



Multiple-level cement vertebroplasty in patients with vertebral compression fractures from osteodystrophy in chronic liver disease

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Multiple compression fractures of osteoporotic vertebrae are common in patients with a liver transplant or with chronic liver disease. The authors describe two such patients, treated with percutaneous cement vertebroplasty at 12 levels, respectively in 4 and in 2 sessions. No complications were seen after follow-up periods of 12 and 8 months respectively. However, this is not a grant for the future, and further follow-up is necessary. Multiple-level cement vertebroplasty should not be generalized before further experience is gained. Moreover, medical treatment continues to play an important role.

Keywords : percutaneous vertebroplasty ; chronic liver disease ; liver transplantation ; osteoporosis ; vertebral fracture.

INTRODUCTION

Osteodystrophy is the most important complication of chronic liver diseases (CLD). The aetiology of the osteodystrophy is complex and multifactorial. The clinical findings can be seen as osteopenia and osteoporosis (14). Osteoporosis is prominent in severe CLD. In liver transplant (LT) patients, the initial causes are malnutrition, immobilisation and inflammation ; in the later stages immunosuppression and chronic corticoid usage play a role (9,13,14).

Osteoporotic vertebral compression fractures (OVCF) in CLD and LT patients hamper the compliance to the treatment of the primary disease, and decrease the quality of life (13). OVCF

is reported to be seen in 3 to 29% of the cases *before* liver transplantation, and in 10 to 42% *after* liver transplantation (4). OVCF is usually multilevel when it is first diagnosed, and extension to even more levels is not exceptional (9).

Percutaneous vertebroplasty (PV) is a minimally invasive treatment for OVCF. It was first used in 1987 by two French radiologists in a patient with an aggressive vertebral haemangioma. Since then the indications have been extended to the treatment of OVCF and painful vertebral metastases (12).

MATERIALS AND METHODS

At all levels, PV was done transpedicularly, under fluoroscopical control, under local analgesia and general sedation. A KyphX bone filler device (Kyphon Inc., Sunnyvale, CA), filled with polymethylmethacrylate-PMMA bone cement (KyphX HV-R bone cement,

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Kyphon Inc., Sunnyvale, CA), was used. Three to 6 ml of cement were used per level. After the procedure patients were monitored for 3 hours. They were mobilized on the same day.

CASE REPORTS

Case 1

A 43-year-old man complained of severe low back pain radiating to the buttocks. He had undergone a liver transplantation 6 months before, because of cholestatic liver disease. He took prednisolone 15 mg/day. Radiographs showed osteoporotic compression fractures L2 and L5. Bone densitometry (DEXA) revealed osteoporosis with a T score of -3.2 at the levels L1, L2, L4 and in the femoral neck. Transpedicular PV was performed at the levels L2 and L5, under sedation and local anaesthesia. The pain subsided and the patient was discharged 2 days later. Alendronate 10 mg/day, salmon calcitonin 200 IU/day, alfacalcidol 1 mcg/day, and calcium 1000 mg/day were added to his medication. Two months later, the complaints recurred and several new OVCFs were noted: T10, T11, T12, and L1. Again, transpedicular PV was performed. However, the procedure was complicated with a pulmonary artery cement embolus. A heparin infusion was started. The patient could leave the intensive care unit after normalisation of his oxygen saturation. He was discharged from the hospital, 4 days after the procedure, under coverage with enoxaparin sodium 2×0.6 cc/day. Three months later, interscapular pain led to the diagnosis of compression fractures T4, T5 and T6. The same treatment was applied. Two months later, vertebral fractures T7, T8 and T9 were treated similarly. No further compression fractures were seen in the subsequent 12 months. Only the levels T1, T2, T3, L3 and L4 were left untreated.

Case 2

A 69-year-old woman with chronic hepatitis C cirrhosis was referred because of acute low back pain. The following vertebral compression fractures were treated with transpedicular PV: T8, T10, T11, T12, L1 and L3. The patient was mobilised on the



Fig. 1. — Case 2. This 69-year-old woman with hepatitis C cirrhosis was treated with transpedicular cement vertebroplasty at all thoracic and lumbar levels, except T1-T5 and L3, in two sessions.

same day, free of pain. But her pain recurred on the second postoperative day, and a transpedicular PV became necessary on the levels T6, T7, T9, L2, L4 and L5. The patient was mobilised on the same day and discharged on the next day. Eight months later no further fractures were noted (fig 1). Only the levels T1-T5 and L4 were left untreated.

DISCUSSION

Osteoporosis is a common finding in patients with a liver transplant or with liver cirrhosis, but the mechanism of this osteoporosis is not yet understood. The equilibrium between bone formation and bone resorption is disturbed. According to the literature, osteoblastic activity is diminished while osteoclastic activity is increased (10,13,14).

After liver transplantation the incidence of at least one OVCF was 14% in the first year, and 21% in the second year, according to Leidig-Bruckner *et al* (9). Giannini *et al* (4) also reported that OVCF occurs mainly during the first 6 to 12 months after

the liver transplantation. In case 1 it typically occurred after 6 months.

After liver transplantation, immunosuppressive treatment would play a role, according to Trautwein *et al* (14). They noted that if the dose of glucocorticoids exceeded 7.5 mg/day, the level of telopeptide, a marker of bone resorption, was significantly higher than in patients not receiving glucocorticoids.

Still according to Leidig-Bruckner *et al* (9), most of the OVCFs were seen in the lower thoracic and in the lumbar region. This was true, at least initially, in cases 1 and 2, after which other levels were affected.

After the first compression fracture, the risk of additional vertebral fractures increases 5 to 25 times. It is not clear if there is an increased risk associated with vertebroplasty itself (8). However, in cases 1 and 2, 12 levels needed treatment, respectively in 4 and 2 sessions, which would plead for a causative relation.

The more cement is injected, the more the resistance of the vertebrae increases ; however the ideal amount of cement to be injected is not well defined yet (1,6,7). About 2.5 to 6 ml of cement are said to be sufficient, taking into account the volume of the vertebral body (6,7). In our patients, 3 to 6 ml were injected per level. Too much cement makes the vertebral bodies so rigid that new OVCFs occur at adjacent levels (2). *In vitro*, 16% filling of the vertebral body restores the prefracture endurance, while 25 to 30% filling leads to excess stiffness (3,5,11). Of course, not only the amount of cement, but also the pre-existing bone mineral density plays a role in the development of subsequent fractures.

Multiple-level cement vertebroplasty should not be generalised before further experience is gained. Medical treatment must continue to play an important role.

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