

***“Vertebroplasty versus Kyphoplasty in
Management of Metastatic Vertebral Bony Lesions”***

Essay

Submitted for the partial fulfillment of the Master Degree in Pain-Relief

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ACKNOWLEDGEMENT

First of all and above all thanks to **God**, without his help this work would have never existed.

I Would like to express my sincere thanks and deep gratitude to **Professor Dr: Khaled Abd Elhameed Mostafa**, Professor of Anesthesiology and Pain-Relief, Head of Anesthesiology and Pain-Relief department, National Cancer Institute, Cairo University for his valuable advice and kind cooperation to accomplish this work.

I would like also to express my deep appreciation to **Dr: Dina Nabil Abbas**, Lecturer of Anesthesiology and Pain-Relief, National Cancer Institute, Cairo University for her continuous help, advice and encouragement.

I would like also to express my deep thanks to **Dr: Sayed Mahmoud Ahmad Abed**, Lecturer of Anesthesiology and Pain-Relief, National Cancer Institute, Cairo University for his continuous help and encouragement.

الملخص العربى

الاورام الثانوية المسببة للآلم تعتبر من المشاكل الشهيرة للاورام الخبيثة ويمكن ان تتسبب فى اعاقة ملحوظة و تدهور فى مرضى الاورام الخبيثة.

أحيانا يصبح مرضى الاورام الخبيثة غير مناسبين للعمليات الجراحية المفتوحة ويحتاجون لفترة قد تمتد لاسباع حتى يصبح العلاج الاشعاعى فعالا فى السيطرة على الاورام الثانوية.

فى السنوات الاخيرة, تم تطوير تقنيات جراحية حديثة و بسيطة وقليلة الاضرار تقدم طريقة فعالة للتحكم فى الكسور المرضية الناتجة عن الاورام الثانوية فى العظام.

تقنية الحقن التكميلى للفقرات باستخدام مادة اسمنتية داخل الفقرة مباشرة من خلال الجلد ظهر لأول مرة سنة ١٩٨٧, وهذه التقنية تعتبر تقنية بسيطة تستعين بتوجيه جهاز الاشعه لحقن المادة الاسمنتية داخل جسم الفقرة.

بالرغم من ان هذه التقنية اصبحت منتشرة و شاع استخدامها, الا انه ظهرت تقنية أخرى فى سنة ٢٠٠١ عبارة عن حقن تكميلى للفقرات باستخدام مادة اسمنتية داخل الفقرة من خلال بالون.

يتم ذلك عن طريق ملئ بالون يتم وضعه داخل جسم الفقرة و يتبعه حقن المادة الاسمنتية داخل الفراغ المتكون بواسطة البالون.

الهدف من ذلك هو استعادة ارتفاع الفقرة و تحسين اعوجاج العمود الفقرى بالاضافة الى تخفيف الآلم كالذى يتم مع تقنية الحقن التكميلى للفقرات استخدام مادة اسمنتية داخل الفقرة مباشرة.

من المهم التأكيد على ان حقن المادة الاسمنتية فى حد ذاته لا يؤثر على الورم نفسه لكن يعطى استقرار لجسم الفقرات فى العمود الفقرى لمرضى الاورام الثانوية.

List of Abbreviations

- BS.....radionuclide Bone Scan.
- CHF.....Congestive Heart Failure.
- COPD.....Chronic Obstructive Pulmonary Disease.
- CSF.....CerebroSpinal Fluid.
- CT.....Computed Tomography.
- F¹⁸.....Fluorodeoxyglucose.
- KP.....Kyphoplasty.
- K-wire.....Kirschner wire.
- MRI.....Magnetic Resonant Imaging.
- PET.....Positron Emission Tomography.
- PMMA.....Polymethylmethacrylate.
- SPECT.....Single Photon Emission Computed
 . Tomography.
- VP.....Vertebroplasty.
- WBB.....Weinstein-Boriani-Biagini.

Introduction and Aim of the work

Percutaneous vertebral augmentation procedures have now become accepted as treatment options in patients with intractable back pain due to vertebral compression fractures caused by metastatic vertebral tumors **(Wilfred et al., ٢٠٠٨).**

These procedures offer a minimally invasive technique of cement application into the vertebral body to manage symptomatic compression fractures without neurologic impairment, namely, Vertebroplasty and Kyphoplasty **(Luca Denaro et al., ٢٠٠٩).**

The aim of this essay is to illustrate and compare the role of Vertebroplasty and Kyphoplasty in treatment of metastatic vertebral lesions.

The following items will be discussed:

- Anatomy of the vertebral column.
- Pathophysiology of bone metastases whether primary or secondary.
- Clinical picture and diagnosis of vertebral metastases.
- Different modalities of management of metastatic vertebral lesions.
- Vertebroplasty and Kyphoplasty and their role in vertebral metastases, including: techniques, indications, contraindications, advantages and disadvantages of both procedures and conclusion.

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Anatomy of the Vertebral Column:

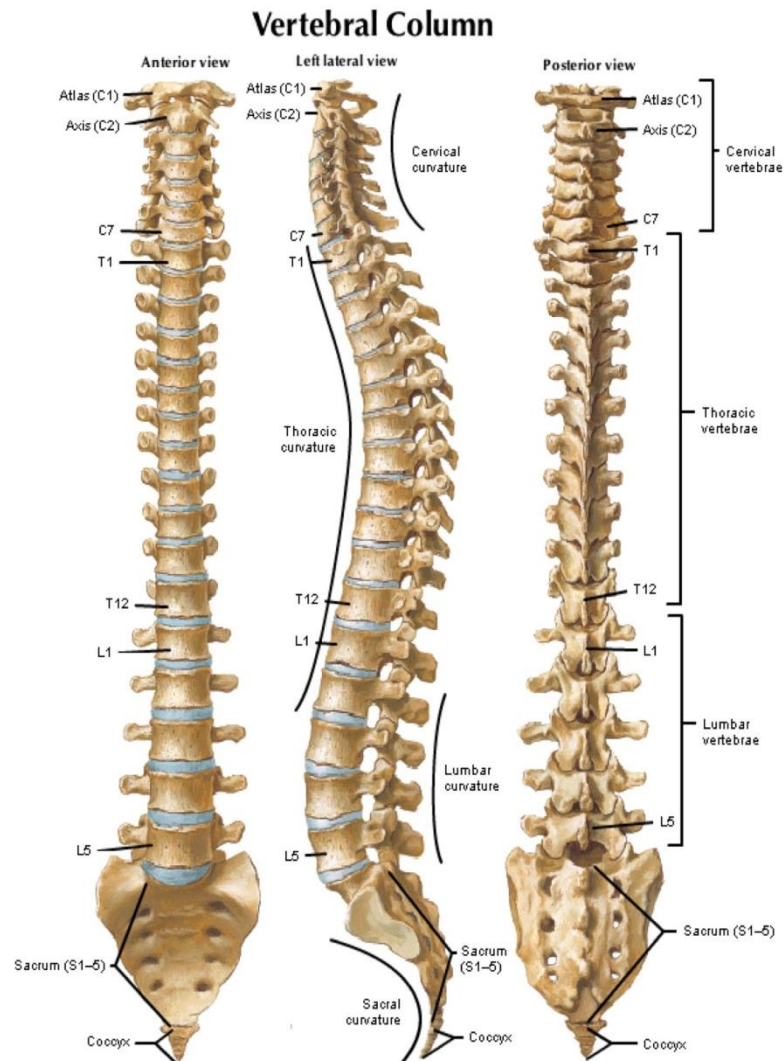


Fig. 1. Vertebral column (anterior, left lateral, and posterior view) (Frank, 2006).

The structures forming the spinal column should be rigid enough to support the trunk and the extremities, also strong enough to protect the spinal cord and cauda equina and anchor the erector spinae and other muscles, and

yet sufficiently flexible to allow for movement of the trunk and head in multiple directions. The anatomical organization of the spinal column and other related structures allows for all of this, but at a price, because the combined properties of rigidity and mobility can lead to many problems, particularly at the level of the cervical and lumbar spines.

The spinal column is composed of 7 cervical, 12 thoracic, 5 lumbar, and 5 fused sacral vertebra, in addition to 5 coccygeal bones. The cervical, thoracic, and lumbar vertebrae are all similar in structure except for the first (atlas) and second (axis) cervical vertebrae. Each “standard” vertebra is composed of a body, two pedicles, four articular facets, two lamina, and one spinous process **(Williams and Newell, 2005)**.

The atlas vertebra is composed of a ring of bone without a body, whereas the axis vertebra has an odontoid process around which the atlas rotates. Between each pair of vertebrae, there are two openings, the foramina, through which pass a spinal nerve, radicular blood vessels, and the sinuvertebral nerves (recurrent meningeal nerves) (Fig. 2).

Each foramen is bordered inferiorly and superiorly by pedicles, anteriorly by the intervertebral disc and adjacent vertebral body surfaces, and posteriorly by the facet joint (**Levin et al., 2001**).

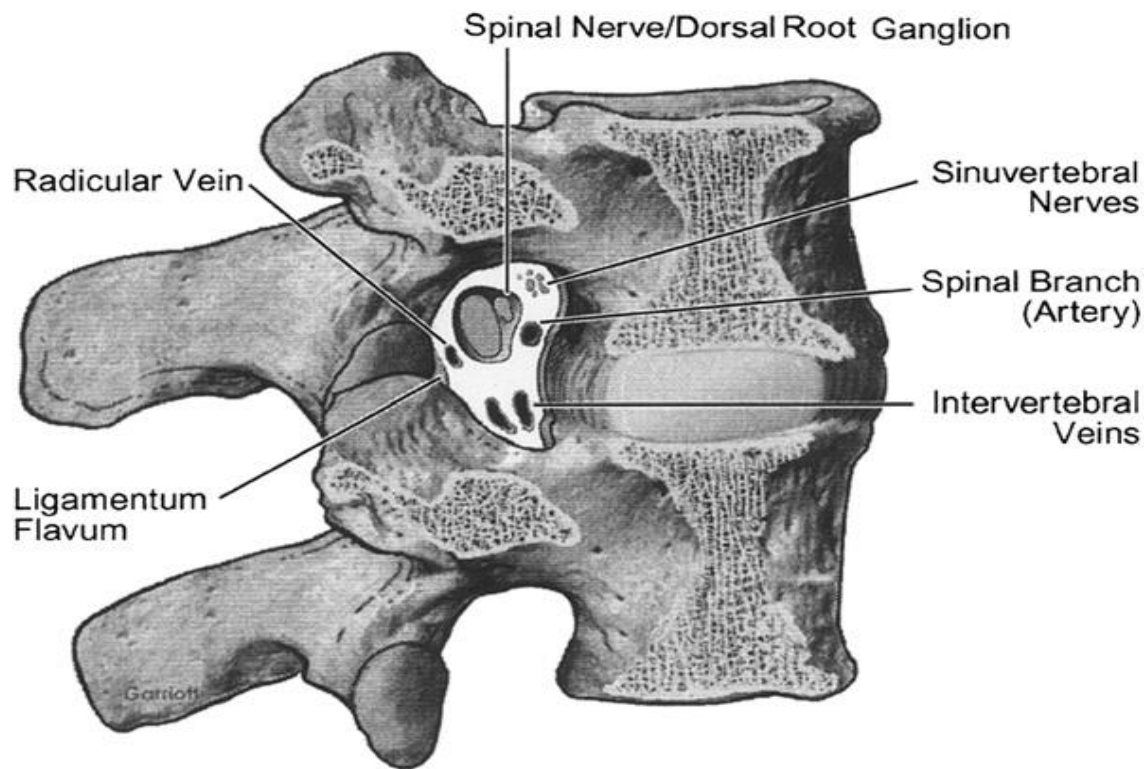


Fig. 2. The intervertebral foramen (Levin et al., 2001).

The spinal canal itself is formed anterolaterally by the pedicles, posterolaterally by the laminae and ligamentum flavum, and anteriorly by the posterior surface of the vertebral bodies and intervertebral discs. In adults the anterior-posterior diameter of the cervical canal from C₁ to C₂ is usually approximately 21 mm (range 16–30 mm), and from C₂ to C₇ the diameter is approximately 18 mm (range 14–23 mm). The anterior-posterior diameter of the cervical spinal cord is 11 mm at C₁, 10 mm from C₂ to C₆, and 9 to 10 mm below C₆. The anterior-posterior diameter of the cervical cord normally occupies approximately 40% of the anterior-posterior diameter of the cervical canal in healthy individuals. This cervical canal anterior-posterior diameter is decreased by 2 to 3 mm with extension of the neck, which is of clinical

importance in the context of hyperextension injuries in an individual with a congenitally narrow spinal canal, especially with the presence of additional narrowing caused by cervical spondylosis (**Jackson, ١٩٩٢**).

The facet joint(which also known by zygapophyseal joint), unlike the intervertebral disc, is a true synovial joint. Although it contributes with a limited extentd to the support of the spinal column, this joint's main function is to maintain the stability of the spinal column by guiding the direction of the vertebral movement, a function that depends on the plane of the facet joint surface, which varies throughout the spinal column. The joint can be a subject of degenerative changes that will result in enlargement, which, in association with thickening of the ligamentum flavum, can cause canal stenosis as a component of spondylosis.

It is innervated by branches from the posterior ramus of the spinal nerve (Fig. ٢) (**Jackson, ١٩٩٢**).