Case report

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To the question of using balloon kyphoplasty in surgical treatment of aggressive vertebral hemangioma (case report)

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Aggressive vertebral hemangiomas represent 4 % of all hemangiomas. Percutaneous vertebroplasty is typically considered as the first-line treatment option for aggressive hemangioma. The lesions that involve the entire vertebral body, extend into the cortical bone constitute 44 % of all vertebral hemangiomas. Extra-vertebral cement migration is reported to occur in 40 to 87.5 % of the cases at percutaneous vertebroplasty being less with the use of balloon kyphoplasty. There is a paucity of literature examining surgical treatment of aggressive hemangiomas with balloon kyphoplasty. We report two cases of aggressive vertebral hemangiomas involving the entire vertebral bodies treated with balloon kyphoplasty. The treatment provided good outcomes with no complications observed postoperatively.

Keywords: sspine, hemangioma, complication, balloon kyphoplasty

INTRODUCTION

Vertebral hemangiomas (VH) are benign vascular tumors around one or two vertebrae [1]. VHs have an incidence of 10-11.5 % in the general population. They typically occur in people of working age, from 18 to 55 years, with two-thirds being females [1, 2, 3]. VHs can be located in the thoracic (60–76 %), lumbar (21–29 %), cervical (2–11 %) or sacrococcygeal (1 %) spine [2, 4]. VHs are multiple in 10-15.5 % of cases [5]. The lesions normally involve a vertebral body in almost 100 % of cases with the entire vertebral body involvement reported in 44 % [6]. In the vast majority of patients, VHs remain asymptomatic and are often labeled as incidental findings once discovered on MR (magnetic resonance) imaging and/or CT (computed tomography) [7]. However, in 0.9-4.0 % of patients, VH can cause clinical symptoms and is termed aggressive [8]. The overall aggressivity of a VH can be measured with aggressive VH scoring system including 9 radiological and clinical criteria with 1 to 5 scores assigned to evaluate each of the categories. VH is considered aggressive with the total score of 5 and over [6]. VH is typically slow-growing [9]. Local pain is usually the most common presenting symptom in 54-94 % of cases [10]. Progressing VH leads to gradual vertebral bone restructuring, and hypertrophied vertical bone trabeculae fail to provide appropriate strength

properties to the vertebral bodies [6]. It is recognized that the decrease in supportability of vertebral body is likely to increase the risk of pathological fracture even with light loads applied to the spine[11].

Percutaneous vertebroplasty (PV) is typically considered as the first-line treatment option for aggressive hemangioma [12]. Major indications to PV in treatment of aggressive VH include high risk of compression fracture and evident vertebrogenic pain syndrome [1]. A percutaneous injection of polymethylmethacrylate (PMMA)-based bone cement into the collapsed vertebra contributes to spinal stabilization strengthening the vertebral body, and pain relief provided through its cytotoxic activity, embolization of the pathological vascular bed and thermo-chemical necrosis of nerve endings [7]. Although PV is a proven method for addressing aggressive VH it is also associated with intraoperative complications. The most common events include leakage of PMMA outside of the vertebral body through cortical defects that can result in neurological deficits [13].

Balloon kyphoplasty (BK) is a technique that has successfully been used in the treatment of aggressive VHs as reported in foreign publications [14]. The first balloon kyphoplasty procedure for osteoporotic vertebral compression fracture was performed

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in 1998 [15]. Clinical results of BK were reported in 2000-es [16]. BK was also proposed as a potential minimally invasive therapeutic option for spinal tumors [17]. The technique was shown to decrease the risk of extravertebral composite leakage [18]. Use of the balloon creates a cavity within the involved vertebral body that compacts the soft bone trabeculae against the outer wall and the delivery of high viscosity PMMA cement minimizes the risk of cement leakage into the spinal canal [19]. Considering the gaps in the available literature, Russian in particular, on the outcomes of BK used to treat aggressive VH with the entire vertebral body involvement and a corical bone defect we report our clinical observations.

Case report

Case 1 A 46-year-old patient A. presented with pain in the thoracolumbar spine that aggravated with physical activity. He experienced pain that scored 8 on the VAS scale for about a year. MRI scan showed hemangioma of the Th12 vertebral body. CT scan of the Th12 vertebra demonstrated involvement of the

entire vertebral body and extension into the posterior elements of the cortical bone (Fig. 1).

Bilateral percutaneous BK of the Th12 vertebra was performed for the patient considering the high risk of extravertebral cement leakage. Neither intraoperative nor postoperative complications were recorded. The patient's symptoms resolved 2 hours postsurgery with VAS score of 0. Postoperative CT scan showed no signs of extravertebral PMMA cement leakage (Fig. 2). The patient was discharged from the hospital next day after surgery. CT scans produced at 6- and 12-month follow-up showed no recurrence of hemangioma.

Case 2 A 52-year-old patient S. presented with persistent gnawing pain in the lumbar spine that aggravated with physical activity. She experienced pain that scored 7 on the VAS scale for about six months. MRI scan performed earlier showed hemangioma of the L5 vertebra. CT scan of the L5 vertebra demonstrated aggressive features of hemangioma with the involvement of the entire vertebral body (Fig. 3).

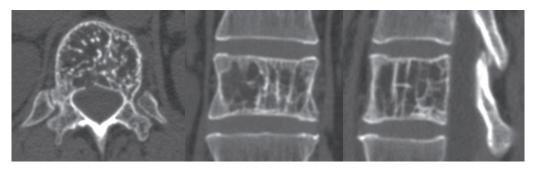


Fig. 1 Preoperative CT scans of the Th12 vertebra of patient A.

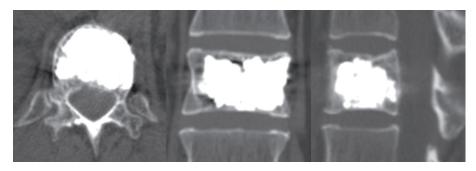


Fig. 2 Postoperative CT scans of the Th12 vertebra of patient A.

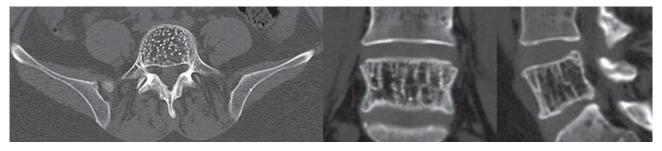


Fig. 3 Preoperative CT scans of the L5 vertebra of patient S.

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The patient was surgically treated with bilateral percutaneous BK of the L5 vertebra. Neither intraoperative nor postoperative complications were observed. The patient's symptoms resolved 2 hours postsurgery with VAS score of 0. Postoperative CT

scan showed no signs of extravertebral PMMA cement leakage (Fig. 4). The patient was discharged from the hospital next day after surgery. CT scans produced at a 12-month follow-up showed no recurrence of hemangioma.



Fig. 4 Postoperative CT scans of the L5 vertebra of patient S.

DISCUSSION

PV is the most common therapeutic option for aggressive VH. Although PV is a proven method for addressing aggressive VH it is also associated with intra- and postoperative complications [5]. Extravertebral cement leaks are common after vertebroplasty and can result in neurological deficits with nerve root compression or extradural compression [20]. In a large series utilizing a CT scan to detect post-vertebroplasty leakage, the frequency of extraosseus leaks ranges from 40 % to 87.5 % [12].

Epidural and foraminal extravertebral cement leakage is observed in 27 % of cases, and compression of neural structures recorded in 0.3–5 % necessitates a decompression surgery [21]. Considering the limitations and known complications of surgical treatment of aggressive VH in presence of cortical bone defect of the involved vertebra, in particular, BK may offer a less invasive technique without

neurological compromise [14]. BK has been reported to decrease the risk of cement leakage since the composite takes the path of less resistance to fill a previously formed cavity in the body of the involved vertebra [18]. PMMA cement filling the cavity should match the volume of the inflated balloon tamp [19]. BK has been shown to provide immediate relief from painful symptoms, restore strength and stiffness of the vertebral body in aggressive VH with a high risk of PMMA leakage effectively reducing epidural extraosseous cement migration [14, 15, 18, 19]. A wide enough canal (5-6 mm) is to be provided in the pedicles to allow the balloon insertion. Slender pedicles of the involved vertebra make the manipulation difficult. PV using higher viscosity cement and sufficient time period is practical for the cases to reduce the risk of extravertebral leakage of the composite [13].

CONCLUSION

BK can be the treatment of choice for patients with aggressive VH and high risk of cement leakage. The case reports presented could interest a wide audience

considering the gaps in the available literature, Russian in particular, on the use of BK in treatment of aggressive VH.

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Conflict of interests The authors have declared that no competing interest exists.

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