

Elastoplasty

[Percutaneous vertebroplasty](#) with [polymethylmethacrylate](#) (PMMA) restores the stiffness and the strength of fractured [vertebral body](#), but changes the pattern of the stress transfer. This effect may cause a secondary fracture of the adjacent [vertebrae](#). Elastoplasty has emerged as a technique to overcome this [complication](#).

[VK100](#) is a mixture of Dimethyl Methylvinyl siloxane and Barium Sulphate. It is elastic, adhesive to bone, leaves 30 min before solidification without exothermic reaction, and shows a stiffness close to the intact vertebrae. The surgical procedure, called [elastoplasty](#), is similar to a [Balloon kyphoplasty](#) (BKP).

Case series

41 cancer patients with symptomatic VCFs (70 vertebral bodies), underwent percutaneous and open elastoplasties. Post-operative leakages, pulmonary embolism (PE) and adjacent fractures were carefully evaluated with neuroimaging. KPS, VAS and Dennis Pain Score were calculated pre- post-operatively and at the last follow-up.

The mean volume of silicone inserted in each vertebra was 3.8 cc. Complications included seven leakages (17%), two asymptomatic PE (4.3%) and 3 post-operative adjacent fractures (7.3%). Median follow-up was 29 months. A significant improvement was observed in KPS, VAS and Dennis Pain Score ($p < .0001$). The 1-yr survival rate was 76.9%.

Elastoplasty appears a safe and effective palliative treatment of VCFs in oncologic patients. Useful qualities of VK100 are the lack of exothermic reaction and the wider working window. The influence of biomechanical properties of silicone on reduction of adjacent level fractures requires further investigations ¹⁾.

Thirty nine patients (9 males, 30 females, 87 spinal levels) were clinically evaluated pre and postoperatively in terms of pain relief, leakage and silicone embolism. The mean age was 67 (range 38-84) years. The mean follow up period was 12,5 months. The patients were evaluated radiologically for the presence of adjacent level fractures postoperatively. Complications were recorded.

The mean VAS score decreased from 7,5 to 3,5 during the last follow-up. Symptomatic silicone pulmonary embolism was not encountered in any patients. Leakage was observed in 5 (13%) cases. There was an adjacent level fracture in 1 case and another fracture which was not at the adjacent level in another one. A hematoma occurred in the needle entry site in a patient with trombocytopenia ($<70,000$).

Elastoplasty is a safe, promising technique in the treatment of vertebral compression fractures (VCFs). Symptomatic silicone pulmonary embolism is not observed. The material's stiffness is close to intact vertebrae. Therefore, elastoplasty may be a good viable option in the treatment of VCFs as it cause less complications and can prevent adjacent level fractures ²⁾.

Thirty patients with one to 3 VCF were treated either with balloon kyphoplasty using VK100 or balloon kyphoplasty using PMMA bone cement. Data from both groups was compared by a matched pair analysis. The medial vertebral height was measured at each examination radiologically. The patients stated their pain intensity using the Visual Analogue Scale (VAS) and the patient's functional impairment was evaluated with the Oswestry-Disability-Index (ODI). All data were assessed before surgery, and 3 days, 3 months, 6 months, and 12 months after surgery. Intraoperative and postoperative adverse events were documented.

The patients' functional impairment and pain improved significantly after surgery. The course of ODI and VAS was comparable in both treatment groups, but the improvement in the VK group was significantly ongoing until the 12 month follow-up. Vertebral height improvement was significant in both groups, but the PMMA group achieved a better absolute restoration. The vertebral height stayed constant during the follow-up in the VK group and worsened significantly in the PMMA group. There was no significant difference between groups concerning the occurrence of additional fractures; and no other types of complications or surgery-related adverse events were observed in either the PMMA group or in the VK group.

The study is only a matched pair analysis of 15 patients for each procedure and the amount of injected filling material was not recorded. : The study results demonstrate that the clinical outcome of VAS and ODI of using the silicon polymer VK100 is comparable or slightly better than using PMMA. VK 100 shows a trend to minor additional fractures during the follow-up. However, height restoration is not satisfactory in comparison to PMMA, although vertebral height stayed more or less constant in the VK group. To address the augmentation success further, it would be necessary to study a larger patient group over a longer study period and to assess additional parameters such as bone density and injected amount of filling material ³⁾.

During the period from July 2011 to January 2012, all patients with an indication for vertebroplasty were treated with elastoplasty. The exclusion criterion was the presence of posterior wall defects. Chest computed tomography (CT) scans were performed to evaluate the presence of perivertebral leakage and pulmonary embolism. The prevalence of leakage was compared with the results obtained for vertebroplasty with PMMA reported in the literature. Other complications during the postprocedural period were recorded.

RESULTS: Twenty-one vertebral bodies in 12 patients were treated with elastoplasty. Silicone pulmonary emboli were detected on the postprocedural chest CT in 60 % (6/10) of the patients. Leakage to the perivertebral venous plexus was seen in 67 % (14/21) of the treated vertebrae. One major complication occurred: severe, medication-resistant dyspnea developed in one patient with multiple peripheral silicone emboli.

CONCLUSIONS: This preliminary evidence suggests that VK100 silicone cement should not be used in elastoplasty because of the increased risk of silicone pulmonary embolism, when compared with the use of PMMA, which occurs worldwide. The major technical disadvantage is that the time taken for the VK100 silicone material to achieve its final strength is too long for practical application ⁴⁾.

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