CASE REPORT

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Comprehensive rehabilitation of a rare case of hemangioma following subsequent attempts with vertebral stabilization

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ABSTRACT

Vertebral body haemangioma is the most prevalent non-painful, slow-growing benign tumours of the spine. These are malformed vascular tumours, which primarily involve the vertebra and may extend to the epidural space. They rarely present with a neurological deficit due to hypertrophy of the posterior cortex of the vertebral body. It is managed by percutaneous vertebroplasty, in which bone cement i.e. polymethyl methacrylate (PMMA) is injected percutaneously into the vertebral body under fluoroscopic guidance. This study reports a case of a 50-year-old female presenting with excruciating back pain, which radiated to both lower limbs, and tingling and numbness over bilateral feet. Investigation reports reveal hemangioma at D8 and D10 level. The surgeon performed posterior decompression following cement leakage due to the previous vertebroplasty. Post-operatively, the patient was immobilized in a thoracolumbar Taylor's brace and acute rehabilitation phase was started. During the intervention period, the patient showed great cooperation and now the patient can maintain the self-balancing and be able to resume self-care activities of daily living and grooming with the minimum assistance.

Keywords: Hemangioma, Embolization, Percutaneous Vertebroplasty, Polymethyl Methacrylate

1. INTRODUCTION

Vertebral body haemangioma is the most common non-painful, slow-growing benign tumours of the spine(Jones et al., 2009). These hemangiomas are composed of newly formed blood vessels with normal capillary, venous, or veno-capillary structure, benign, malformed vascular tumours and without arterio-venous shunt (Hao and Hu., 2012). About 2–3% of all spinal tumours are vertebral body haemangioma and about 11% indicate vertebral body haemangioma of all vertebral autopsies. Its most common symptom is pain. Rarely there is hypertrophy of the posterior cortex of the vertebral body, which leads to neurological deficit (Jones et al., 2009). They primarily involve the vertebra and may extend to the epidural space. The two microscopic types of vertebral hemangiomas, which frequently coexist are cavernous and capillary hemangiomas (Hao and Hu., 2012). Cavernous hemangiomas consist of substantial large dilated and clustered blood vessels while capillary hemangiomas consist of thin-walled capillary vessels of various sizes and the latter is separated by normal bone tissue (Chen et al., 2006).

Percutaneous vertebroplasty (PVP) is principally for the treatment of hemangioma and subsequently found to be useful in treating painful vertebral metastasis and painful osteoporotic vertebral compression (Boschi et al., 2011; Farzi et al. 2020). It is the procedure of injecting polymethyl methacrylate (PMMA) or bone cement percutaneously into the vertebral body under fluoroscopic guidance (Elghany et al., 2019). Its major complication is cement leakage, but intradural cement leakage occurs rarely. Surgical decompression enables immediate improvement in case of neurological involvement (Hao and Hu, 2012). We aimed to test a therapeutic exercise program for post-operative.

2. PATIENT INFORMATION

A 50-year-old female with right-hand dominance complained of tingling and numbness in both feet, which gradually spread to lower trunk, heaviness in both lower limbs, difficulty in walking and performing activities of daily living, and pain in the lower back and lower limbs, which aggravated during vigorous household chores since 4 months. She went to Kasturba Gandhi Hospital, Maharashtra with the above complaints, where investigations were done. The magnetic resonance imaging (MRI) revealed the presence of vertebral hemangioma at D8 and D10 vertebral bodies, which involved the anterior, middle, and posterior columns with extraosseous extension involving prevertebral, bilateral paravertebral and extradural regions at these levels. This resulted in bilateral neural foraminal stenosis, bilateral neural compromise, cord compression, and focal cord signal changes at these levels. Lumbar canal stenosis was present at L3-L4 and L4-L5 disc levels. The spine had spondylo-degenerative changes, which was treated temporarily bymedications, and tumour excision was suggested. Then, she underwent ayurvedic treatment for a month. When the symptoms did not subside, she came to Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe, Wardha, Maharashtra, where she was suggested to undergo embolization. In the morning of July 5, 2020, the patient underwent vertebroplasty where in bone cement was injected into the vertebral body. Two hours post-surgery, the patient presented with increased lower limb weakness for which investigations were carried out. Cement leakage was noted in MRI, for which posterior decompression surgery was done in the evening of July 5, 2020. Post-operation, she was referred for the spine rehab management (figure 1 & 2).

On observation, the patient was well oriented and conscious with time, placed and person. She was kept in the semi-fowler position with bilateral lower limbs in slightly abducted, rotated externally, and bilateral feet in plantar flexion. The assessment of dermatomes and myotomes demonstrated the absence of superficial sensation in the right side at L4,L5, and S1 levels, and reduced

superficial sensation in the left side. Patellar reflexes and ankle jerk reflexes were absent on the right side. Hyporeflexia was present on the left side.

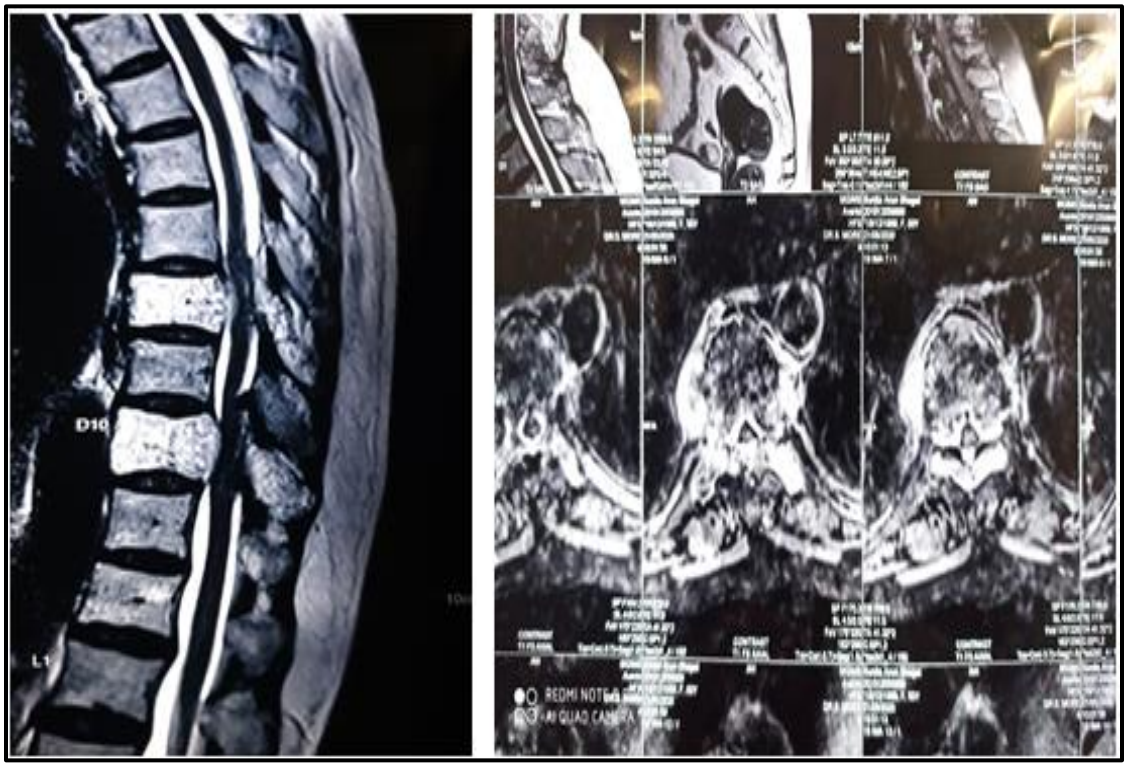

Figure 1 Sagittal and Transverse MRI depicting vertebral hemangioma at D8 and D10 level, involving the anterior, middle, and posterior columns.

Figure 2 Pre-Post treatment Photograph

Spine Rehab Management

The therapeutic exercises were designed with the goal to normalize the function of weak muscles, reduce pain and inflammation, and to improve the functional mobility. The patient participated in 36 sessions averaging 45minutes-1-hour each, twice a day, for 3 weeks.

Goals

Reduce inflammation and pain, Encourage wound healing, Increase active ranges and strength, Educate on body mechanics, posture for bed mobility and self care activities, Bedside sitting, standing, mobility exercise, Educate for a daily activities and related works, Social communication.

Phase 1(Post Operative- acute phase)

Day 1

Initially the treatment was initiated with diaphragamatic breathing after post operation in hospital, Immoblization with taylor brace and education about bed positioning

Day 2

Bed positioning with breathing assisted mobility exercises for thoracic expansion. Passive Ankle toe movement exercises and Passive heel slides for bilateral lower limb was initiated 10 repetitions bilaterally.

Day 3-4

Thoracic expansion exercise, upper limb mobility exercises, ankle toe, heel slides were continued. Lower limb mobility exercises in all planes were initiated.

Day 5-7

Upper limb strengthening exercises were started along with the assisted breathing training. Active assisted lower limb mobility exercises were continued. Active pelvic exercises were taught to the patient. Assisted log rolling was initiated by the patient from supine to side lying.

Phase 2

2nd Week

Upper limb strengthening exercises along with the active assisted lower limb exercises were continued. Vigorous log rolling could be performed by the patient. Trunk controlling was trained by pelvic bridging and pelvic rotation exercises. Patient was rehabilitated from supine to side lying and sitting. First sitting was initiated with hand support then trained for the without support. Dynamic quads were initiated with assistance in the sitting position for the lower muscle strengthening.

Phase 3

3rd and 4th week

Along with the above training programme, patient was rehabilitated for the balance training. Coordinated organized exercises were commenced. Weight shifting, functional reach outs, weight transfer, pushups was started. Sit to stand was initiated with assistance of therapist; then turned it with assistance of walking aids and started for a balancing and weight shifting on bilateral lower limbs. When the patient was trained in balance, stand marching was taught to the patient. Patient was able to walk 50 feet with assistance.

Rehabilitation Phase

5th week

In this week with the above mentioned training program patient was trained for functional rehabilitation. It includes standing with minimal assistance, stepping at place, functional reach outs in standing, dressing in long sitting, toileting and bedding activities. Transferring from sitting on bed to the wheelchair with minimal assistance was trained. Gradually improvement was seen in patients walking, patient was able to walk 150 feet with minimal assistance.

Follow up

The patient was able to stand independently; therefore she was educated independent ambulation, carrying out mild routine activities at home, and slight home modification to reduce the risk of fall.

Outcome Measures

The pre-treatment score on the Functional independence measure (FIM) scale was 56/126, and the score improved to 112/126 following the treatment. On assessment, the superficial and deep sensations showed significant improvement at the end of the treatment (table 1 & 2).

Muscle Testing

Table 1 Pre and Post rehabilitation muscle strength (MMT)

		Pre-rehab		Post rehab	
		LEFT	RIGHT	LEFT	RIGHT
Hip	Abductors	3/5	5/5	0/5	3/5
	Adductors	3/5	5/5	0/5	3/5
	Flexors	3/5	5/5	0/5	3/5
	Extensors	3/5	5/5	0/5	3/5
	Internal Rotators	3/5	5/5	0/5	3/5
	External Rotators	3/5	5/5	0/5	3/5
Knee	Extensors	3/5	5/5	1/5	4/5
	Flexors	3/5	5/5	0/5	4/5
Ankle	Plantar Flexors	3/5	5/5	1/5	4/5
	Dorsi flexors	3/5	5/5	1/5	4/5

Range of Motion

Table 2 Pre and Post rehabilitation ROM

		LEFT				RIGHT			
		Active		Passive		Active		Passive	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Hip	Abduction	10^0	30^0	30^0	35^0	0^0	40^0	30^0	45^0
	Adduction	$10\text{-}0^0$	$30\text{-}0^0$	$30\text{-}0^0$	$35\text{-}0^0$	0^0	$40\text{-}0^0$	$30\text{-}0^0$	$45\text{-}0^0$
	Flexion	90^0	110^0	100^0	115^0	0^0	110^0	70^0	120^0
	Extension	10^0	15^0	20^0	20^0	0^0	15^0	10^0	20^0
	Internal Rotation	30^0	40^0	40^0	45^0	0^0	30^0	35^0	45^0
	External Rotation	25^0	40^0	35^0	45^0	0^0	30^0	35^0	45^0
Knee	Flexion	100^0	110^0	110^0	115^0	0^0	120^0	110^0	125^0
	Extension	$100\text{-}0^0$	$110\text{-}0^0$	$110\text{-}0^0$	$115\text{-}0^0$	0^0	$120\text{-}0^0$	$110\text{-}0^0$	$125\text{-}0^0$
Ankle	Plantar Flexion	20^0	30^0	25^0	35^0	0^0	35^0	35^0	40^0
	Dorsi Flexion	10^0	15^0	15^0	20^0	0^0	20^0	20^0	20^0

3. DISCUSSION

Hemangiomas represent benign, silent lesions, which usually remain undetected. During a neural arch expansion, direct compression of the thecal sac or nerve roots and vertebral body enlargement tends to make the lesions become symptomatic (Chen et al., 2006). Usually, one vertebra is affected as seen in 77% of cases of vertebral hemangiomas, and multiple locations involvement is rare

(Samuel et al., 2017). Vertebroplasty is the surgical management of vertebral haemangioma, which consists of the resection of the vertebral body and the epidural hemangioma associated with an iliac crest or tibial graft (Harvey., 2016). Then a decompressive laminectomy is performed with transpedicular injection of acrylic cement or its percutaneous injection to set the vertebra. Besides, radiotherapy and pre-operative embolization can be performed; the latter reduces the risk of bleeding. All these methods may be used individually or in combination. In this case the patient diagnosed with hemangioma along with neural involvement had undergone for pre-operative embolization as well as vertebroplasty with posterior decompression.

Following vertebroplasty, small cement leaks are inconsequential, but large leaks may cause local or radicular pain, neurologic complications, and pulmonary embolisation. Pain may aggravate while the cement discharges into surrounding tissues or veins (Mathis, 2003). In the case of cement leakage, immediate surgical decompression and removal of cement are required. Cement leakage into the spinal canal, neural foramina, and disc space may occur following 11 to 73% of vertebroplasty procedures (Samuel et al., 2017). In this case such complication happened during vertebroplasty and for that she was underwent for posterior decompression.

Hence, a Good-quality image monitoring and clear visualisation of the cement can help prevent such discrepancies (Chopp et al., 2000, Williams et al., 2018). The above study demonstrated the impact of early rehabilitation on the operated case of haemangioma, wherein patient's abilities to perform motor tasks such as walking, transferring, pushing, and other daily activities through minimal assistance with significant improvements. The principles of motor learning can be used for gait training in people who have the potential to walk. Repetitive practice is a key component for a good prognosis.

4. CONCLUSION

During rehab-intervention following haemangioma surgery, the patient showed great enthusiasm and cooperation. She maintained her balance independently and resumed the activities of daily living with minimal assistance.

Acknowledgement

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Author's Contribution

All author made the best contribution for the concept, assessment and evaluation, data acquisition and analysis and interpretation of the data.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from the individual included in this case report. Additional informed consent was obtained from all individual participants for whom identifying information is included in this case report.

Abbreviations

PVP- Percutaneous vertebroplasty
PMMA - Polymethyl methacrylate
ADL's- Activities of daily livings

Data and materials availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

REFERENCES AND NOTES

1. Boschi V, Pogorelić Z, Gulan G, Perko Z, Grandić L, Radonić V. Management of Cement Vertebroplasty in the Treatment of Vertebral Hemangioma. Scand. J. Surg. 2011; 100:120–124.
2. Chen YJ, Tan TS, Chen WH, Chen CC, Lee TS. Intradural Cement Leakage: A Devastatingly Rare Complication of Vertebroplasty. Spine. 2006; 31(12):379-382.
3. Chopp M, Zhang XH, Li Y, WangL, Chen J, Lu D, Lu M, Rosenblum M.Spinal cord injury in rat: treatment with bone marrow stromal cell transplantation. NeuroReport. 2000; 11:3001–3005.
4. Elghany HA, Hossam AE, Wael TK, Bana EG, Baset AA, Waleed S. Transforaminal Lumbar Inter Body Fusion versus Instrumented Posterolateral Fusion in Degenerative Lumbar Spine Diseases. Int J Adv Res Ortho. 2019; 2(1):1-6.
5. Farzi S, Abdolhoseinpour H, Sigari RA. Comparison of Kyphoplasty and Vertebroplasty to increasing the height of vertebral body in Osteoporotic VBF. Med Sci, 2020, 24(101), 317-326
6. Hao J, Hu Z. Percutaneous Cement Vertebroplasty in the Treatment of Symptomatic Vertebral Hemangiomas. Pain Physician. 2012; 15:43-49.
7. Harvey LA. Physiotherapy rehabilitation for people with spinal cord injuries. J. Physiother. 2016; 62:4–11.
8. Jones JO, Bruel BM, Vattam SR. Management of Painful Vertebral Hemangiomas with Kyphoplasty: A Report of Two Cases and a Literature Review. Pain Physician. 2009; 12:297-303.
9. Mathis JM.Percutaneous Vertebroplasty: Complication Avoidance and Technique Optimization. Am. J. Neuroradiol. 2003; 24:1697–1706.
10. Samuel AM, Moore HG, Cunningham ME. Treatment for Degenerative Lumbar Spondylolisthesis: Current Concepts and New Evidence. Curr. Rev. Musculoskelet. Med. 2017; 10:521–529.
11. Williams TL, Smith B, Papathomas A. Physical activity promotion for people with spinal cord injury: physiotherapist's beliefs and actions. Disability and Rehabilitation. 2018; 40:1:52-61.