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Introduction

Due to its minimal invasiveness and immediate pain relief, **Balloon Kyphoplasty (BKP)** has gained and increased popularity as treatment of symptomatic for vertebral compression fractures (VCFs) also in neoplastic patients. Significant and persistent improvement in pain and body functions are reported even in advanced cases and with lower risks compared to vertebroplasty.

However, **BKP** for VCFs in cancer patients is more challenging than for osteoporotic or traumatic ones. Cord compressions are frequent and the incidence of complications is reported to be ten-fold greater, approaching 10%.

Even if **PMMA** is the gold standard for BKP, it has also some disadvantages: exothermic reaction, short working time, rapid solidification, absence of interdigitation with bone.

A new purified silicon material (VK100[®]) has been recently introduced for BKP.

It is a mixture of Dimethyl methylvinyl siloxane, Barium Sulphate and Platinum catalyst, it is adhesive to bone, it has no exothermic reaction leaving up to 30 minutes before solidification and is more elastic than PMMA, showing a stiffness close to that of the intact bone. The surgical procedure called elastoplasty, is similar to a BKP.

Materials and Methods

Between 2013 and 2015, we treated **46 cancer patients (80 vertebral bodies)** through percutaneous, open elastoplasty and augmentation procedures after complex stabilization techniques.

Surgical complication as leakages, pulmonary embolism (PE) and adjacent fractures were evaluated post-operatively with chest and spine X-ray (37 pz had also post-operative spine and thoracic CT scan).

KPS, VAS and Dennis Pain Score were calculated pre- post-operatively and at the last follow-up.

Results

28 females, 18 patients; mean age 64 yrs

Median Follow-up was 29 months (range 3-53)

The average working time allowed by VK 100 was 30 minutes (range 20-45).

The mean volume of silicon inserted in each vertebra was 3.8 cc (range 1.5 – 6 cc). Median operative time was 125 minutes (range 40-660)

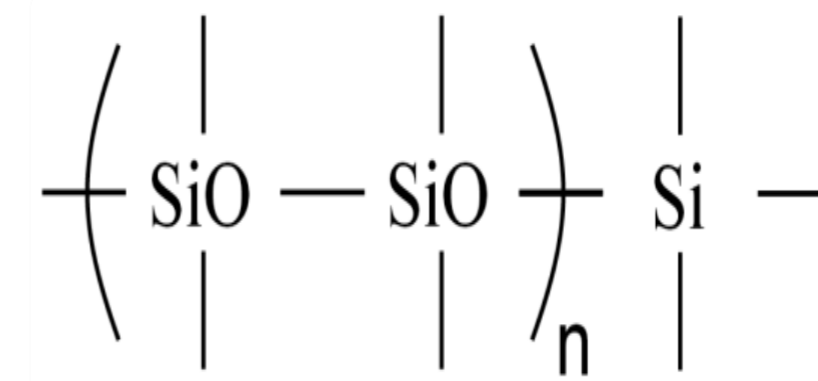
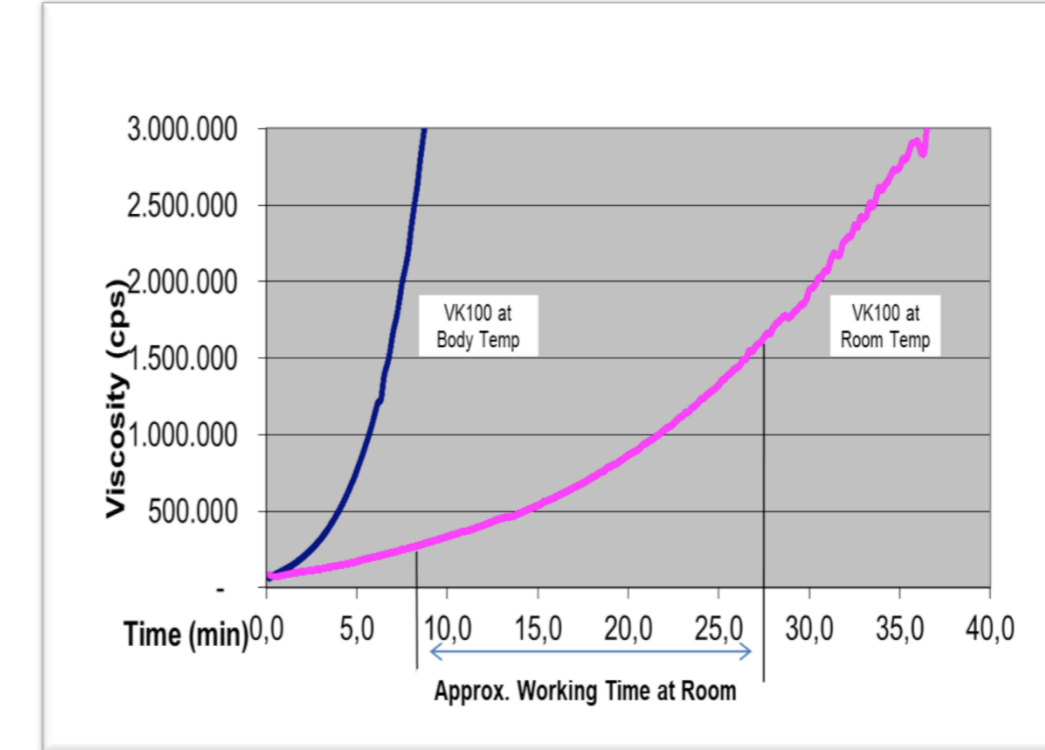
Complications included seven cases of leakages in 41 patients treated with BKP (17%), one of them with transient neurologic impairment, two asymptomatic PE (4.3%) and 3 postoperative adjacent fractures (7.3%). One case of permanent worsening of paraparesis for post-operative hematoma.

A significant improvement was observed in KPS, VAS and Dennis Pain Score (p < 0.0001).

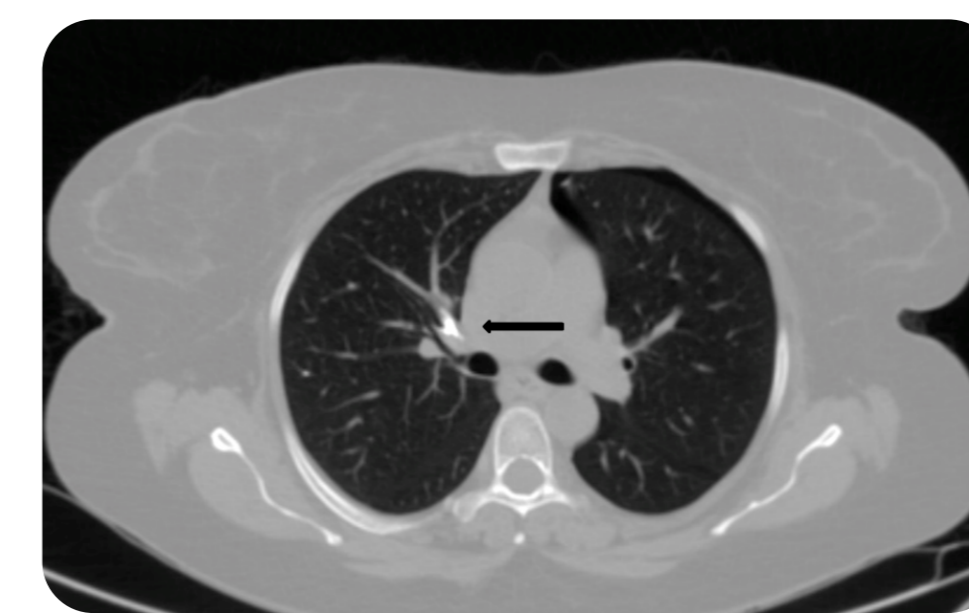
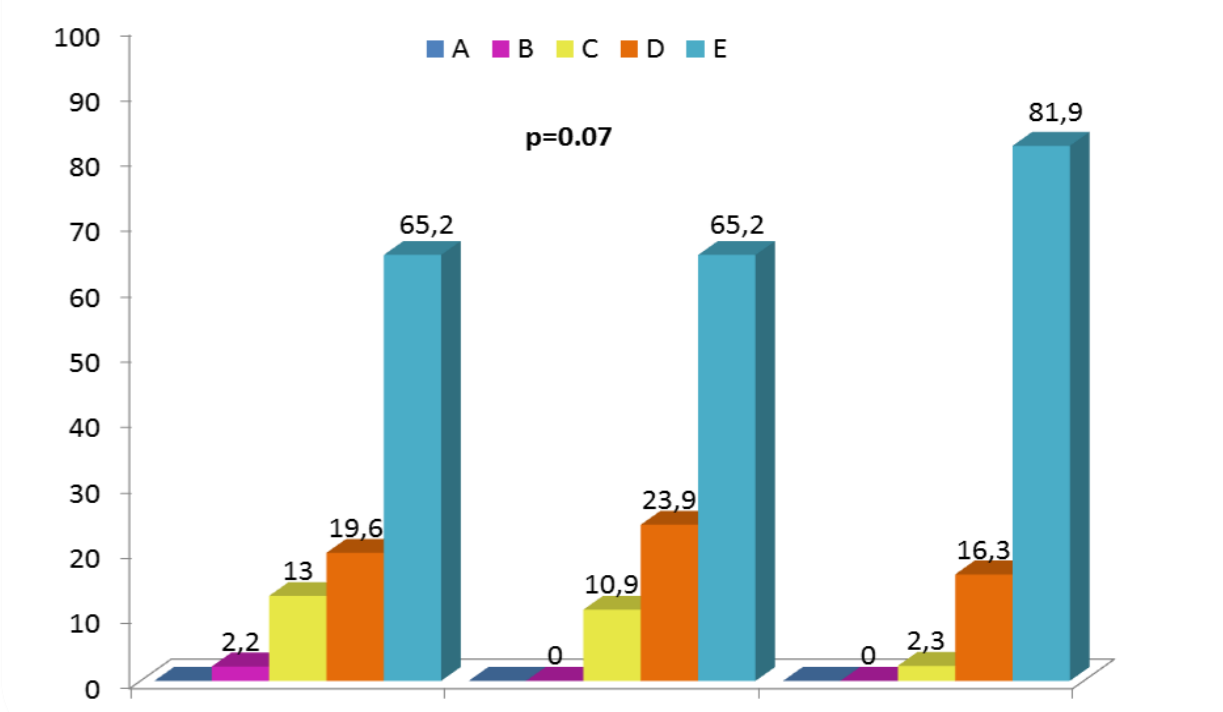
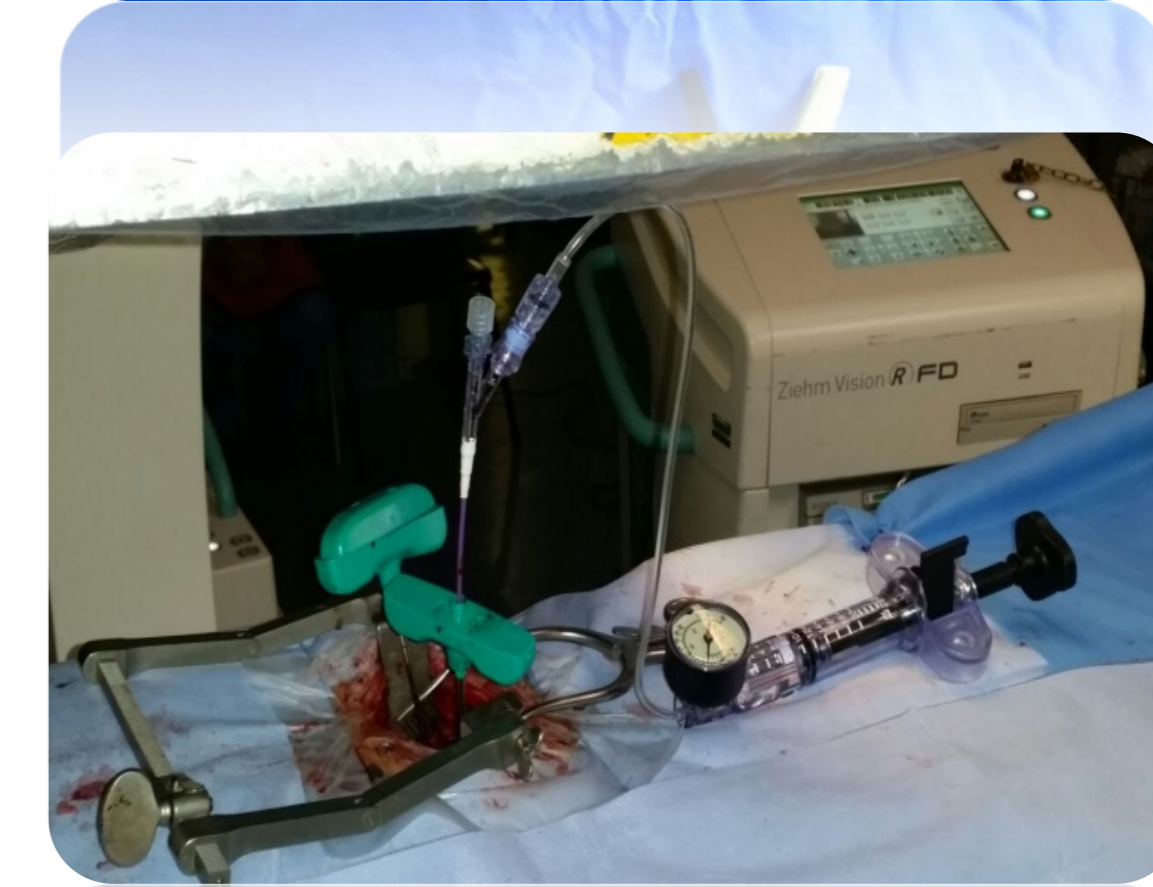
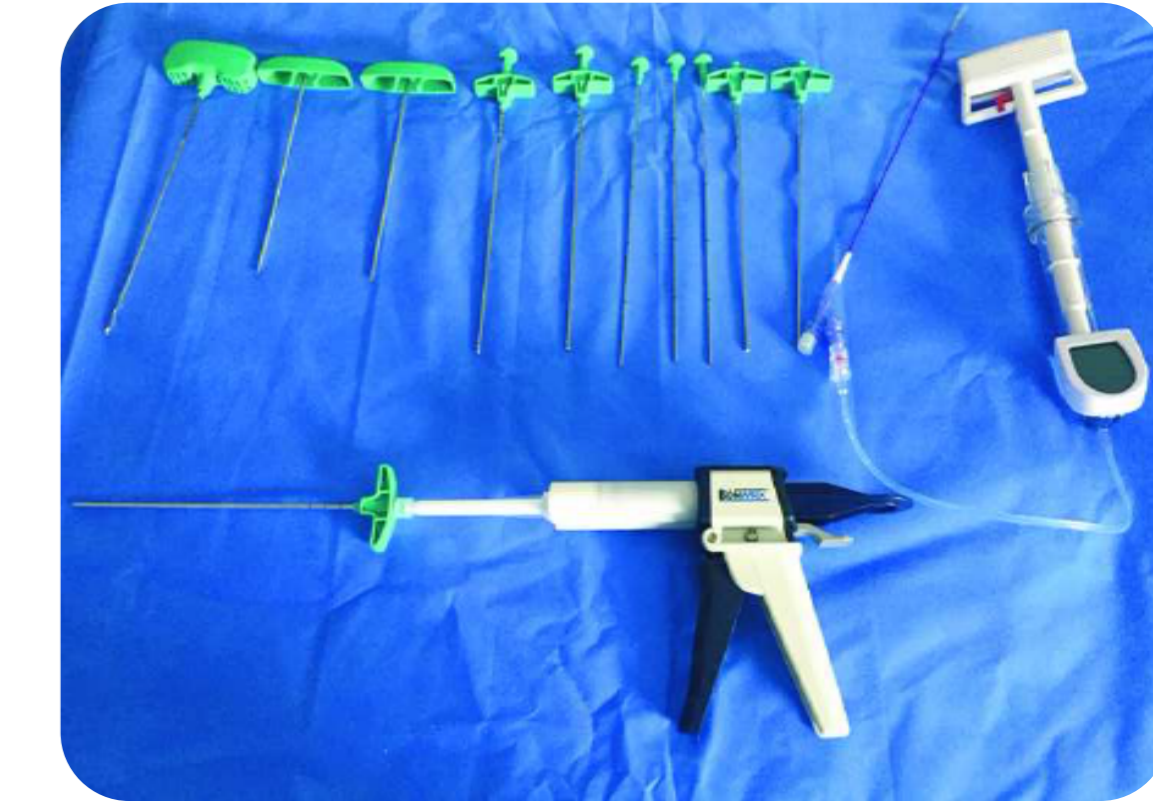
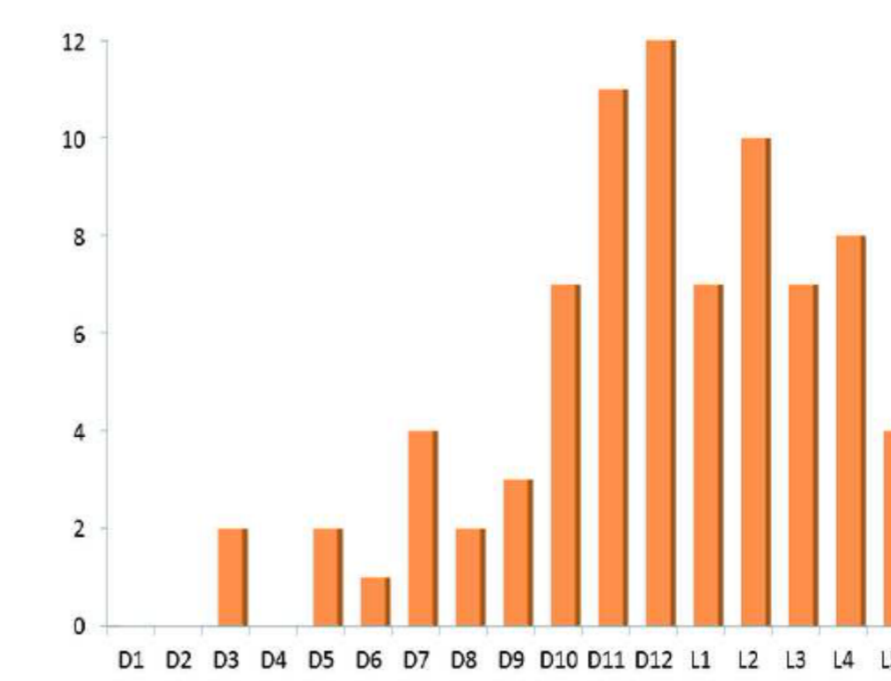
The 1-yr survival rate was 77.5%, 2-yr survival rate was 66.7%

Conclusions

Elastoplasty appears a safe and effective palliative treatment of VCFs in oncologic patients. Given the lack of exothermic reaction and the wider working window, it may be considered instead of PMMA in some difficult cases. The influence of biomechanical properties of silicon on reduction of adjacent level fractures deserves further investigations. The careful waiting for a proper viscosity, before silicone injection inside the vertebra and a low pressure injection, are very important to prevent complications.



Patients characteristics	n (%)
Histology of cancer	
Solid Tumors	28 (61)
Hematological tumors	15 (33)
Primitive spine tumor	3 (6)
Number of levels surgically treated with BKP	70 in 41 patients
Only one	17 patients (42)
Two levels	19 patients (46)
Three levels	5 patients (12)
Number of levels treated with Augmentation	10 in 5 patients
Site of treated vertebrae	
Thoracic	44 (55)
Lumbar	36 (45)
Type of surgery	
Percutaneous Elastoplasty	22 (48)
Open Elastoplasty	13 (28)
Mixed open and percutaneous Elastoplasty	6 (13)
Augmentation procedure	5 (11)
Median Tokyo score	10
Median SINS score	12
Percutaneous Elastoplasty	12
Open Elastoplasty	10
Mixed open and percutaneous Elastoplasty	10.5
Augmentation procedure	13
Median LOS (range)	
Percutaneous Elastoplasty	5 days (2-26)
Open Elastoplasty	3 days (2-15)
Mixed open and percutaneous Elastoplasty	10 days (3-26)
Augmentation procedure	4.5 days (3-13)
Augmentation procedure	15 days (10-20)



	Pre-op	Post-op	FU	P value
VAS median (range)	80 (60-90)	40 (10-60)	30 (0-70)	<0.0001
KPS median (range)	60 (50-80)	70 (50-80)	70 (40-90)	<0.0001
Dennis Pain Score median (range)	5 (4-5)	3 (2-4)	2 (1-5)	<0.0001

