



## KYPHOPLASTY: EVALUATION OF 108 PATIENTS

### KİFOPLASTİ: 108 HASTANIN DEĞERLENDİRİLMESİ

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#### SUMMARY:

**Objective:** The aim of this study is to evaluate the experience of 108 patients that operated with kyphoplasty.

**Materials and Method:** We inspected 108 patients who were operated for vertebral fracture with the procedure kyphoplasty between January-2014 and March-2016 at Dr.Lütfi Kırdar Kartal Training and Research Hospital Neurosurgery Clinic. The parameters that evaluated are the level of fracture, gender and age.

**Results:** Mean age of the study population was  $62.7 \pm 12.9$  years. Sixty-five patients (60.2%) were females, and 43 were males (39.8%). The comparison of age between genders revealed that mean age of females was  $65.6 \pm 12.2$ , and mean age of males was  $58.3 \pm 13.0$ . The difference of age between genders was statistically significant.

**Conclusions:** Kyphoplasty is a relatively safe and effective technique that provides short term pain relief, improved functional outcomes and had a superior capability for kyphotic angle and anterior vertebral body height improvement.

**Key Words:** Kyphoplasty, Vertebra body fracture , Vertebroplasty

**Level of evidence:** Retrospective clinical study, Level III

#### ÖZET:

**Amaç:** Çalışmamızın amacı kifoplasti opeasyonu yapılmış 108 hasta tecrübemizi incelemektir.

**Materyal ve Metod:** Ocak-2014 ile Mart-2016 tarihleri arasında Dr.Lütfi Kırdar Kartal Eğitim ve Araştırma Hastanesi beyin cerrahisi kliniğinde vertebra kırığı nedeniyle kifoplasti prosedürü uygulanan 108 hastayı inceledik. Değerlendirilmeye alınan parametreler kırığın seviyesi, yaş ve cinsiyettir.

**Sonuçlar:** Popülasyonun ortalama yaşı  $62.7 \pm 12.9$  olarak hesaplandı. 65 hasta kadın (%60.2) ve 43 hasta erkekti (%39.8). Ortalama kadın hasta yaşı  $65.6 \pm 12.2$ , erkek hasta yaş ortalaması ise  $58.3 \pm 13.0$  olarak hesaplandı. Cinsiyet ve yaş ortalamaları arasındaki fark istatistiksel olarak anlamlı bulundu.

**Çıkarım:** Kifoplasti kısa zamanda ağrı gidermek, fonksiyonel geri kazanım, kifotik açığı düzeltebilme ve vertebra korpus ön yüksekliğini iyileştirme için güvenli ve efektif bir yöntemdir.

**Anahtar Kelimeler:** Kifoplasti, Vertebra cismi kırıkları, Vertebroplasti

**Kanıt Düzeyi:** Retrospektif klinik çalışma, Düzey III

## INTRODUCTION:

Vertebral fractures are devastating if they impose neurological deficits especially if unstable. Vertebral fracture patients who were inflicted by osteoporosis, trauma or neoplasm would present by pain and progressive functional limitation interfering with their daily activity<sup>12,15,18</sup>. Conservative treatment modalities of these fractures are bed rest, analgesia, bracing, rehabilitation and a combination of these treatments<sup>10</sup>. But it may be difficult for patients, especially the elderly, to tolerate long term bed rest. Also conservative management cannot reverse kyphotic deformity that causes the biomechanical changes in the spinal segment. Surgery fails because of poor quality of osteoporotic vertebral bone<sup>17</sup>.

Percutaneous vertebroplasty was introduced in France by Galibert et al. in 1987, first described for the treatment of a hemangioma at the C2 vertebra<sup>8</sup>. It involves percutaneous injection of viscous polymethylmethacrylate (PMMA) into the vertebral body. With kyphoplasty, prior to injecting the cement, balloon is percutaneously inserted into the fractured vertebral body and inflated to create a cavity. The balloon is then deflated and removed and PMMA is injected.

The aim of this study is to evaluate the experience of 108 patients that operated with kyphoplasty.

## MATERIALS AND METHODS:

We evaluated 108 patients who were operated for vertebral fracture with the procedure kyphoplasty between January-2014 and March-2016 at Dr.Lütfi Kırdar Kartal Training and Research Hospital Neurosurgery Clinic. The informations were collected from the patients file archives retrospectively. Radiological data were inspected from the PACS system. The parameters that evaluated are the level of fracture, gender and age.

## STATISTICAL ANALYSES:

Categorical data were presented as frequencies and percent, and numerical data were presented as mean and standard deviation. Comparisons between independent groups were performed by Mann-Whitney U test. Statistical significance was considered as  $p < 0.05$ . SPSS 21 (IBM Corp., NY, USA) was used for the analyses.

## RESULTS:

Mean age of the study population was  $62.7 \pm 12.9$  years. Sixty-five patients (60.2%) were females, and 43 were males (39.8%). The levels of vertebral fractures that the patients had presented in Table-1. The comparison of age between genders revealed that mean age of females was  $65.6 \pm 12.2$ , and mean

age of males was  $58.3 \pm 13.0$ . The difference of age between genders was statistically significant.

The thoracolumbar junction levels T12 (%16.7) and L1 (%29.6) are consisting most of the operations.

**Table-1.** Levels of the vertebral fractures operated with kyphoplasty

	N	%
L1	32	29,6
L1 and L2	1	0,9
L1 and L3	2	1,9
L1 and L4	1	0,9
L2	16	14,8
L2 and L3	2	1,9
L2 and L5	1	0,9
L3	4	3,7
L3 and L4	1	0,9
L3 and L4 and L5	2	1,9
L4	6	5,6
T10 and T12	1	0,9
T11	8	7,4
T11 and L1	1	0,9
T12	18	16,7
T12 and L1	2	1,9
T12 and L1 and L2	1	0,9
T6	1	0,9
T7	1	0,9
T7 and T8	2	1,9
T8	4	3,7
T9	1	0,9
Total	108	100,0

## DISCUSSION:

Osteoporotic vertebral fractures are multiple in up to 20% of patients and affect more than 20% of those older than 50 years with slight female prevalence that markedly increases when they age above 80 years<sup>7</sup>. Height loss of the osteoporotic fractured vertebra may be mild (20-25%), moderate (25-40%) or severe (> 40%). The thoracolumbar region is mostly affected. Osteoporotic vertebral fractures are commonly wedged with anterior or midbody shortening, and minimal posterior vertebral body curbing.

Pain management is the key feature of treating osteoporotic fractures through vertebral body stabilization in patients with no neurological deficits. Prolonged bed rest together with analgesics and drug management may bring about pain relief at the expense of increased consequent dreadful recumbence complications<sup>17</sup>. Increased osteoporosis, pneumonia, pulmonary dysfunction, eating disorders, loss of independence, mental status change due to pain and the use of medications and deep vein thrombosis or strokes are commonly confronted<sup>18</sup>. It was reported that conservative outpatient treatment would not yield adequate control of pain in less than 20-25% of patients<sup>11</sup>. Early ambulation after surgical interference is a safeguard against multitude of complications especially in old patients following vertebral osteoporotic fractures. Minimally invasive fixation and vertebral cementing procedures deliver several advantages in this setting of pain control.

Vertebroplasty and kyphoplasty are statistically both effective and safe if applied when properly indicated. This was proved in both retrospective and prospective studies as well as in meta-analysis<sup>9,14,19</sup>. The procedure benefits supersede its risks and it proved to be cost effective<sup>11</sup>. Also there are studies that denies the benefits of vertebroplasty<sup>1,2</sup>.

Kyphoplasty was developed as adjunctive procedure to vertebroplasty when a balloon inflates the compressed vertebra and enables more thick bone cement to maintain the restored height with less incidence of cement leakage. It permits kyphosis correction if performed within 3 months post-fracture.

Complications like cement leakage, vascular invasion of cement, pedicle fractures and neurological deficits could be seen at the same time<sup>4,16</sup>. To avoid complications vertebral pedicle anatomy and curvature angles must be evaluated<sup>3,5,6,13</sup>. Both vertebroplasty and balloon kyphoplasty are contraindicated in the presence of infection, blood coagulopathy, sensitivity to contrast or cementing substance or breach of the posterior vertebral cortical bone and retro pulsed fragments<sup>7</sup>.

Kyphoplasty is a relatively safe and effective technique that provides short term pain relief, improved functional outcomes and had a superior capability for kyphotic angle and anterior vertebral body height improvement.

## REFERENCES:

1. Boszczyk B. Percutaneous vertebroplasty does not reduce pain and disability from osteoporotic vertebral compression fracture. *Evidence Based Medicine* 2015; 20 (5): 181.
2. Buchbinder RG, Golmohammadi K, Johnston RV, Owen RJ, Homik J, Jones A, Dhillon SS, Kallmes DF, Lambert RG. Percutaneous vertebroplasty for osteoporotic vertebral compression fracture. *Cochrane Database System Rev* 2015; DOI: 10.1002/14651858.CD006349.pub2.
3. Demirel N, Şerifoğlu L, Gül A, Gergin S, Düzkalır HG, Başaran R, Düzkalır AH, Özdoğan S. Measurement of spinal curvature angles on adults. *JTSS* 2016; 27(1): 9-12.
4. Düzkalır AH, Özdoğan S, Tiryaki M, Gül A, Yaltırık CK, Köken M. Complications of percutaneous vertebroplasty. *JTSS* 2015; 26(3): 255-262.
5. Düzkalır HG, Özdoğan S, Gül A, Gergin S, Şenol Ö, Düzkalır AH, Tatarlı N, Köken M. Morphometric study of lumbar vertebra pedicles. *JTSS* 2015; 26(2): 101-106.
6. Düzkalır HG, Özdoğan S, Gül A, Gergin S, Şenol Ö, Düzkalır AH, Tatarlı N, Köken M. Lumbar lordosis and sacral slope angle measurements according to adult age groups: A morphometric study. *JTSS* 2015; 26(2): 107-111.
7. El-Fiki M. Vertebroplasty, Kyphoplasty, Lordoplasty, expandable devices and current treatment of painful osteoporotic vertebral fractures. *World Neurosurgery* 2016; doi: 10.1016/j.wneu.2016.04.016.
8. Galibert P, Deramond H, Rosat P, Le Gars D. Preliminary note on the treatment of vertebral angioma by percutaneous acrylic vertebroplasty. *Neurochirurgie* 1987; 33:166-168.
9. Gill JB, Cupper M, Chin PC, Zhang Y, Shutt R Jr. Comparing pain reduction following kyphoplasty and vertebroplasty for osteoporotic vertebral compression fractures: Meta-analysis. *Pain Physician* 2007; 10(4): 583-590.
10. Harris ST, Watts NB, Genant HK, McKeever CD, Hangartner T, Keller M, Chesnut CH 3rd, Brown J, Eriksen EF, Hoeseyni MS, Axelrod DW, Miller PD. Effects of risedronate treatment on vertebral and nonvertebral fractures in women with postmenopausal osteoporosis: A randomized controlled trial. Vertebral Efficacy With Risedronate Therapy (VERT) Study Group. *JAMA* 1999; 282 (14): 1344-1352.
11. Jensen ME, McGraw JK, Cardella JF, Hirsch JA. Position statement on percutaneous vertebral augmentation: a consensus statement developed by the American Society of Interventional and Therapeutic Neuroradiology, Society of Interventional Radiology, American Association of Neurological Surgeons/Congress of Neurological Surgeons, and American Society of Spine Radiology. *J Vasc Interv Radiol* 2007; 18: 325-330.

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12. Köken M, Özdoğan S, Kendirlioğlu BC, Kocaman B. Spinal tuberculosis. *JTSS* 2015; 26(1): 65-70.
  13. Köken M, Özdoğan S, Gergin YE, Kendirlioğlu BC, Yüce E, Tiryaki M, Tatarlı N, Süslü HT, Hiçdönmez T. Torakolomber bileşke pedikül çaplarının farklı erişkin yaş gruplarına göre morfometrik analizi. *JTSS* 2014; 25(3): 199-203.
  14. Liu JT, Liao WJ, Tan WC, Lee JK, Liu CH, Chen YH, Lin TB. Balloon kyphoplasty versus vertebroplasty for treatment of osteoporotic vertebral compression fracture: a prospective, comparative, and randomized clinical study. *Osteoporos Int* 2010; 21(2): 359-364.
  15. Phillips FM. Minimally invasive treatments of osteoporotic vertebral compression fractures. *Spine* 2003; 28: 45-53.
  16. Sabuncuoglu H, Dincer D, Guclu B, Erdogan E, Hatipoglu HG, Ozdogan S, Timurkaynak E. Intradural cement leakage: a rare complication of percutaneous vertebroplasty. *Acta Neurochir (Wien)* 2008; 150: 811-815.
  17. Shen M, Ken Y. Osteoporotic Vertebral Compression Fractures: A Review Of Current Surgical Management Techniques. *Am J Orthop* 2007; 36(5): 241-248.
  18. Shi-Ming G, Wen-Juan L, Yun-Mei H, Yin-Sheng W, Mei-Ya H, Yan-Ping L. Percutaneous vertebroplasty and percutaneous balloon kyphoplasty for osteoporotic vertebral compression fracture: A metaanalysis. *Indian J Orthopaedics* 2015; 49(4): 377-387.
  19. Xiao H, Yang J, Feng X, Chen P, Li Y, Huang C. Comparing complications of vertebroplasty and kyphoplasty for treating osteoporotic vertebral compression fractures: a meta-analysis of the randomized and non-randomized controlled studies. *Eur J Orthop Surg Traumatol* 2015; 25: 77-85.