for. The treatment carried out was effective, bringing a reduction in the dose of analgesics (treatment with strong opiates and gabapentine were successfully withdrawn), with the consequent reduction in possible secondary effects.

In conclusion, we believe that the case described is relevant due to the clinical and radiological presentation (multiple hemangiomatosis), the initial delay and confusion in the diagnosis (which is usually carried out with a radiological examination), as well as for her excellent response to radiotherapy treatment.

Although there are many ways of treating vertebral hemangiomas, there are no guides to its management; there are difficulties in its diagnosis in the asymptomatic phase of the disease, and treatment is generally suggested when there are complications such as fracture or secondary compression. In spite of this, it is necessary to emphasise the importance of a precise diagnosis and an appropriate follow up to avoid severe and permanent consequences.

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