

VERTEBROPLASTY

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HISTORY:

The procedure was originally developed in France in 1984 and has been further refined in the US since 1995.

Definition:

Minimally invasive procedure, in which injection of cement (methyl - methacrylate) into a fractured vertebral body as a means of treating pain.

Aim:

To relieve pain in this patients who have not responded to conservative measures.

Pathology:

- When a vertebral body fractures → usual rectangular shape of the bone becomes compressed, → pain.
- These may involve the collapse of **one or more** vertebrae in the spine
- It is common result of **osteoporosis**.

→ RISK FACTORS:

- Advanced age
- Caucasian or Asian race
- Low weight
- Diseases such as kidney failure
- Medication use: such as *prednisone*.

Indications:

Vertebral compressed fractures that are persistently painful. "*Selected applications*"

- VERTEBROPLASTY , is Typically recommended after I- Failure, of less invasive treatments , *such as* :
 - Bed rest,
 - pain medications
 - Back brace or
 - II- Medications undesired side effects, such as :
 - Stomach ulcers or changes in mental status.
 - III- Vertebroplasty can be performed immediately in patients with problematic pain requiring hospitalization or for conditions that limit bed rest and pain medications.
- ➔ IV- Vertebroplasty is also performed on patients who are:
- Too **Elderly** patients.
 - **Non tolerate** open spinal surgery,
 - Severe osteoporotic bone for surgical repair
 - **Malignant** Vertebral compression.

Technique:

- It performed by several medical specialists.
- **Radiologists** are the most appropriate group to perform this image-guided interventional technique,
- **Imaging** (radiographs, CT and MR) plays a role in selecting patients appropriate for the procedure.

➔ TOOLS:

- Bone needles
- Cement Mixture.

(Needles, injector sets and cements are now manufactured specifically for vertebroplasty.)

- **High quality fluoroscopy** for needle placement is recommended

eg. (C-arm fluoroscopy).

Vertebroplasty Vs kyphoplasty

- **In vertebroplasty**, injection of cement mixture into the *fractured bone* through a *hollow needle*.
- **In kyphoplasty**:
 - A balloon is first inserted into the fractured bone through the hollow needle to create a cavity or space.
 - Then cement is injected into the cavity once the balloon is removed.
- **Preparation:** as those before any interventional technique (Fasting, medicationetc). .
- **Anesthesia:** - **Local** - **general:** May be used.
 - **Sedation with Analgesia** in Most cases, "I.V."
 - **General anaesthesia** in some patients is required.
- The skin of the selected area is carefully **sterilized**.
- Skin and underlying tissues are anesthetized with lidocaine
- **Position:** Prone.
- **Cement material:** is Formed of mixture containing,
(polymethylmethacrylate (PMMA) + barium powder + tobramycin, + a solvent).
- **Needle Insertion:** The special bone needle is passed slowly through the pedicle into the vertebral body using a slightly angled posterior approach.

- **Contrast Test Injection:** When the needle is in appropriate position, → a small test injection with x-ray contrast is performed ← to ensure avoiding a **vein** (to avoid *Embolization*).
- **Cement Injection:** The cement mixture is slowly injected during constant x-ray monitoring. → Until the potential spaces within the vertebral body are filled.
- **Needle withdrawal:** the needle is slowly removed.
- The other half of the vertebral body is then filled with the cement.
- It usually takes approximately **30-60 minutes** to perform one level.
- **More than one level** can be performed if necessary during a single session.

→ **After the procedure:**

- **Motility:** The patient is allowed to carefully **ambulate**.
- Usually go home within several hours.
- Most patients experience significant pain relief within the *firsts 1-2 days*.
- Many can stop their pain medications.

Complications:

- There are **potential risks** of vertebroplasty; these may be:

→ **Needle related:**

- Pedicle fracture,
- Needle breakage,
- Infection.
- pneumothorax,
- haemorrhage,

→ **Cement related:**

- Root compression,
- cord compression,

- Cement embolus),

➔ ***Procedure related:***

- fat embolus,

- Rib or vertebral fracture),

➔ ***Sedation related:***

- Respiratory arrest,
- Airway injuries,

- Cardiac arrest or
- Drug related (allergy).

- The overall complication rate from reports suggests that symptom-inducing or potentially serious complications occur in approximately 2% of patients treated for osteoporotic fracture.

Follow Up:

- Appropriate **medical therapy** for All patients treated by vertebroplasty or kyphoplasty for osteoporotic compression fractures & care of the special clinician in osteoporosis management → to reduce future fracture risk.

Follow Up Care

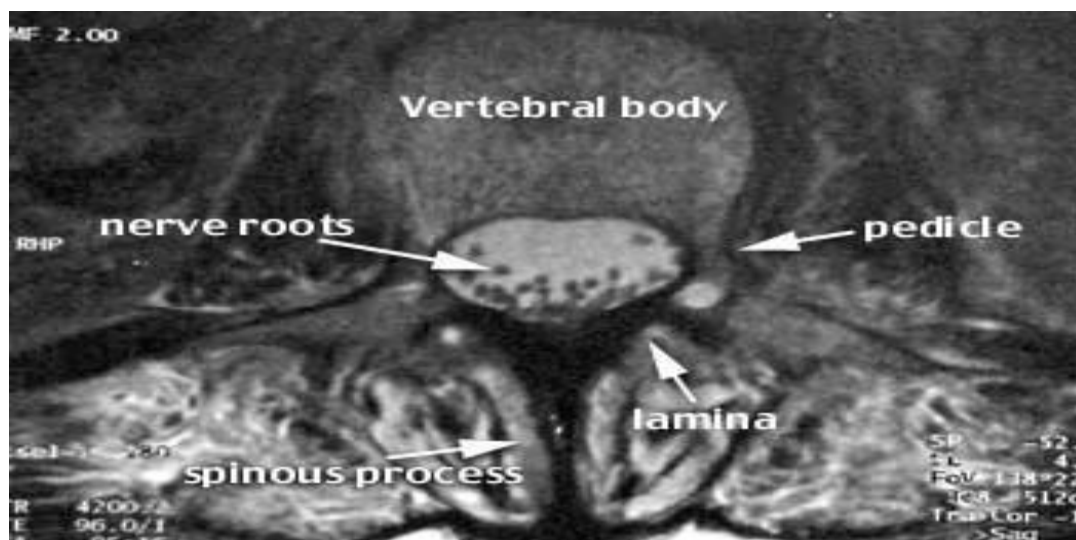
- 1) Pain medications - usually tapered over several days after procedure
- 2) Muscle relaxants
- 3) Adjust medications to prevent further mineral loss

Relative Contraindications:

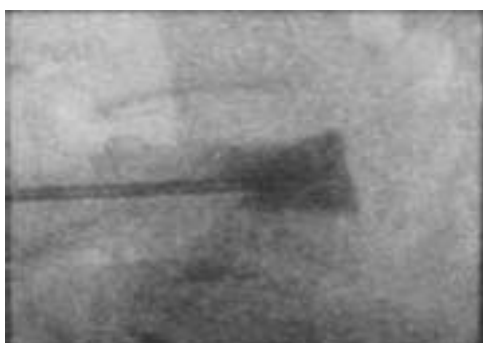
- 1) Young patient: the long term effects of the cement mixture are unknown
- 2) Vertebral bodies above the T5 level → the procedure is riskier and more difficult.
- 3) Patients with prior unsuccessful spine surgery

Vertebroplasty Statistics:

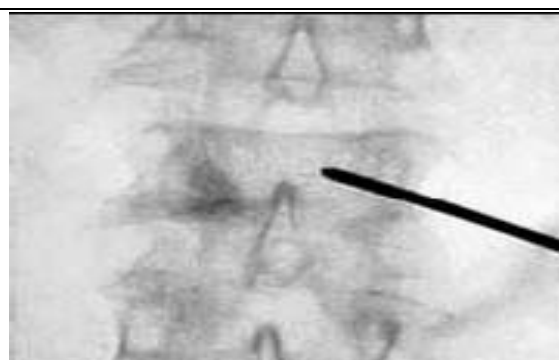
- 1) >80% moderate to marked pain relief
- 2) <5% induced fractures from procedure
- 3) <1% symptomatic embolism or infection



"Needle in position through Trans-pedicular Approach"



Injecting Cement



P-A view with needle In other side



In This patient's paralysis quickly resolved with steroid administration (decreased tumor swelling) and her pain was markedly decreased following the vertebroplasty. She left the hospital without having any surgery.