

Symptomatic vertebral hemangiomas- results of treatment with radiotherapy

HC SUPARNA, BM VADHIRAJA, RC APSANI, T SEETHARAMAIAH, DJ FERNANDES, K RAO, K VIDYASAGAR

Abstract

Objectives:

Vertebral hemangiomas are benign vascular lesions occurring in spine. Though vertebral hemangiomas are frequently seen, they are rarely symptomatic. Pain is the commonest symptom. There is no agreement on single treatment modality for symptomatic lesions. Surgery, intralesional injection of absolute alcohol, methyl methacrylate injection are few methods used to treat them. Radiotherapy has been shown effective in many studies in terms of pain relief and at times in cord compression too. Results of radiotherapy in symptomatic vertebral hemangiomas treated in our centre are analyzed.

Materials and methods:

Six patients with symptomatic vertebral hemangiomas were treated with external radiotherapy to a dose of 36-40 Gy. Four patients had only pain as their symptom. Two patients had additional neurological deficits with paraparesis at presentation. Result in terms of pain relief was assessed at the end of RT and during follow up. Median follow up was four and half months.

Results:

Out of six patients, pain relief was seen in four patients who had only pain as their symptom. There was neither pain relief nor improvement in neurological deficits in remaining two patients.

Conclusion:

Radiotherapy is an effective and simple modality of treatment for symptomatic vertebral hemangiomas where pain is the main symptom without neurological deficits. It is non invasive and safe.

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Keywords: vertebral hemangioma, radiotherapy

Introduction:

Vertebral hemangiomas are benign tumours leading to resorption of underlying bone. They usually involve skull bones and spine. Vertebral body hemangiomas are usually found in about 11% at general autopsy, which are usually asymptomatic. The most frequent symptoms are pain and motor dysfunction due to spinal cord compression.

Plain x-ray films show coarse vertical striations involving partial or complete vertebral body with or without extension into neural arch and usually referred to as "honey comb" appearance [1] (fig 1 & 2). On CT scan, cross

section of vertical trabeculae with intervening stroma of the soft tissue or fat gives "polka dot" appearance [1] (fig 3). Extra osseous, para vertebral and epidural extension can also be visualized. Hyper intense region in vertebral body on T1W and T2W images of fatty matrix and hypo intense areas due to matrix of trabeculations or vascular channels gives the characteristic mottled appearance in MRI scans [1, 2]. MRI scans also help to know the exact extent of involvement of vertebra and extra osseous involvement causing spinal cord compression.

Treatment of vertebral hemangioma is usually done to relieve symptoms. Treatment methods include radiotherapy, surgery, embolization, intralesional injection

From the Department of radiotherapy and Oncology- Shirdi sai baba cancer hospital- Kasturba Medical College- Manipal- 576104- Karnataka, India

Request for Reprints: Dr.M.S Vidyasagar- Professor & Head- Dept. of Radiotherapy & Oncology- Shirdi Sai Baba Cancer Hospital- K .M.C., Manipal - 576 104- Karnataka, India

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of ethanol, and vertebroplasty with methyl methacrylate. In this study the results of 6 patients who received radiotherapy are analyzed.



Fig.1 - Pre RT AP radiograph of lumbar spine showing vertical striations in L3 vertebrae.



Fig 2 - Pre RT lateral radiograph of lumbar spine showing vertical striations in L3 vertebrae.

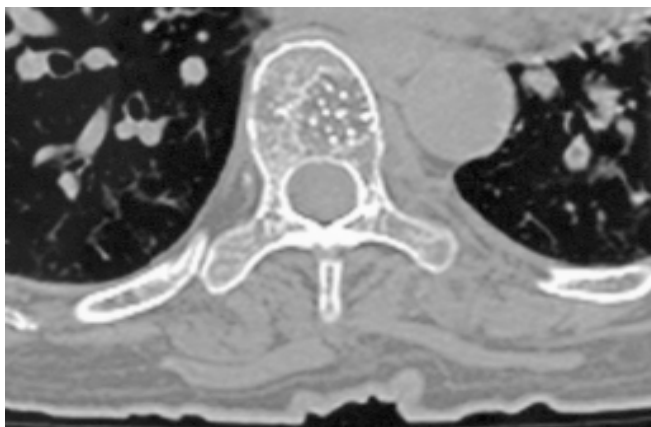


Fig 3 -CT of thoracic spine showing polka dot appearance of the vertebra.

Methods and materials:

From January 1991 onwards until December 2003, six patients were seen with symptomatic vertebral hemangiomas in Kasturba Hospital, Manipal. The work up of all these patients included detailed clinical examination, plain radiographs of spine (anterior lateral views), CT scan and MRI scan, and histological confirmation by guided closed or open vertebral biopsy.

All patients were treated with Radiotherapy. Dose given was 36 -40 Gy, in 18-20 fractions, over 4 weeks, by single direct posterior field. The field included involved vertebra with one vertebra above and one below.

Results:

During 13 years mentioned, six patients were seen with symptomatic vertebral hemangiomas. Out of six patients, five were women and one was man. Patients were aged between 20 and 70 years. All patients had history of backache either localized or radiating to lower limbs. One had paraparesis and one presented with paraplegia of two months duration. Only one patient had lesion in more than one vertebra and remaining five were with lesions in single vertebra.

All patients had plain radiographs of the spine. Four of them had MRI and one had CT scan for diagnosis. Three patients had lesions in thoracic vertebrae and three had in lumbar vertebrae. Histological diagnosis was obtained in all six patients, four by open biopsy, and two by closed biopsy. Four patients received radiotherapy as a single mode of therapy and two patients received radiotherapy after surgery. (Table-1)

The response to the treatment was assessed in percentage of symptomatic relief. Out of four patients who received radiotherapy alone, complete response (100 %) was seen in one, good response (>50%) in two and partial response (<50%) in one patient. Patient follow up was available for three to twenty months with a median follow up of four and half months. The remaining two patients who had surgery followed by radiotherapy showed no response to treatment. Both of them were having the neurological deficits for months at presentation.

The plain x-rays taken during the follow up didn't show any change in the appearance. (Fig 4 &5).

Discussion:

Vertebral hemangioma is a benign vascular lesion affecting the body of the vertebra. It is thought to be of dysembryonal origin. It can be cavernous, capillary or mixed type. There is no definite preponderance of high incidence of any type of hemangioma studied in various series. Pastushyn et al [3] reported a high incidence of capillary type while Murugan et al reported 75% patients with cavernous type of lesion in their series [4]. In our series, only one patient had cavernous type of lesion.

TABLE -1

Patient	Sex	Age	Involved level	Symptoms	Treatment	Response
1	F	65	L1	Low backache	RT	<50 %
2	M	57	D 3	Backache 1 year Paraplegia-2 months	Surgery and RT	0
3	F	70	D 8 ,9,10	Pain 2 yrs, paraparesis 6months	Surgery and RT	0
4	F	70	L 1	Low backache	RT	>50 %
5	F	22	L 3	Low backache	RT	>50 %
6	F	66	D 4	backache	RT	100 %



Fig 4 - Post RT AP radiograph of lumbar spine not showing much difference compared to Fig.1.

Although vertebral hemangiomas occur in 10-12 % of spines at autopsy, it is not common to see patients with symptoms [5]. Backache is the commonest symptom at presentation [6, 7, 8]. Cord compression leading to neurological deficits and paraplegia is a late event. Doppman et al observed paraplegia or paraparesis in six patients out of 11 cases [7] whereas Faria et al in their series of nine patients reported back ache in eight patients [8]. In our series all patients had backache and in addition to backache two patients had paraplegia due to spinal cord compression.

Treatment of symptomatic vertebral hemangiomas depends upon the expertise available in the hospital where the patient reports. Usual treatment options are surgical decompression, endovascular embolization, injection of absolute alcohol or methyl methacrylate and radiotherapy [4, 6, 7, 8, 9, 10] Combinations of these modalities are also tried in extensive lesions. Surgery is usually done for decompression by laminectomy and excision of soft tissue components of the tumor compressing the spinal cord.

Endovascular embolization is done with particulate agents



Fig.5 - Post RT Lateral radiograph of lumbar spine not showing much difference compared to Fig.2.

like polyvinyl alcohol foam. They are used either as sole modality or preoperatively to reduce the vascularity. As a sole modality, the remissions are transient. [10, 11] Intravertebral injection of methyl methacrylate as a treatment mode seems to be effective for stabilizing the vertebral bodies at risk of collapse or to alleviate severe pain [12]. It forms a cast in the intraspinal region and prevents the occurrence of fracture. But if administered in patients with nerve root compression, this can worsen the compression due to formation of cast, requiring surgical decompression.

The CT guided injection of absolute alcohol can cause intraluminal thrombosis and destruction of endothelium that composes the hemangiomas. Devascularisation causes shrinking of lesion and decompression of nerve roots [10]. The main advantage of it is it can be repeated in recurrent patients. But there may be an increase in complications like pathological fracture, para vertebral abscess, Brown Sequard syndrome [7, 10].

Reports available suggest that radiotherapy alone or in combination can give good symptomatic relief of pain [8,

9]. The radiation therapy was also employed in some patients following decompression to avoid further recurrence. In acute compressions the results have been good [13, 14]. Yang et al reported that five out of seven paraplegic patients recovered sufficiently to walk again after external Radiotherapy alone. Recovery was complete in three of them [9]. They also concluded that radiation can be used as a primary treatment in patients with severe cord compression and decompression surgery can be employed in cases of failure of treatment with radiation. In our series, out of six patients only two patients had surgical intervention and radiotherapy, but failed to respond.

The exact mechanism of action of radiotherapy on vertebral hemangiomas is not known. It is also known that pain relief is seen in almost all patients treated with radiation. It may be predicted that the response to radiation is similar to that seen in pain relief due to radiation in the management of vertebral secondaries. Radiotherapy can result in loss of segments of capillaries causing deficit of micro vascular network, with subsequent ischaemic changes. Anti-inflammatory effect of radiation also has been attributed for the relief of pain observed with radiotherapy [15].

In this series all six patients received a dose of 36-40Gy and four of them showed response. Remaining two patients who failed were of established paraplegia, suggesting the dose adequacy. The limited studies available on total dose and fractionation schedules have suggested a total dose of 30 to 40 Gy with per fraction dose of 1.8 to 2 Gy [6, 8, 9, 13]. The pain relief was much greater with dose of 40GY than 30Gy with a dose per fraction of 2Gy. Rades et al (2003) pooled and studied (LQ model-statistical analysis) the data to understand the impact of total dose on complete pain relief by using equivalent dose in 2Gy fractions [16]. They concluded with a note that 40Gy with 2Gy per fraction gives good pain relief.

Malignant transformation of vertebral hemangiomas are virtually unknown [17]. One patient in whom repeated irradiation was given for recurring hemangioma, malignant component was reported, which is unlikely to be due to irradiation, as the lesion was aggressively behaving with repeated recurrences, which is not characteristic of benign hemangiomas [18]. So there is not much evidence to fear malignant transformation of the lesions. Probably with modern radiation the side effects and occurrence of malignant transformation is very minimal.

Conclusion

Radiotherapy is an effective and acceptable mode of treatment for symptomatic hemangiomas of vertebra where pain is the main symptom. Other options exist like intralesional injection of ethanol, vertebroplasty with methacrylate, surgical decompression etc. They are

invasive techniques involving risks where as radiotherapy is non-invasive and safe. The results obtained in terms of symptomatic relief in our series as well as in literature are equal or better. 36-40 Gy with 2 Gy per fraction is accepted standard dose to achieve good pain relief.

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