Osteoporosis compression fracture of vertebral bodies with percutaneous vertebroplasty treatment

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Percutaneous vertebroplasty is rather a new procedure in Taiwan for compression fracture patients. We collected 22 patients and carried out these procedures under local anesthesia with good results especially when patients belonged to high-risk groups.

Key words: Vertebroplasty, Polymethylmethacrylate (PMMA), Phelbography

Percutaneous vertebroplasty using methylmethacrylate (MMA) was first described by Galibert in 1987 [1]. Initially this technique was used for treatment of vertebral hemangiomas [2]. Later, wider ranges of use were found such as bone metastasis. The relative contraindications for the procedure include destruction of posterior vertebral wall with or without compression of the spinal canal (i.e. which considers leakage of cement with cord compression), complete loss of vertebral body height (i.e. a vertebra reduced to less than 1/3 of its original height may lead to a technically difficult procedure) [3] and presence of osteoblastic metastasis lesion. Osteoporosis with acute compression fractures of the spine is a common source of disabling pain in an increasing patient population, and conservative therapeutic measures often fail to relieve the patients from their discomfort within an acceptable period of time. Osteonecrosis compression fracture can be diagnosed by MRI with T1WI low and T2WI high signal intensity [4] while the compression fracture is located without spinal cord or root compression. The aim of this report is to present our experience in treatment of compression fracture.

MATERIAL AND METHODS

From 2000-09-20 to 2001-02-28, 22 patients (female: male, 20:2) with ages ranging from 63 years old to 93 years old (mean age 76.9 years old) underwent 24 operations with 34 vertebral bodies. Pre-operative severe back pain persisted for at least three months without neurologic deficit. The average duration was about half a year. The symptoms including progressive limitation of activity due to back pain, prolonged bed rest and narcotic analgesia intake. 16 thoracic vertebrae and 18 lumbar vertebrae were chosen (Fig 1). The procedure was done under single-plane
DSA (MD3 Philips, Holland) fluoroscopic guidance via bilateral transpedicular approach with the patient in prone position while local anesthesia was used. The chosen vertebral pedicle became oval-shape with X-ray in oblique position. Nine-gauge bone biopsy needles (Allegiance, Dominican Republic) were introduced from the pedicle into the center of the vertebral body, which had been seen from lateral view (Fig 2). Before injection of polymethylmethacrylate (PMMA) (Johnson & Johnson, USA), vertebral phlebography was obtained to evaluate filling pattern and potential for PMMA leakage from incontinuity of the posterior wall or venous plexus. Needle advancement once rapid flow of contrast medium into the vena cava or peri-vertebral venous was seen. A mixture of powdered PMMA 40gm and 5gm sterile barium sulfate powder (E Z-EM, Westbury, NY) was mixed together with liquid PMMA component without sterile. A single dose of PMMA mixture was divided into equal parts. Each part of the needle injected 2-4ml of mixture until the hemi-vertebra was totally filled without leakage (Fig 3). The devices used during the procedure as shown in Fig 4.

After operation, the patient remained in supine position for 3 hours to allow complete curing of the PMMA and follow up AP & lateral plain films of the spine. Throughout the whole procedural course, blood pressure, electro-cardiographic readings and oxygen saturation were monitored continuously.

**RESULT**

The etiologies of these compression fractures were classified as Table 1. The procedures were technically successful in all patients with different levels of bone pain relief according to Japanese Cervical Spine Score [5] (Table 2). The result was assessed as excellent with improvement rate \( \geq 80\% \); good 50-79\%; fair 25-49\% and poor \( \leq 24\% \). The duration of surgical time was about half an hour. Bone densitometry of these patients was grade III to grade IV using Dural Energy X-Ray Absorptiometry (DEXA Lordland, USA). Complications were divided into minor and major as

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**Figure 1.** L1 vertebral body osteoporosis compression fracture.

**Figure 2.** Lateral view of fluoroscopy during vertebroplasty.

**Figure 3.** Post vertebroplasty with injection of bone cement.

**Figure 4.** Devices used during procedure.
Table 3. The minor complications including leakage to psoas muscle or ulceration of skin [6]. The major complications including leakage of cement with spinal cord compression or pulmonary embolism.

In our cases, only 1 major complication that is leakage of bone cement with spinal cord compression at T12 level was found and needed surgery to remove the bone cement. However patient was dead with bronchopneumonia and respiratory failure 2 months after operation. Leakages of cement to the psoas muscle were found in 3 cases without neurological signs after half a year follow-up.

DISCUSSION

Vertebroplasty is a rather safe procedure with excellent results under fluoroscopic guidance, especially for elderly patients and patients with high risks for surgery. Some authors advocate needle placement under CT control [7]. However, injection under fluoroscopy can be seen in real time which can detected the leakage of cement easily. Bilateral transpedicular approach can save time in the procedure. Larger lumen of needle than references suggested is used for more satisfactory results. Vertebral phlebography is important to prevent early cement leakage to the vena cava or peri-vertebral vein. Keeping the cement refrigerated can extend its solidifying time during preparation. The whole procedural course is about 20 minutes. The vapor of methyl methacrylate is potentially hazardous [8]. The complications were divided into both minor and major types. The minor complications including leakage to psoas muscle and ulceration of skin. The major complications including leakage to canal with spinal cord compression and pulmonary embolism [9].

REFERENCES

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急性壓迫性骨折之經皮椎體整形術治療

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經皮椎體整形術，在台灣是一項新的手術。收集過去半年共22個病人之案例，簡單扼要地介紹此一手術，因為病人不須要在麻醉下進行手術，因此非常適合高危險群患者（如慢性阻塞性肺病、高血壓患者⋯），同時因為在X光透視下可以完整看到骨水泥的灌注情形，比直接手術來得妥當，另一方面術後的追蹤，也有很好的效果，所以是一項相當值得推行的手術。

關鍵詞：骨椎體整形術、骨質疏鬆症、壓迫性骨折