Profile of Vertebral Hemangioma on MRI in a Tertiary Hospital.

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Abstract:
Vertebral hemangiomas are common benign lesions with an estimated frequency of 1-2 % of all spinal tumors. Though vast majority are asymptomatic, a small percentage of these lesions present with spinal cord compression. Most of vertebral hemangiomas show typical CT, MRI findings, except a few which are atypical or aggressive type. In the present study we describe the complete clinical and MRI profile of vertebral hemangiomas as diagnosed in a tertiary hospital. The MR imaging of 3200 patients were analyzed for the evidence of vertebral hemangioma in the present study, of which hemangiomas were noted in 245 patients with an incidence of 7.6%. The age group varied from 20 to 80 years, and the maximum number of cases (53%), recorded were between 40 and 50 years (33 %), males are predominant in the present study most common site of involvement was thoracic vertebra (52%) followed by lumbar vertebra (33%), cervical (10%) and sacrum (2%). The typical type was the most common type seen in this study 187 cases (76%). From present study we conclude that the imaging features of vertebral hemangiomas on MRI are very typical and can be grouped into typical, atypical and aggressive types for further evaluation.

Keywords: Hemangiomas- vertebra- aggressive.

Introduction:
Hemangiomas are the most common benign tumors involving the spine. The most frequent site is dorsal spine, and the lesions are filled with vascular channels with thickened trabeculae. Most of the lesions are confined to the vertebral body only and extend into posterior arch in few cases. Most of hemangiomas are asymptomatic, some of them present with spinal cord compression, if the tumor extends into the spinal canal [1]. On plain radiography hemangiomas presents with typical sign “corduroy appearance” due to the presence of vertical trabeculae. On CT the vertebral hemangioma is characterized by “polka dot pattern”. On MR imaging hemangiomas produce hyper intense signal on T1, T2 weighted sequence due to the presence of fatty marrow, and show enhancement after contrast administration.

Materials and methods:
A retrospective study of imaging findings on MRI whole spine of all patients who have undergone MRI with various neurological disorders was done. The study period was December 2012 to December 2015. All the patients underwent MRI spine on Avanto (Siemens ltd) using standard protocols. The study was done mainly to identify the presence of hemangiomas in different locations, and to evaluate for any associated, related complications. Total number of patients showing vertebral hemangiomas in the study was 245. Age distribution varied from 20 years to 80 years. Based on MR imaging characteristics vertebral hemangiomas are grouped into
1. Typical
2. Atypical
3. Aggressive types.

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Observations and Results:
The MR imaging of 3200 patients were analyzed for the evidence of vertebral hemangioma in the present study, of which hemangiomas were noted in 245 patients with an incidence of 7.6%. The age group varied from 20 to 80 years, and the maximum number of cases (53%), recorded were between 40 and 50 years (33 %), males are predominant in the present study most common site of involvement was thoracic vertebra (52%) followed by lumbar vertebra (33%), cervical (10%) (Fig 6) and sacrum (2%). The typical type was the most common type seen in this study 187 cases (76%) (Fig1), the atypical type was seen in 31 cases (12.6%) (Fig 2), and aggressive type in 27 cases (11%) (Fig 3). Sacrum was involved in 4 cases (Fig 4). Single lesions are more commonly seen than multiple lesions (66%) (Fig5), and the thoracic vertebra is the most common site for multiple lesions.

![Types Of Vertebral Hemangiomas](image)

![vertebral hemangiomas site distribution](image)

![Fig: 1a T1W](image)  ![Fig: 1b T2W](image)  ![Fig 2a T1W](image)  ![Fig 2b T2W](image)  ![Fig 2c STIR](image)  ![Fig 3a T1W](image)  ![Fig 3b T2W](image)  ![Fig 3 coronal](image)  ![Fig 4](image)  ![Fig 5](image)

*Fig 1a, 1b: Sagittal MRI Spine shows typical vertebral hemangioma at D2 vertebra*
*Fig 2a,2b,2c: Sagittal MRI Lumbar spine shows atypical vertebral hemangioma at L3 vertebra*
*Fig 3a,3b,3c: Sagittal & axial MRI cervical spine shows aggressive type vertebral hemangioma at C7 vertebra*
*Fig 4: Sagittal MRI shows multiple vertebral hemangiomas at D7, D9 and L1 vertebra*
*Fig 5: Sagittal MRI Lumbar spine shows vertebral hemangioma at S1 vertebra.*
Discussion:
Vertebral hemangiomas are classified into typical vertebral hemangiomas, atypical vertebral hemangiomas. The majority of vertebral hemangiomas belong to a typical group which have common characteristic imaging features and are rarely symptomatic. However, a small percentage of vertebral hemangiomas have distinctive histological findings depending on the amount of the fat, interstitial edema, blood vessels which are termed as atypical vertebral hemangiomas. Some of the atypical vertebral hemangiomas produce neurological deficits called as aggressive vertebral hemangiomas [2]. The neurological deficits are due to cord compression which results from hypertrophy of vertebral body b) compression fracture of body of the vertebra c) extension of hemangiomas into epidural space d) due to hemorrhage [3]. Thoracic vertebra is the commonest site of spinal compression. Histologically hemangiomas are divided into capillary, cavernous, arteriovenous, venous types. The vessels permeate the bone marrow and encase the trabeculae. Based on the MR imaging features vertebral hemangiomas are classified as typical, atypical, and aggressive types. The variations in the MR imaging correlates with the histological picture, as the composition of the tumor mass varies between fatty tissue, vasculature and interstitial edema. Typical vertebral hemangioma – on plain radiography shows vertical trabecular pattern in the body without expansion. These thickened trabeculae on reformatted CT scan are called “corduroy sign”. The hemangiomas show typical punctate areas of high attenuation (polka dot – sign) on unenhanced CT scan. On MR, vertebral hemangiomas are hyper intense on both T1 and T2 weighted imaging, mildly hyper intense on STIR sequence. The thickened trabeculae appear as linear areas of hypo intensity within the hyper intense T1 weighted imaging. These lesions show variable enhancement on contrast. Atypical vertebral hemangiomas – they differ from typical vertebral hemangiomas in the form of increased vasculature with reduced fat content, and are iso to hypo intense on T1 weighted and hyper intense on T2 weighted and STIR imaging. On contrast the enhancement is variable. The thickened vertical trabeculae are not easily detected due to changes in the signal intensity. Aggressive vertebral hemangiomas – show nonspecific radiographic features like expanded cortex, erosion of pedicle, vertebral collapse. Laredo et al [4] described 6 radiographic and CT features in aggressive vertebral hemangiomas 1) cortical expansion 2) thoracic location T3 to T9 3) irregular honeycomb pattern 4) involvement of entire vertebral body 5) extension into to neuronal arch 6) soft tissue mass. A scoring system has been proposed by the authors based on the findings, but its significance is not yet proved. On MR imaging aggressive vertebral hemangiomas appear hypo intense on T1 weighted images and hyper intense on T2 and STIR images. Freidman suggested that diagnosis of aggressive vertebral hemangiomas can be made if the lesion shows normal vertebral body height, a sharp margin with normal marrow, intact cortex adjacent to a paraspinal mass and enlarged para spinal vessels. At angiography the aggressive vertebral hemangiomas show characteristic dilatation of arterioles of vertebral body, multiple blood pools in the capillary phase, intense opacification throughout the vertebral body. Pressney et al [5] described MR characteristics of typical and atypical hemangiomas based on imaging. The presence of fatty component in vertebral hemangioma is indicative of inactive form of vertebral hemangioma, whereas lesions with low signal intensity on MR Imaging indicate more active vascular type with potential to compress the spinal cord [4]. Case of multiple vertebral hemangiomas in the thoracic region causing vertebral compression due to epidural extension of mass has been reported [6, 7]. Wesley B Schrock et al [8] presented a case of Aggressive vertebral hemangioma producing progressive paraplegia. Diffusion weighted MR imaging was used to differentiate atypical hemangioma and metastases, and found it to be a useful tool in the diagnosis, characterization, and differentiation of both [9]. Huda Ali Rasool [10] analyzed the MR imaging in 700 patients for the evidence of hemangiomas. In their study they found the lesions were more common in female, older age group and in lumbar spine. Where as in comparison our study the incidence of vertebral hemangiomas was more common in males and middle aged group and in thoracic spine. In the present study there was no case of spinal cord compression either due to vertebral collapse or due to extra dural soft tissue mass, and all the patients who have undergone MRI due to different clinical conditions and not related to vertebral hemangioma. As the aggressive type of hemangiomas are likely to produce spinal cord compression due to expansion of vertebral body or the presence of soft tissue mass, all these cases need to be evaluated further. The typical vertebral hemangiomas need to be differentiated from conditions that have similar imaging findings like fatty replacement and modic type 2 changes. The atypical vertebral hemangiomas have to be differentiated from metastases and multiple myeloma. The metastases to the spine commonly involve the pedicle and posterior vertebral elements; whereas vertebral hemangiomas involve the vertebral body mainly. Multiple myeloma is characterized by signs of osteoporosis with focal bone lesions and diffuse bone marrow infiltration which is not seen with atypical vertebral hemangiomas. The aggressive vertebral...
hemangiomas have to be differentiated from primary bone tumors involving the vertebra like lymphoma, chordoma, epithelioid hemangioendothelioma, plasmacytoma, which have characteristic imaging findings. Lymphoma usually presents with associated epidural, paraspinal soft tissue masses. Chordoma usually involve the entire vertebral body with epidural soft tissue mass. Epithelioid hemangioendothelioma presents with mixed signal intensities on both T1 and T2 weighted sequences with paraspinal mass.

As majority of vertebral hemangiomas detected are asymptomatic, no specific treatment is required. The treatment options for symptomatic vertebral hemangiomas are many, they include surgical decompression, radiotherapy, percutaneous vertebroplasty with polymethyl methacrylate, intralesional injection of ethanol and intra-arterial embolization [2].

Conclusion:
The imaging features of vertebral hemangiomas on MRI are very typical and can be grouped into typical, atypical and aggressive types for further evaluation.

References:
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