



Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en



Original article

Radiologic study of disc behavior following compression fracture of the thoracolumbar hinge managed by kyphoplasty: A 52-case series



S. Teyssédou^{a,*}, M. Saget^a, L.E. Gayet^b, P. Pries^a, C. Brèque^c, T. Vendevre^a

^a Unité Fonctionnelle Rachis et Neurostimulation, CHU La-Milètrie, 2, rue de la Milètrie, 86000 Poitiers, France

^b Service de Chirurgie Orthopédique et Traumatologique, CHU La-Milètrie, 2, rue de la Milètrie, 86000 Poitiers, France

^c Laboratoire d'Anatomie et de Biomécanique, 6, rue de la Milètrie, 86000 Poitiers, France

ARTICLE INFO

Article history:

Received 17 December 2014

Accepted 16 November 2015

Keywords:

Vertebral fracture
 PMMA bone cement
 Kyphoplasty
 Intervertebral disc
 Minimally invasive

ABSTRACT

Introduction: Kyphoplasty has proved effective for durable correction of traumatic vertebral deformity following Magerl A fracture, but subsequent behavior of the adjacent discs is unclear. The objective of the present study was to analyze evolution according to severity of initial kyphosis and quality of fracture reduction.

Material and method: A single-center prospective study included cases of single compression fracture of the thoracolumbar hinge managed by Kyphon Balloon Kyphoplasty with polymethylmethacrylate bone cement. Radiology focused on traumatic vertebral kyphosis (VK), disc angulation (DA) and disc height index (DHI) in the adjacent discs. Linear regression assessed the correlation between superior disc height index (SupDHI) and postoperative VK on the one hand and correction gain on the other, using the Student *t* test for matched pairs and Pearson correlation coefficient.

Results: Fifty-two young patients were included, with mean follow-up of 18.6 months. VK fell from 13.9° preoperatively to 8.2° at last follow-up. DHI found significant superior disc subsidence ($P=0.0001$) and non-significant inferior disc subsidence ($P=0.116$). DA showed significantly reduced superior disc lordosis ($P=4*10^{-5}$). SupDHI correlated with VK correction ($r=0.32$). Preoperative VK did not correlate with radiologic degeneration of the adjacent discs.

Conclusion: Correction of traumatic vertebral deformity avoids subsidence and loss of mechanical function in the superior adjacent disc. The underlying disc compensates for residual deformity. Balloon kyphoplasty is useful in compression fracture, providing significant reduction of traumatic vertebral deformity while conserving free and healthy adjacent discs.

Level of evidence: IV.

© 2015 Elsevier Masson SAS. All rights reserved.

1. Introduction

Inspired by vertebroplasty as described by Galibert and Dermond in 1984 [1], kyphoplasty was developed by Reiley in 1998, followed by Belkoff in 2001 [2]. The principle consists in restoring vertebral body anatomy using balloons, and reinforcing the anterior spine by cement injection. Indications were initially limited to tumoral [3] and osteoporotic lesions [4,5], but now include fracture in young patients [6,7].

Benefit is proven with respect to lasting reduction of traumatic vertebral kyphosis [7,8] and central depression of the vertebral plate [9]. There have been few studies focusing on discal evolution [10].

The present single-center prospective study of 52 patients managed by balloon kyphoplasty for Magerl A fracture [11] consisted in radiologic assessment of the adjacent discs, with the main objective of analyzing disc evolution according to severity of initial kyphosis and quality of fracture reduction.

2. Material & method

2.1. Study population

A total of 168 patients underwent kyphoplasty. Nineteen were lost to follow-up and 5 died. Fifty-two patients (16 females, 36 males) met the inclusion criteria (below). Mean age at surgery was 44.8 years (range, 19–72 years) and mean follow-up 18.6 months (range, 11–35 months). The mean quantity of cement injected was 7.4 ± 2.8 cc. Etiology and location were varied (see Fig. 1): 19 high falls, 15 road accidents, 10 sports accidents (including 6 falls from

* Corresponding author. Tel.: +33 6 28 05 61 41.

E-mail address: s.teyessedou@gmail.com (S. Teyssédou).

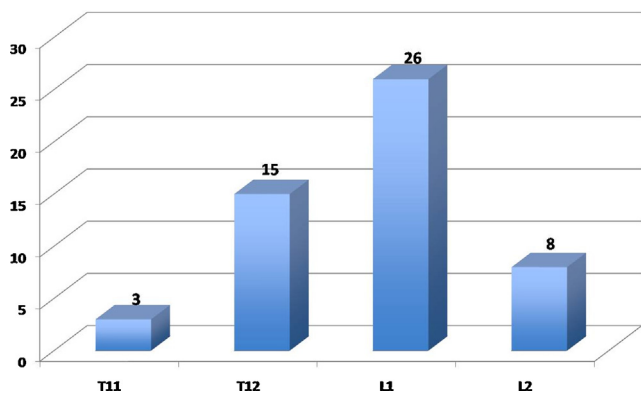


Fig. 1. Distribution of fractured vertebrae.

horses), 5 low falls, and 3 other. All fractures were Magerl type A: A.1 in 29 cases and A.3 in 23.

2.2. Inclusion criteria

The single-center prospective study was conducted between January 2008 and May 2011.

Patients were included if undergoing kyphoplasty (Kyphon Balloon Kyphoplasty–Medtronic Sofamor Danek, Memphis, TN, USA) for single Magerl A compression fracture of the thoracolumbar hinge (T11–L2). Exclusion criteria comprised posterior arc lesion, multi-level degenerative discopathy, primary neurologic deficit, A.3.3 lesion with excessive comminution or inter-fragment distance (score ≥ 6 on the load sharing classification [12]), and A.2.2 biconcave (“diabolo”) fracture [13]. Due to reduction loss associated with calcium phosphate cement [14–17], we used polymethylmethacrylate (PMMA) cement (BoneCement V, Biomet Biologics, Warsaw, IN, USA). The long-term evolution of PMMA was explained to the patients and alternative treatment by corset or osteosynthesis, depending on the case, was offered.

2.3. Treatment

Surgery, performed between days 0 and 6 post-trauma, consisted in vertebral deformity reduction by positioning on the

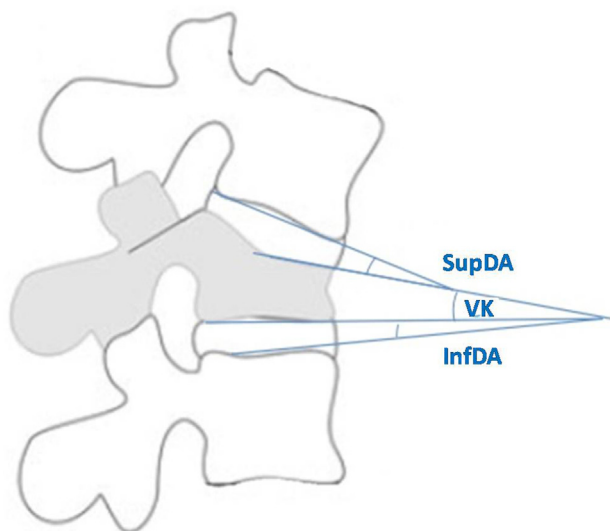


Fig. 2. Angle measurements (SupDA: superior disc angulation; InfDA: inferior disc angulation; VK: vertebral kyphosis).

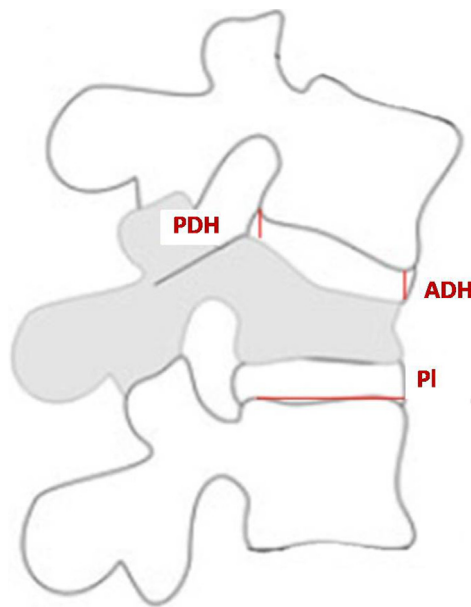


Fig. 3. Linear measurements (ADH: anterior disc height; PDH: posterior disc height; PI: underlying plate of the underlying vertebra).

surgery table, application of balloons, and vertebral body reinforcement by cement injection [18]. Balloon and cement volume were optimized on a case-by-case basis. Surgery was conducted by two senior surgeons, with the patient positioned prone on supports, under general anesthesia and AP and lateral radioscopic control. Trocars were positioned downward and converging so as to create a single cement cavity [7].

Patients were raised on DI and discharged following D2.

2.4. Radiography

Radiography was performed preoperatively and postoperatively at D45, M3, M6, M12 and last follow-up.

Lateral spinal radiologic analysis using SpineView™ software [19] measured vertebral kyphosis (VK) according to Kuklo et al. [20] (Fig. 1), and studied the over- and underlying discs by measuring disc angulation (SupDA and InfDA, respectively, in degrees of lordosis) and anterior (ADH) and posterior (PDH) disc height (Figs. 2 and 3).

Disc height indices (SupDHI and InfDHI) were calculated from these values [21] to avoid enlargement bias.

$$DHI = \frac{(ADH+PDH)}{\text{Length of superior plate of underlying vertebra}} \times 100$$

Disc Height Index (DHI).

Postoperative CT screened for presence and location of cement leakage (paravertebral, discal, intra-canal).

2.5. Statistics

SPSS® software was used for Student matched-pairs *t* tests of angular values (VK and DA), with normal distributions. Pearson correlation coefficients assessed correlation between VK and DHI. Linear regression assessed the correlation between SupDHI and postoperative VK and VK correction gain. The significance threshold was set at 5%.

Download English Version:

<https://daneshyari.com/en/article/4080945>

Download Persian Version:

<https://daneshyari.com/article/4080945>

[Daneshyari.com](https://daneshyari.com)