AUCTORES
Globalize your Research

Journal of General Medicine and Clinical Practice

Patricia Alejandra Garrido Ruiz *

Open Access

Review Article

Vertebral Hemangioma: Treatment

Patricia Alejandra Garrido Ruiz* Marta Román Garrido[2]

1Neurosurgery Department, Salamanca University Hospital, Spain

2Primary Care Department, Salamanca University Hospital, Spain

***Corresponding Author:** Patricia Alejandra Garrido Ruiz, Neurosurgery Department, Salamanca University Hospital, Spain.

Received date: November 25, 2023; Accepted date: January 05, 2024; Published date: March 12, 2024

Citation: Patricia Alejandra Garrido Ruiz, Marta Román Garrido, (2024), Vertebral Hemangioma: Treatment, *J. General Medicine and Clinical Practice*, 7(3); **DOI:10.31579/2639-4162/128**

Copyright: © 2024, Patricia Alejandra Garrido Ruiz. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Vertebral hemangiomas are benign and relatively common tumors that usually do not cause any symptoms. However, in some cases, they can become aggressive and cause neurological symptoms by expanding and eroding into the epidural space. Surgery is often recommended in such cases, especially if symptoms are severe or develop rapidly. Different surgical approaches are used, such as decompression alone, gross-total resection, and en-bloc resection. Other treatments, such as radiation, embolization, vertebroplasty, and ethanol injection, may also be used in combination with surgery. However, due to the rarity of aggressive vertebral hemangiomas, it is challenging to conduct large-scale studies to determine the best treatment approach. Therefore, the author of this chapter decided to provide a comprehensive review of the available literature. This retrospective review outlines the indications and options available **Kew Words:** sickle cell disease; sickle cell pain management clinic; vaso-occlusive crisis; concept analysis; sickle cell pain

1.Introduction

Spinal hemangiomas are collections of benign hamartomata's vascular tissue growths that line endothelium spaces. They can be present in up to 11% of autopsy specimens. [1] Hemangiomas can sometimes cause pain or neurological problems due to the compression of nerve roots. On CT scans, they have a distinctive polka-dot appearance with punctuate sclerotic foci indicating thickened vertical trabeculae. [2] In cases of aggressive hemangiomas, there may be bulging of the posterior cortex and extension of the paravertebral soft tissue. Various treatments have been used to manage symptomatic spinal hemangiomas. For pain control, vertebroplasty, kyphoplasty, ethanol injection, radiotherapy, and transarterial embolization have been successful. Preoperative embolization can also be used as an adjunctive treatment for aggressive hemangiomas requiring surgical management. [20] Hurley et al. have used Onyx to embolize vertebral hemangiomas preoperatively in two cases, with a reported operative blood loss of 1500 and 100 ml. [6] Acosta et al. also found a significant reduction in blood loss after presurgical embolization of vertebral hemangiomas in their series.

[11] Vertebral hemangiomas (VH) are the most common benign tumors that occur in the spine. They are formed due to a vascular proliferation in bone marrow spaces that are confined by bone trabeculae. These neoplasms of endothelial cells are considered benign vasoformative growths that grow within the bone's marrow spaces, encasing the bony trabeculae. While they are generally considered neoplasms, some authors refer to them as hamartomas or vascular malformations due to the lack of aggressive histopathological features. Although most VH remain clinically silent and require only monitoring, they may cause symptoms. In rare cases, VH can exhibit active behavior, such as rapid proliferation, extending beyond the vertebral body, invading the paravertebral and epidural space and causing possible compression of the spinal cord or nerve roots. The treatment of VHs is complex and involves various modalities, including surgery, embolization, radiotherapy, and vertebroplasty. However, the role of these techniques as adjuvants to surgery is yet to be elucidated. It is important to provide a concise summary of the treatments and outcomes associated with VH to guide treatment plans. This chapter reviews the management of symptomatic VHs and summarizes their clinical presentation and treatment options.

Vertebral hemangiomas (VHs) are a type of benign tumor that are generally asymptomatic and do not require any treatment or surveillance. However, they can cause symptoms in about 1% of patients due to nerve compression resulting from bone expansion, erosion through the cortex, fracture or hematoma. There is a new fusion gene, EWSR1-NFATC1, associated with these tumors that suggest they may actually be neoplasms; however, this hypothesis is still a matter of debate. [14] VHs are benign vascular hamartomas detected incidentally during radiological evaluation with a reported incidence of 10%–12% [1]. Based on the Enneking classification, VHs are classified into three types: latent, active, and aggressive [2]. Latent lesions (Enneking stage 1) have mild bony destruction without symptoms, whereas active lesions (Enneking stage 2) present with pain because of bony destruction. Aggressive VHs (AVHs) (Enneking stage 3) are lesions with bony destruction and epidural soft tissue extension that are seen in 1% of

affected patients [3,4]. Among all patients with AVHs, 55% present with pain, whereas the remaining 45% present with compressive myelopathy or neurological deficits, and therefore, aggressive management is indicated in this subgroup of patients [3,25].

The hypothesis about aggressive vertebral hemangiomas is still being debated. These lesions, known as Enneking Stage 3, are more likely to involve the entire vertebral body, extend into the posterior elements, and have an irregular honeycomb pattern with lytic areas on radiological evaluation. [20,22] The symptoms of this condition depend on the location of the tumor and the degree of compression on the spinal cord or nerve roots. Female patients may experience symptoms during the last trimester of pregnancy, possibly due to the effects of a gravid uterus. [21] Aggressive vertebral hemangiomas are more common in adults but can also occur in children. [20]

It is generally agreed that surgical intervention is necessary when hemangiomas cause pain or neurological symptoms. [10, 19] However, the best treatment strategy is still controversial. Some surgeons have used less-invasive techniques, such as vertebroplasty, endovascular or percutaneous embolization, ethanol injection, and radiation therapy. [9] Others recommend surgery in the form of decompression, gross-total resection, or even en bloc resection. Because these lesions are relatively rare and there is limited research available, few studies with long-term follow-up directly compare treatment options. Moreover, some authors have reported on a diverse group of patients who had local pain related to intercompartmental vertebral hemangiomas without neural compression or aggressive features. [11,13] Therefore, we believe that it is important to publish a thorough review of the literature to help clarify the best approach to treating hemangiomas.

There are many different methods for treating AVHs, including vertebroplasty, radiotherapy, intralesional spondylectomy, and en bloc spondylectomy. If AVHs are not causing any neurological symptoms, vertebroplasty or radiotherapy may be used. [18] However, if AVHs are causing neurological symptoms, surgical intervention is necessary to prevent the risk of pathological fracture and recurrence. In such cases, pre-operative embolization is recommended. The surgical options for AVHs include en bloc spondylectomy with anterior reconstruction, intralesional spondylectomy with reconstruction, and posterior instrumented decompression with or without vertebroplasty. While en bloc spondylectomy has been shown to result in no local recurrence, it is also associated with significant blood loss. Conversely, less invasive procedures such as posterior instrumented decompression and vertebroplasty have resulted in good patient outcomes with only one case of recurrence, according to a study by Wang et al. involving 39 patients with AVH. Despite all these treatment strategies, no clear consensus exists in the literature regarding the management of AVH because of the rarity of these lesions.

Vertebral hemangiomas (VHs) are often discovered incidentally during the evaluation of patients with back or neck pain. VH has an incidence rate of 15% among the 275 benign spinal tumors, and less than 5% of patients with VH develop symptoms. [7] VHs commonly occur in the thoracic and lumbar spine and can involve the body, pedicle, or lamina. Depending on the extent of growth and compression of adjacent neural elements, VHs can be asymptomatic or cause pain or neurological deficits. Although these lesions are histologically benign, they do progress and enlarge within the vertebra, spinal canal, and paravertebral space. It is this progression and expansion that results in pain and neurological deficits.

The diagnosis of vertebral hemangioma (VH) is typically made using plain radiographs, CT scans, and MRI. CT scans can effectively show the characteristic "polka-dot" or "corduroy" appearance of the coarsened trabeculae within the affected vertebrae. On MRI, lesions are usually hyper-intense on both T1 and T2-weighted images and can be enhanced post-contrast due to the high vascularity of the tumor. In some cases, metastatic lesions (atypical hemangiomas) may also be presen

Image 1. Vertebral hemangioma (L3)

2.Discussion:

VHs are the most commonly found benign tumors in the spine. Although they are classified as benign, they are vascular malformations (hamartomas) made up of capillary and venous structures [9]. VHs are more commonly found in females, with male-to-female ratios ranging from 1:1.3 to 1:2.25 [4]. AVHs are a rare subgroup of hemangiomas (1%) that show signs of extra-osseous invasion, bony expansion, cortical breach, and invasion of the epidural and paravertebral space, which can lead to pathological fractures or neurological deficits. [8] About 45% of AVH cases present with neurological symptoms due to compressive myelopathy [23]. Cord compression in AVH can be caused by posterior cortical wall ballooning, epidural soft tissue expansion, acute hemorrhage into the epidural space, or pathological

collapse. Given the worsening neurology, early intervention is recommended to achieve neurological recovery and optimal functional status.

It is more common for arteriovenous hemangiomas (AVHs) to occur in the thoracic spine [27]. This region is more likely to experience symptoms due to its narrow vertebral canal dimensions. In fact, 57.1% of patients in a study had lesions in their thoracic spine, followed by the thoracolumbar spine in 33.3% of patients. It is common for multiple VHs to appear, with some patients having hemangiomas at multiple levels [29]. However, only one of the lesions showed features of AVH, while the rest were benign and inactive. In this study, 10 patients had multiple lesions, and only one patient had no symptoms. The SINS (Spinal Instability Neoplastic Score) is used to assess the tumor-related instability of the spinal column. As there are no other scoring systems for assessing the stability of the spine in benign tumors, the SINS was used in this study. The average SINS class in this study was class II, with a mean score of 9.5 (range, 7–12). Although all lesions had a cortical breach, none of them were unstable (range, 13-18) according to the SINS class.

Early surgical decompression is indicated in the presence of progressive neurological deficit or myelopathy and offers the best outcomes. Surgical treatment options include decompression and vertebroplasty, intralesional spondylectomy, en bloc spondylectomy with stabilization, or reconstruction of the vertebral defect. Because of the inherent vascularity of VHs, preoperative embolization is favorable for reducing blood loss during surgery. According to a recent meta-analysis conducted by Robinson et al. [30], patients who underwent preoperative embolization bled less (980±683 mL) compared to those who did not undergo embolization (1,629±946 mL) prior to surgery. It is important to note that all patients in the study had undergone preoperative embolization, and the maximum blood loss observed was 1,700 mL. The study also found that none of the patients suffered from massive hemorrhages during the procedure.

Posterior decompression is a commonly used technique for patients with AVH. Dobran et al. [31] suggested that posterior laminectomy is effective in patients with AVH and cord compression due to the epidural soft tissue component. Urrutia et al. [32] reported complete neurological recovery in their study following instrumented decompression. The study involved decompressive laminectomy with stabilization performed on three patients who had nonprogressive mild neurological deficits. All three patients showed neurological improvement during the follow-up period.

The literature has well documented the role of vertebroplasty in VHs. In fact, Deramond et al. [33] were the first to perform vertebroplasty on the AVH of atlas. When dealing with aggressive lesions with cortical destruction, performing vertebroplasty is beneficial as it helps to prevent a pathological collapse and provides support to the anterior column. There is evidence to suggest that injecting cement can reduce the blood loss during decompression and shrink the size of the tumor. A study by Jiang et al. found that patients who underwent vertebroplasty and decompression had less bleeding (1,093 mL) compared to those who only underwent decompression (1,900 mL). Similar results were observed in another study with a lower amount of bleeding in patients who underwent both procedures (561 mL) compared to those who underwent decompression alone (663 mL). The cement is injected using the transpedicular approach after instrumented laminectomy, which helps reduce bleeding from the lesion and allows for a wider decompression. The combination of vertebroplasty with decompression has shown promising results and is considered an effective procedure with a low risk of recurrence. In cases where total en bloc corpectomy with cage reconstruction is necessary, this procedure is performed.

En bloc spondylectomy is associated with significant perioperative morbidity due to excessive blood loss, despite its ability to provide wide surgical margins. Acosta et al. [11] reported an average blood loss of 2.1 L in 10 patients who underwent en bloc spondylectomy. In a recent study involving 23 patients with Enneking stage 3 AVH, it was found that the maximum blood loss during total en bloc spondylectomy was 2.8 L in the embolization group and 4 L in the non-embolization group. Due to this, some authors recommend using less invasive approaches, like intralesional tumor resection, to achieve satisfactory results with relatively less blood loss. In the study, intralesional tumor resection, decompression, and stabilization were performed in nine patients, and the maximum blood loss observed was 1.7 L. Goldstein et al. conducted a multicenter study that consisted of 33 patients with VH that had epidural extension. They found that intralesional resection had minimal recurrence (3%) and an excellent survival rate. Our belief is that intralesional tumor resection can obliterate the vascular channels and significantly reduce the risk of recurrence. The study showed that there were no recurrences among the patients who underwent intralesional resection. Even in patients with extensive involvement of all zones (1–12) according to the WBB classification, intralesional excision resulted in satisfactory neurological outcomes without recurrence.

Vertebral hemangiomas are more common in patients in their sixth decade of life, particularly in women. In our review, out of 71 patients, 52 were women, and the thoracic spine was affected in 35 of them. This is consistent with the literature, which estimates the male to female ratio at 3:2. If VH is discovered incidentally and asymptomatic, observation is usually recommended. In case of pain, vertebroplasty has been successfully used in both children and adults to relieve symptoms. However, if neurological deficits are present, vertebroplasty alone may not suffice, and laminectomy and instrumentation may be necessary.

We usually perform laminectomy to decompress the cord and nerve roots. Although our sample size was small, our results are consistent with other studies indicating that decompression is an effective treatment for relieving pain and improving deficits in patients with vertebral hemangiomas. [5,13] Total spondylectomy, which involves both anterior and posterior approaches, was also utilized.

The incidence of vertebral hemangioma (VH) is relatively low, and most cases do not present any symptoms. However, in some cases, VH can cause pain, neurological deficits, and compression fractures. The current treatment options for VH include observation, embolization, vertebroplasty, surgery, and pre and post-operative radiation. Despite various studies that have been conducted to determine the best treatment approach, the results have been inconclusive. One study, however, showed that vertebroplasty is a safe and effective treatment option for symptomatic VH, with a low recurrence rate, less blood loss, and a higher incidence of pathologic vertebral fractures.

Radiation therapy:

Radiation therapy has been used as an effective treatment for aggressive vertebral hemangiomas since the 1930s. However, it has only been recommended as a primary modality for the treatment of slowly progressive lesions because its therapeutic effects are delayed. Several studies have been conducted on the effectiveness of radiation therapy for the treatment of vertebral hemangiomas. In 1951, Manning reported several cases in which radiation therapy resulted in complete resolution of symptoms and controlled local progression of disease. In 1975, Glanzmann et al. conducted a study on 62 patients treated with radiation therapy and reported that 60% experienced permanent improvement. In 1985, Faria et al. reported on a series of 9 patients with symptomatic vertebral hemangiomas treated with radiation therapy and found that 77% had complete or near-complete resolution of symptoms. [16,17], They also reported that no patient who initially responded to treatment experienced recurrence of the disease. In another study, Yang et al. reported on 23 patients with aggressive hemangiomas who underwent radiation therapy and found that over 80% experienced relief of pain and sensory symptoms. Furthermore, 5 of 7 patients who presented with paraplegia regained the ability to walk. In a study of 17 cases in which patients were treated with radiation, 87.5% had complete resolution of pain, 66.7% of patients had complete resolution of numbness or paresis, and 66.6% of patients with paraplegia recovered completely.

This study included 10 patients with slowly progressive neurological deficits who received radiation therapy alone. However, treatment failed in 2 cases, and surgery was required for those patients.

According to a retrospective analysis of pooled data, there is a dose-effect relationship for the treatment of symptomatic vertebral hemangiomas using radiation alone. The authors recommended a total dose of 40 Gee. Aich et al. treated 7 consecutive patients with aggressive vertebral hemangiomas by administering 40 Gee of external beam radiation therapy over 4 weeks. They noted that all of the patients tolerated treatment well and demonstrated improvement in motor strength. At the last follow-up, 6 of the 7 patients had either no weakness or only mild weakness. While the development of intensity-modulated radiation therapy may allow for the safe delivery of higher radiation doses, this has not yet been demonstrated in patients with vertebral hemangiomas.

It is worth noting that the appearance of aggressive vertebral hemangiomas on radiographs does not seem to change over time even after successful treatment. This suggests that radiation therapy can effectively control pathological vascular tissue, but it may not have an observable impact on the surrounding bone tissue. Therefore, some experts have proposed that radiation alone may not be the most effective treatment for patients with neurological compression caused by focal bone hypertrophy

Vertebroplasty:

Since the late 1980s, vertebral hemangiomas have been treated with methyl methacrylate cement in a procedure called vertebroplasty. This technique offers hemostatic embolization and enhances the load-bearing capacity of the anterior column. However, vertebroplasty is not recommended for aggressive hemangiomas as the cement may create a dense cast that includes the epidural portion of the cavity. Feydy et al. reported two cases of cervical vertebral hemangiomas that were treated with vertebroplasty, resulting in immediate alleviation of pain, but these lesions lacked cortical expansion or epidural extension typical of aggressive vertebral hemangiomas. Vertebroplasty was utilized to treat an aggressive hemangioma that had epidural disease. However, it was complicated by the leaking of cement into the spinal canal. In a series of 24 cases of vertebral hemangiomas published by Guarnieri et al., 6 of which had aggressive features, none of the patients had recurrent symptoms at a 4-year follow-up. Balloon kyphoplasty has been reported to decrease the risk of cement leakage. Either kyphoplasty or vertebroplasty may also be used intraoperatively in conjunction with decompressive surgery.

Ethanol Ablation:

In 1994, Heiss, Topman, and Oldfield introduced percutaneous ethanol ablation as a treatment for aggressive vertebral hemangiomas. The procedure showed a positive clinical result in 93% of the 14 patients within 14 months. A later study of 11 patients treated with ethanol injection showed complete obliteration of the lesions on post-procedure angiography and no recurrence at follow-up after 15-76 months. Despite its effectiveness in ameliorating neurological symptoms, the treatment may cause complications such as osteonecrosis, vertebral collapse, transient neurological deterioration, spinal cord injury, hemodynamic instability, and asystole. However, there is little long-term data on the rate of recurrence. To prevent vertebral collapse, some surgeons may use lower doses of ethanol or combine ethanol injection with percutaneous vertebroplasty. Chen et al. reported a successful case of an aggressive vertebral hemangioma treated with ethanol injection in combination with endovascular embolization, with no clinical or radiographic recurrence at a 21-month follow-up. However, alcohol ablation is no longer the preferred treatment method due to other options with comparable clinical outcomes and fewer complications. [24,26]

Endovascular embolization:

Vertebral hemangiomas are highly vascular lesions, and one of the greatest risks of surgical intervention is uncontrollable hemorrhage. In 1951, Manning estimated the operative mortality rate associated with resection of a vertebral hemangioma to be 20%-25% due to uncontrollable bleeding. This was before modern surgical technology was available. In the 1970s, it was suggested that angiography could be used not only for diagnostic purposes but also for embolization prior to surgery, which could reduce the risk of hemorrhage during the operation.

Endovascular embolization is a suggested treatment for aggressive vertebral hemangiomas. It has been proposed as an alternative to surgery. Several case studies describe successful outcomes with this method. Gross et al. report on a patient who experienced relief from a high-grade spinal block after endovascular embolization with Geofoam. Heister and Ends were able to treat a patient with an aggressive vertebral hemangioma causing paraplegia with embolization followed by radiotherapy. The patient had an excellent clinical outcome with no recurrence at the 15-year mark. Raco et al. reported on two patients who underwent embolization alone. Both patients showed clinical improvement and remained free of recurrence at 18 and 36 months following the procedure.

While some authors have reported positive outcomes with the use of embolization in treating vertebral hemangiomas, others have reported negative experiences. A case report by Kergol et al.48 described a woman who initially underwent embolization to treat her aggressive vertebral hemangioma during pregnancy, but later developed recurrent spinal cord compression two years later. [28] Similarly, a retrospective review of eight patients by Smith et al. found that none of their patients experienced improvement with embolization alone. Embolization is also generally not recommended in cases where feeding vessels supply the artery of Adamkiewicz as well as the hemangioma. Surgeons must also be cautious of reflux of the embolic material into the intercostal or lumbar arteries. In such cases, transpedicular embolization with NBCA has been suggested as a safer alternative to transarterial embolization.

Surgery:

Surgical decompression and gross-total resection are common treatments for aggressive vertebral hemangiomas. Acosta et al. conducted a retrospective review of 10 cases where patients underwent gross-total resection of aggressive vertebral hemangiomas. The patients received preoperative embolization followed by intralesional spondylectomy. The study reported no recurrence at an average follow-up of 2.42 years.

This study reports on the treatment of aggressive vertebral hemangiomas in seven patients through en bloc resection, which resulted in no recurrence of tumor. However, the article presents conflicting data on how many patients underwent intralesional resection, which in this study could mean either subtotal or gross-total resection. Nonetheless, it is worth noting that at least one patient who underwent intralesional resection without radiation therapy experienced a recurrence after 5.3 years from surgery.

Several authors have recommended a treatment plan for aggressive vertebral hemangiomas that involves surgery followed by adjuvant radiation therapy. One case series conducted by Jayakumar et al. involved 12 patients with spinal cord compression from aggressive vertebral hemangiomas who were treated with preoperative embolization, decompressive laminectomy for subtotal resection, and adjuvant radiation therapy. Out of the 12 patients, 11 had favorable clinical outcomes, but long-term follow-up data on recurrence were not provided. Djindjian et al. presented a similar case involving a man with an aggressive vertebral hemangioma who was treated with embolization, decompressive surgery, and postoperative radiation. The patient had complete resolution of his symptoms and no recurrence within 6 years. Another case involving a patient with an aggressive vertebral hemangioma was described by Bremnes et al. who was successfully treated with decompressive laminectomy and subtotal tumor excision followed by radiation. In 1993, Fox and Onofrio published a study including 10 patients with aggressive vertebral hemangiomas resulting in spinal cord compression

who underwent subtotal resection, and 1 patient who underwent gross-total resection.

Two out of five patients who received subtotal resection without adjuvant radiation treatment, experienced recurrence at 5-6 years post-surgery. One out of five patients who underwent subtotal resection with adjuvant radiation treatment developed recurrence after 17 years post-surgery. However, this patient only received 10 Gy radiation, which is considered ineffective according to several studies mentioned earlier in the text. The other four patients who did not experience recurrence received radiation doses ranging between 26 and 45 Gy. It is believed that the reason for late recurrence in the patient who received 10 Gy radiation is due to the ineffective dose. The remaining patient who underwent gross-total resection without adjuvant radiation therapy did not experience recurrence of the disease. In a retrospective series by Jiang et al., 45 cases involving patients with severe or quickly evolving neurological deficits underwent surgery for aggressive vertebral hemangiomas, including two patients who underwent surgery after the failure of radiation therapy.

Out of the six patients who underwent decompression without radiation therapy, three of them developed recurrence between 12 to 108 months after the surgery. On the other hand, none of the patients who had a complete resection or were treated with a combination of radiation and surgery had any recurrence during the 24 to 133 months' follow-up period.

Within the last decade, there have been some reports in medical literature about the en bloc resection of aggressive vertebral hemangiomas. However, this surgical procedure is technically complicated and often results in a high rate of morbidity. A systematic review has reported a 36.3% complication rate for en bloc resection of spinal tumors, while another study found that patients who underwent en bloc resection had higher rates of revision when compared to those who had piecemeal resection of spinal tumors. As a result, this operation is generally reserved for patients with a proven survival benefit, such as those with a pathological diagnosis like chordoma or chondrosarcoma.

3. Conclusions

In patients with AVH and neurological deficits, less extensive approaches such as posterior decompression with vertebroplasty and intralesional tumor resection with anterior reconstruction can result in good clinical and neurological outcomes with less recurrence. En bloc spondylectomy is rarely necessary.

VH (vertebral hemangioma) is often discovered incidentally during the evaluation of patients with back or neck pain. In most cases, VH can be correctly diagnosed through radiographic and MRI studies. Our review, in agreement with our literature search, indicates that asymptomatic lesions can be observed. For VH presenting with pain, vertebroplasty has been demonstrated to be an effective treatment option. In cases where vertebroplasty is not effective and VH is presenting with deficit or pain, decompressive surgery and stabilization (where required) is recommended. Recurrent VH can be treated with radiation therapy

For over a century, there has been much debate in neurosurgery regarding the most effective treatment for aggressive vertebral hemangiomas. Various therapeutic options have been proposed, including radiation, vertebroplasty, ethanol injection, embolization, surgery, or a combination of these. The surgical approach has also been a topic of discussion. Some experts suggest decompression alone, while others recommend gross-total resection, and still others endorse en bloc resection. Due to the rarity of aggressive vertebral hemangiomas, there are currently no extensive studies that compare different treatment modalities, and consequently, there is no concrete evidence to support one approach over another.

Based on our own experience and a careful review of the literature, it is important to follow certain principles. If a patient has an uncertain radiological diagnosis, it is advisable to perform percutaneous biopsy. This helps rule out lesions that can mimic an aggressive hemangioma. For patients with aggressive vertebral hemangiomas who have mild or slowly progressive neurological symptoms, nonoperative management with embolization, vertebroplasty, or radiation therapy can be attempted. However, if the symptoms are due to compression by a focal bony prominence, surgery may be the only option.

In cases where patients have severe or rapidly progressing symptoms, it is advisable to consider surgery. Preoperative embolization should also be done when possible. Both piecemeal gross-total resection and en bloc resection seem to have good clinical outcomes with a low probability of tumor recurrence. However, it is preferable to perform piecemeal gross-total resection due to its lower rates of complication and reoperation. In cases where it is only possible to perform a decompression or subtotal resection, vertebroplasty or adjuvant radiation therapy should be considered to reduce the risk of recurrence. Aggressive vertebral hemangiomas are benign lesions that do not have metastatic potential and are not associated with mortality. Even if a tumor recurs after a subtotal resection, a second decompressive surgery can still be performed with a low risk of morbidity.

4. Bibliography:

1. Healy M, Herz DA, Pearl L. (1983). Spinal hemangiomas. Neurosurgery;13(6):689–691.
2. Fox MW, Onofrio BM. (1993). The natural history and management of symptomatic and asymptomatic vertebral hemangiomas. J Neurosurg;78(1):36–45.
3. Goldstein CL, Varga PP, Gokaslan ZL, Boriani S, Luzzati A, et al. (2015). Spinal hemangiomas: results of surgical management for local recurrence and mortality in a multicenter study. Spine 40(9):656–664.
4. Blankstein A, Spiegelmann R, Shacked I, Schinder E, Chechick A. (1988). Hemangioma of the thoracic spine involving multiple adjacent levels: case report. Paraplegia 26(3):186–191.
5. Djindjian M, Nguyen JP, Gaston A, Pavlovitch JM, Poirier J, et all., (1992). Multiple vertebral hemangiomas with neurological signs. Case report. J Neurosurg;76(6):1025–1028.
6. K.K. Unni, C.Y. Inwards, M.F.M.E. Research, (2010). Dahlin's Bone Tumors: General Aspects and Data on 10,165 Cases: Wollters Kluwer Health/Lippincott Williams & Wilkins,
7. J.H. Chi, A. Bydon, P. Hsieh, T. Witham, J.P. Wolinsky, et all., (2008). Epidemiology and demographics for primary vertebral tumors, Neurosurg. Clin. N. Am. 191–194,
8. C.A. Sansur, N. Pouratian, A.S. Dumont, D. Schiff, C.I. Shaffrey, et all., (2007). Part II: spinal-cord neoplasms–primary tumours of the bony spine and adjacent soft tissues, Lancet Oncol. 8 137–147,
9. S. Gaudino, M. Martucci, R. Colantonio, E. Lozupone, E. Visconti, et al., (2015). A systematic approach to vertebral hemangioma, Skeletal Radiol. 44 25–36,
10. C.L. Goldstein, P.P. Varga, Z.L. Gokaslan, S. Boriani, A. Luzzati, L. et al., (1976). Spinal hemangiomas: results of surgical management for local recurrence and mortality in a multicenter study, Spine Phila. Pa (Phila Pa 1986) 2015 (40) 656–664,
11. Acosta FL Jr, Sanai N, Cloyd J, Deviren V, Chou D, Ames CP: Treatment of Enneking stage 3 aggressive vertebral hemangiomas with intralesional spondylectomy: report of 10 cases and review of the literature. J Spinal Disord Tech 24:268–275, 2011
12. Aich RK, Deb AR, Banerjee A, Karim R, Gupta P: (2010). Symptomatic vertebral hemangioma: treatment with radiotherapy. J Cancer Res Ther 6:199–203,

13. Alexander J, Meir A, Vrodos N, Yau YH: (2010). Vertebral hemangioma: an important differential in the evaluation of locally aggressive spinal lesions. Spine (Phila Pa 1976) 35: E917– E920,
14. Arbajian E, Magnusson L, Brosjö O, Wejde J, Folpe AL, Nord KH, et al: (2013). A benign vascular tumor with a new fusion gene: EWSR1-NFATC1 in hemangioma of the bone. Am J Surg Pathol 37:613–616,
15. Asthana AK, Tandon SC, Pant GC, Srivastava A, Pradhan S: (1990). Radiation therapy for symptomatic vertebral haemangioma. Clin Oncol (R Coll Radiol) 2:159–162,
16. Asumu TO, Williamson B, Hughes DG: (1996). Symptomatic spinal hemangiomas in association with cutaneous hemangiomas. A case reports. Spine (Phila Pa 1976) 21:1082–1084,
17. Baker ND, Klein MJ, Greenspan A, (1986). Neuwirth M: Symptomatic vertebral hemangiomas: a report of four cases. Skeletal Radiol 15:458–463,
18. Bremnes RM, Hauge HN, Sagsveen R: (1996). Radiotherapy in the treatment of symptomatic vertebral hemangiomas: technical case report. Neurosurgery 39:1054–1058,
19. Chen HI, Heuer GG, Zaghloul K, Simon SL, Weigele JB, Grady MS: (2007). Lumbar vertebral hemangioma presenting with the acute onset of neurological symptoms. Case report. J Neurosurg Spine 7:80–85,
20. Cheung NK, Doorenbosch X, Christie JG: (2011). Rapid onset aggressive vertebral haemangioma. Childs Nerv Syst 27:469– 472,
21. Chi JH, Manley GT, Chou D: (2005). Pregnancy-related vertebral hemangioma. Case report, review of the literature, and management algorithm. Neurosurgeon Focus 19(3): E7,
22. Cianfoni A, Massari F, Dani G, Lena JR, Rumboldt Z, et al: (2014). Percutaneous ethanol embolization and cement augmentation of aggressive vertebral hemangiomas at two adjacent vertebral levels. J Neuroradiology 41:269–274,
23. Cloyd JM, Acosta FL Jr, Polley MY, Ames CP: (2010). En bloc resection for primary and metastatic tumors of the spine: a systematic review of the literature. Neurosurgery 67:435–445,
24. Cotten A, DeArmond H, Corset B, Lejeune JP, Leclerc X, et al: (1996). Preoperative percutaneous injection of methyl methacrylate and N-butyl cyanoacrylate in vertebral hemangiomas. AJNR Am J Neuroradiology 17:137–142,
25. Dinkjian M, Nguyen JP, Gaston A, Pavlovich JM, Poirier J, et all., (1992). Multiple vertebral hemangiomas with neurological signs. Case report. J Neurosurgeon 76:1025–1028,
26. Doppman JL, Oldfield EH, Heiss JD: (2000). Symptomatic vertebral hemangiomas: treatment by means of direct intralesional injection of ethanol. Radiology 214:341–348,
27. Yung BC, Loke TK, Yuen NW, Chan CC: (1998). Spinal cord compression caused by thoracic vertebral hemangioma involving only the posterior elements of two contiguous vertebrae. Skeletal Radiol 27:169–172,
28. Slimani O, Jayi S, Fdili Alaoui F, Bouguern H, Chaara H, et al: (2014). An aggressive vertebral hemangioma in pregnancy: a case report. J Med Case Reports 8:207,
29. Jiang L, Liu XG, Yuan HS, Yang SM, Li J, et al. (2014). Diagnosis and treatment of vertebral hemangiomas with neurologic deficit: a report of 29 cases and literature review. Spine J;14(6):944–954.
30. Robinson Y, Sheta R, Salci K, Willander J. (2015). Blood loss in surgery for aggressive vertebral hemangioma with and without embolization. Asian Spine J;9(3):483–491.
31. Dobran M, Mancini F, Nasi D, Gladi M, Sisti S, et all., (2017). Surgical treatment of aggressive vertebral hemangioma causing progressive paraparesis. Ann Med Surg (Lond); 25:17-20.
32. Urrutia J, Postigo R, Larrondo R, Martin AS. (2011). Clinical and imaging findings in patients with aggressive spinal hemangioma requiring surgical treatment. J Clin Neurosis; 18:209-212.
33. DeArmond H, DE Priester C, Galibert P, Le Gars D. (1998). Percutaneous vertebroplasty with polymethylmethacrylate: technique, indications, and results. Radiol Clin North Am; 36:533-546.
34. R. Heyd, M.H. Seegenschmiedt, D. Rades, C. Winkler, H.T. Eich, et al., (2010). Radiotherapy for symptomatic vertebral hemangiomas: results of a multicenter study and literature review, Int. J. Radiat. Oncol. Biol. Phys. 77 217–225

This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: **Submit Manuscript**

DOI:10.31579/2639-4162/128

Ready to submit your research? Choose Auctores and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more https://www.auctoresonline.org/journals/general-medicine-and-clinical-practice