ISSN 2640-9615 | Volume 8

Journal of Clinical and Medical Images

Research Open Access

Minimally Invasive Surgical Treatment of Spinal Hemangiomas

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Received: 12 Mar 2025
Accepted: 25 Mar 2025
Published: 29 Mar 2025
J Short Name: JCMI

Keywords: Hemangioma;Vertebroplasty; Lumbar Spine; Pathology; Osteosynthesis; Radiation Therapy; Minimally Invasive; Neurosurgery

Citation: R Karim. Minimally Invasive Surgical Treatment of Spinal Hemangiomas. J Clin Med Img. 2025; V8 (7): 1-3

1. Abstract

The results of surgical treatment of 27 patients with aggressive hemangiomas of the thoracic and lumbar spine were analyzed. All patients were conditionally divided into two groups, taking into account the severity of the pathological process. Vertebroplasty with bone cement was common in the treatment of both groups of patients. Differences in the groups were in one group, taking into account the presence of an intracanal component, compression of the dural sac and nerve roots, it was the performance of decompression-stabilizing transpedicular osteosynthesis of the spine with open vertebroplasty. Obtaining almost identical ratios of good and satisfactory results of treatment in both groups of patients confirms that the algorithm of surgical treatment used and the amount of treatment performed in one or two operations, taking into account the severity of the pathological process, were reasonable and correct.

2. Introduction

Until now, vertebral hemangioma is still an incompletely studied nosological form, neither the pathogenesis of the disease has been determined, nor the optimal treatment tactics have been developed. And today, in most hospitals, radiation therapy remains the main method of treating aggressive hemangiomas, the effectiveness of which is extremely low. Hemangiomas of the vertebral bodies, detected at autopsies in 5%-11% of patients, are the most common benign neoplasms in which vertebroplasty is performed [1,5,7]. Currently, the following types of treatment for spinal hemangiomas are used: surgery, trans arterial embolization, percutaneous vertebroplasty, radiation therapy. During surgical treatment, there is a high risk of massive intraoperative bleeding and non-radical removal of the formation. A long recovery period is also one of the unfavorable factors when choosing a treatment method. Transarterial embolization causes partial occlusion of the supplying arterial vessels of the hemangioma, but does not cause destruction of the formation itself. Partial entry of the sclerosing material into the intercostal or lumbar arteries can cause pain in these patients. If necessary, re-embolization is not possible due to occlusion of the feeding vessels. Radiation therapy is a fairly effective method of treatment, however, the effect of radiation is delayed in time, and the risk of post-radiation myelopathy is also high.

The aim of the study was to improve the quality of life of patients with vertebral hemangiomas using open and through skin vertebroplasty.

3. Materials and Methods

The work is based on the analysis of 27 cases of patients with aggressive hemangiomas of the spine, who were examined and treated at the Bukhara Regional Multidisciplinary Medical Center. From 2018 to 2020.

Of the studied 27 patients, there were 12 (44.4%) men and 15 (55.6%) women. The average age of the patients was 45 and ranged from 28 to 62 years. The distribution of patients by gender and age is presented in [Table 1].

The table above shows that female patients predominated in all age groups. The largest age group consisted of patients 45-59 years old 12 (44.6) and 21-44 years old 10 (33.2%), that is, the most able-bodied age.

We assessed the intensity of the pain syndrome using a four-point DENIS scale (1989), where the criteria were the use of painkillers. The distribution of patients depending on the intensity of the pain syndrome is presented in [Table 2].

In most cases, the pain was constant, periodically increased or decreased for no apparent reason, sometimes it was associated with vertical physical activity. Very often, patients were disturbed by night pains. Physiotherapy, which was often prescribed to such patients, aggravated the pain.

The condition of all patients, both at admission and at discharge and in the long term, was assessed using the Karnovsky quality of life scale. According to the Karnofsky scale, the quality of life of patients was assessed in the long-term period after surgery based on the obtained follow-up data.

According to the scale, 100-80% is regarded as a satisfactory condition, 70-40% - moderate, and 30-10% - a serious condition. Upon admission, 21 (77.8%) patients were in a satisfactory condition, 6 were in a moderate condition (22.2%) patients in serious condition were not observed.

Interventions were performed at Th3-L5 levels. Percutaneous vertebroplasty was performed in the thoracic region - 6 vertebrae, in the lumbar region - 10 vertebrae, in the thoracic and lumbar regions - 12 vertebrae. Operational aid - decompressive laminectomy with posterior fusion with transpedicular fixation systems and open vertebroplasty was performed in 6 (22.2%) patients. Needles were passed through transpeduncular access. The puncture of the vertebral bodies was performed under image Intensifier Tube (IIT) control. The technique of vertebroplasty was no different from that generally accepted today. Bone cement was injected using Stryker PCD systems with the addition of contrast agents (barium sulfate powder).

In all cases, control spondylography was performed.

Surgical treatment was in 6 (22.2%) patients. Decompressive-stabilizing operations with transpedicular fixation with plates with open vertebroplasty: in the thoracic region - 4 (14.8%) and lumbar - 2 (7.4%) patients.

4. Results and Discussion

Aggressive vertebral hemangiomas were clinically manifested in most cases by persistent pain syndrome of moderate intensity (2 points according to DENIS) without significant differences in the compared groups.

Local pain syndrome, reflex muscular-tonic reactions, limited movements in the spine and general motor activity of patients during the day. However, in most cases (6 cases), motor activity disorders did not reach the degree at which the patient would not be able to move

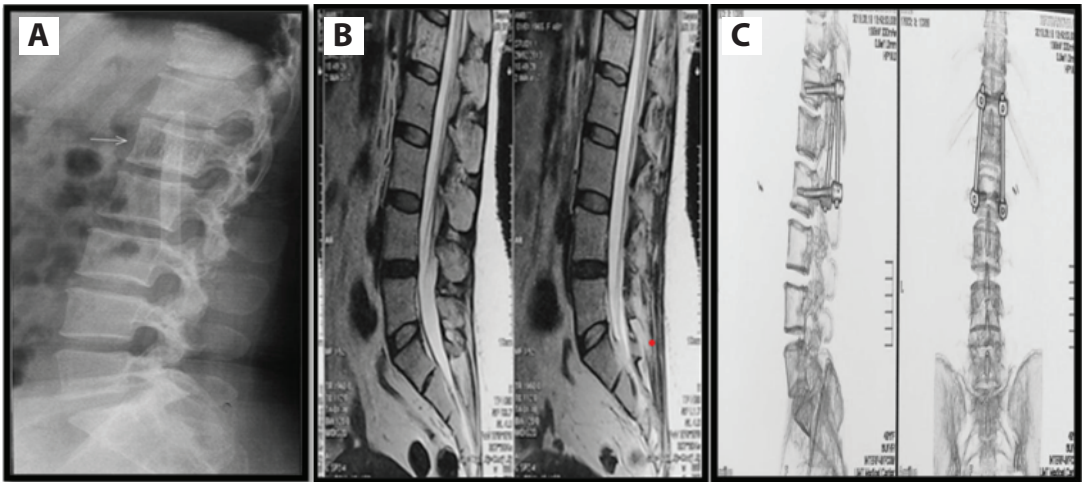

Figure 1: Hemangioma of the VL1 vertebral body
Figure (a): spondylogram of the lumbar spine in lateral projection
Figure (b): MRI of the lumbar spine
Figure (c): MSCT after decompression-stabilizing surgery and open vertebroplasty

Table 1: The distribution of patients by gender and age

Age in years	Gender				Total	
	Male		Female			
	abs.	%	abs.	%	abs.	%
21-44 years old	3	11	6	22,2	9	33,2
45-59 years old	7	26	5	18,6	12	44,6
60 years old and above	2	7,4	4	14,8	6	22,2
Total	12	44,44	15	55,6	27	100

Table 2: Distribution of patients depending on the intensity of pain according to the DENIS scale

Points*	Number of patients	%
0	0	0
1	8	29,6
2	14	51,8
3	5	18,6
4	0	0
Total	27	100

without assistance. In this connection, the scale for assessing the quality of life did not reflect the entire range of options for changes in the motor activity of patients with vertebral hemangiomas. In no case (in the second group) did the score of motor activity disorders exceed one according to the J.R. Gaughen. That is, there were no patients in the sample who were in a forced horizontal position or moved with the help of a wheelchair. The frequency of admission and the choice of the pharmacological group of painkillers directly depended on the severity of local pain and radicular syndromes and on individual characteristics of pain tolerance. The rest periodically or constantly used non-steroidal anti-inflammatory drugs.

Of all 27 (100%) operated patients, 22 (81.4%) patients noted the absence of pain, 5 (18.6%) decreased pain. In the postoperative period, 85.1% of operated patients noted a significant regression of pain.

Improvement of the neurological status after surgical treatment in the second group occurred in 6 (100%) patients, the neurological deficit improved slightly. The Karnofsky scale was used to assess the functional outcome of treatment. At the same time, good results suggested a decrease in neurological deficit and an increase in the Karnofsky index in the early postoperative period.

Analysis of the immediate results of surgical treatment, on average 10-14 days after surgery, shows that out of all 27 (100%) patients, good results on the Karnofsky scale were achieved in 25 (92.6%), satisfactory results in 2 (7.4%) observations, unsatisfactory results, *i.e.*,there was no persistent deterioration in the condition of patients. Assessment of immediate results on the Karnovsky scale indicates a positive impact of surgery on the health and well-being of patients in most cases.

5. Conclusions

1. Indications for open vertebroplasty with decompression-stabilizing surgery in this category of patients were: intense pain syndrome, the presence of an intracanal hemangioma component, compression of the dural sac, neurological deficit.

2. Puncture vertebroplasty is a more effective treatment for aggressive spinal hemangiomas. This method helps to reduce the intensity of the pain syndrome.

Puncture vertebroplasty is a minimally invasive technique with a minimum percentage of complications, which significantly reduces the length of the patient's stay in the hospital. After vertebroplasty puncture, the increase in strength properties of vertebral bodies and the normalization of venous hemodynamics contribute not only to the regression of pain, but also to an increase in movement activity in the spine and resistance to physical stress in the first week after the surgery.

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