Acta Orthopaedica et Traumatologica Turcica xxx (2016) 1–4

Contents lists available at ScienceDirect

Acta Orthopaedica et Traumatologica Turcica

journal homepage: https://www.elsevier.com/locate/aott

Comparison of effectiveness of kyphoplasty and vertebroplasty in patients with osteoporotic vertebra fractures

Ahmet Ateş [a], Halil Can Gemalmaz [b], Mehmet Ali Deveci [c], Sezai Aykın Şimşek [d], Engin Çetin [e], Alpaslan Şenköylü [f, *]

[a] Özel EGM Hayat Hospital, Turkey
[b] Acıbadem University, Turkey
[c] Çukurova University School of Medicine, Turkey
[d] Koç University School of Medicine, Turkey
[e] Gazi Osman Paşa Taksim Training and Research Hospital, Turkey
[f] Gazi University School of Medicine, Turkey

ARTICLE INFO

Article history:
Received 10 September 2015
Received in revised form
17 February 2016
Accepted 20 April 2016
Available online xxx

Keywords:
Clinical results
Functional results
Kyphoplasty
Outcomes
Radiological results
Vertebroplasty

ABSTRACT

Objective: The aim of this study was to compare the functional and radiological outcomes of vertebroplasty and kyphoplasty in patients with osteoporotic vertebra fractures.
Methods: The files of the patients who underwent vertebroplasty or kyphoplasty for osteoporotic vertebrae fractures were retrieved from the archives. Forty-three patients with complete follow-up data were included in the study group. The patients were evaluated for radiological outcomes in terms of local kyphosis angle, wedging index, compression ratio, visual analog pain scale (VAS) and Oswestry Disability Index (ODI).
Results: In the study group, kyphoplasty was performed on 24 vertebrae of 22 patients (17 females, 5 males; mean age: 73 years) whereas vertebroplasty was applied on 24 vertebrae of 21 (16 females, 5 males; mean age: 74.7 years) patients. The mean follow-up time was 26 months. When the VAS and ODI values of the groups were analyzed, both groups showed statistically significant progress after the operation. Radiological data showed that the kyphoplasty group showed statistically significant improvement in the sagittal index values whereas the vertebroplasty group did not. The overall complication ratio was 4%.
Conclusion: Both vertebroplasty and kyphoplasty are effective treatment methods for functional recovery and pain relief in osteoporotic fractures of the vertebra. Although radiological outcomes of the kyphoplasty seem to be better, this does not have any clinical relevance. We suggest vertebroplasty over kyphoplasty since it is an easier method to manage.
Level of evidence: Level III, Therapeutic study.

Introduction

Osteoporosis is a disease of the bone characterized with a decrease in the bone mineral density and bone quality. It is vastly a problem of the elderly people and presents as a great public health issue.[1] Vertebral body compression fractures are the most encountered type in osteoporosis patients.[2] Clinically, these fractures can cause a wide range of symptoms including pain, decrease in quality of life, kyphosis which may lead to respiratory complications, immobilization due to pain, and complications of immobilization, which all may result in depression. Among these comorbidities, immobilization is known to aggravate osteoporosis.

The main goal in the treatment of osteoporotic vertebra fractures is to relieve pain, regain functions of daily living and halt the progression of osteoporosis. It is accepted that surgical interventions with implants cause frequent failures and non-union

* Corresponding author. Orthopaedics and Traumatology, Gazi University School of Medicine, Beşevler, 06510, Ankara, Turkey.
E-mail address: drsenkoylu@gmail.com (A. Şenköylü).
Peer review under responsibility of Turkish Association of Orthopaedics and Traumatology.

http://dx.doi.org/10.1016/j.aott.2016.10.002

due to low bone quality in these patients. It has also been shown that morbidity and mortality risks of surgical treatment are higher in elderly patients.[3,4]

Several minimally invasive techniques have emerged and gained popularity in the last decade. Vertebroplasty and kyphoplasty have proved popularity among procedures performed percutaneously. These two techniques offer a recognizable increase in quality of life in patients with an osteoporotic vertebra fracture by improving stability and thus relieving pain.

In this study, we aimed to demonstrate the functional and radiological differences of osteoporotic vertebral fracture patients treated with vertebroplasty or kyphoplasty.

Patients and methods

The archives of the Department of Orthopedics and Traumatology at the School of Medicine at Gazi University were scanned for patients who had been diagnosed with an osteoporotic vertebra fracture. Forty-three of these patients over the age of 60, had pain refractory to 4–6 weeks of conservative treatment, and those who had bone marrow edema adjacent to the fracture site on MR scans were included in the study. All patients were treated either by vertebroplasty or kyphoplasty. Patients with secondary osteoporosis (malignancy, metabolic disease, post-radiotherapy) and fractures due to high-energy traumas were excluded.

Surgical treatment was performed on 48 levels of vertebrae in 43 patients (Table 1). Kyphoplasty was performed on 24 vertebrae of 22 patients (17 females, 5 males; mean age: 73 years, range: 63–86 years) while vertebroplasty was performed on 24 vertebrae of 21 patients (16 females, 5 males; mean age: 74.7 years, range: 65–87 years). All patients were invited for final evaluation except one who had died during the follow-up period. Two other patients refused to attend the final follow-up.

Patients' age, sex, the onset time of symptoms, number of vertebral levels affected by the fracture, mechanism and type of trauma, presence of concomitant or prior fractures, medical history, medications taken currently, risk factors for osteoporosis and medications used for the treatment of osteoporosis were recorded. All patients underwent detailed physical examination including a detailed neurological assessment.

Local kyphosis angle, wedging index and compression ratio were measured from the X-rays taken before the surgical interventions (Figs. 1–3). The local kyphosis angle was measured according to the method defined by Cobb.[5] DEXA was ordered for the patients who have not undergone a bone mineral density test within the past year (Table 2). Patients' pain level was assessed preoperatively using the visual analog pain scale (VAS).[6]

Functional evaluation was done using the Oswestry Disability Index (ODI) version 2.0 which is a patient-reported outcome assessment questionnaire. ODI is a widely used questionnaire form that contains 10 separate sections of six questions regarding level of pain, personal care activities, weight lifting, walking activity, sitting, standing, sleeping, social life activities, transportation, and sexual activities.[7,8] In our study, all participants answered all sections except the ones related to sexual activities. Table 3 summarizes the mean values of outcome variables before and after the operations for both vertebroplasty and kyphoplasty patients.

Patients who met the above inclusion criteria were treated with the following methodology with a transpedicular approach. All vertebroplasty procedures were done under local anesthesia whereas all kyphoplasties were carried out under deep sedation or general anesthesia, plus local anesthesia as inflation of the balloon and reduction caused formidable pain. A C-arm image intensifier

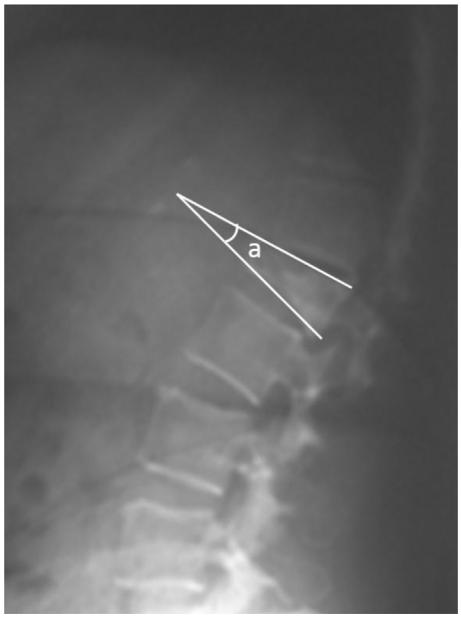

Fig. 1. Local kyphosis angle = a.

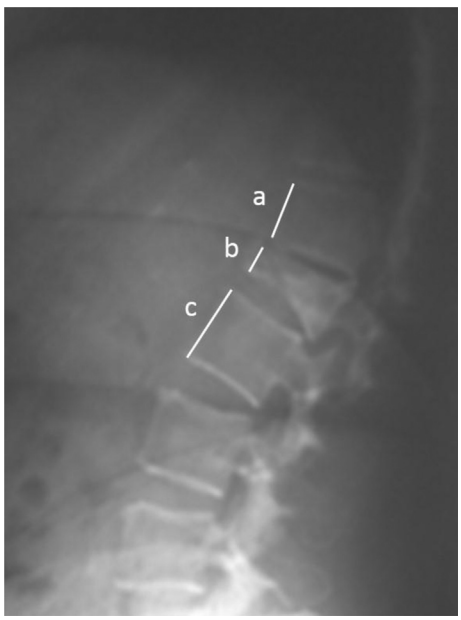

Fig. 2. Compression ratio = ((a+c)/2)/b.

Table 1
Distribution of the patients by the type and level of surgical interventions.

Level	Vertebroplasty	%	Kyphoplasty	%
L1	8	33.3	3	12.5
L2	5	20.8	5	20.8
L3	3	12.5	2	8.3
L4	4	16.7	2	8.3
L5	1	4.2	0	0
T4	0	0	1	4.2
T8	1	4.2	1	4.2
T9	0	0	3	12.5
T10	1	4.2	0	0
T11	0	0	2	8.3
T12	1	4.2	5	20.8
Total	**24**	**100**	**24**	**100**

Please cite this article in press as: Ateş A, et al., Comparison of effectiveness of kyphoplasty and vertebroplasty in patients with osteoporotic vertebra fractures, Acta Orthop Traumatol Turc (2016), http://dx.doi.org/10.1016/j.aott.2016.10.002