

Anaphylaxis during percutaneous kyphoplasty for an osteoporotic vertebral fracture

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Sir,

The aim of balloon kyphoplasty is to reduce excessive vertebral compression due to a vertebral body fracture. This is done by distention of a balloon inserted into the vertebral body prior to the injection of polymethylmethacrylate (PMMA). The procedure may be needed in compression fractures that result in greater than 70% reduction of the original vertebral height. [1],[2],[3],[4] The diagnosis of an osteoporotic fracture is based on clinical and radiological observations including the Dual X-Ray Absorptiometry (DEXA) scan. Accordingly, it may be considered as a minimally invasive intervention for the treatment of vertebral body pain.

A female patient, aged 76 years, was admitted with a history of pain in the thoracolumbar region for 8 months. It was incapacitating enough to prevent her from standing and walking. Analgesics only gave her a transient relief in her symptoms. She had a history of allergic reaction to non-steroid anti-inflammatory medication and to sulfonamides. She had a localized tenderness at the level of the thoracic (T)12 vertebra. Her basic laboratory assessment, including her coagulation profile, was normal. Her magnetic resonance imaging (MRI) showed a compression fracture of the T12 vertebra due to osteoporosis. There was an overall reduced bone density. She was planned for a transpedicular kyphoplasty to relieve her of her pain. The procedure was carried out in prone position under general anesthesia in view of her elderly age and the possibility of her being non-co-operative during the procedure. A small skin incision was made at the entry point and a transpedicular needle was introduced until the anterior third of the vertebral body. A C-arm image intensifier was used for the intra-procedural image guidance. By expanding the balloon, the endplate was lifted and a cavity was formed within the vertebra. The balloon was removed and deployment of the PMMA mixture was carried out in a controlled manner within this cavity. Venous embolization of the material was prevented by injecting a slightly firmer mixture of PMMA under radioscopy control. No leakage into the epidural space occurred. The patient, however, developed a sudden fall in her blood pressure within minutes after the PMMA was injected into the collapsed vertebra. Her end tidal (ET) CO₂

fell rapidly and she started developing fever and a red rash all over her body. She soon had an impalpable pulse, an unrecordable blood pressure and a progressive bradycardia. A timely cardiac massage, and administration of steroids, antihistamines and adrenaline revived her. The patient was resuscitated and could soon be extubated. She appreciated the pain relief following the procedure and was mobilized the next day. She was placed on calcium and vitamin D 3 supplementation and was discharged on the fourth postoperative day.

The fundamental principle of kyphoplasty is to percutaneously inject a rapidly hardening substance (i.e. the PMMA) into the vertebral body. [5] It aims at restoring the height of the fractured vertebral body and the correction of local kyphosis. The mechanism responsible for pain relief after a kyphoplasty is not known but may involve rendering the peripheral nerve endings insensitive or achieving mechanical stabilization of the vertebral body micro-fractures. [6]

PMMA is made by mixing a polymer powder with a liquid monomer. The bone cement injection is performed under continuous lateral radiographic guidance. [5],[6],[7],[8] The complications include a pedicle fracture, fat embolism, pulmonary embolization, cement leakage into the spinal canal and paraplegia. Severe anaphylactic shock during cement injection can occur as a consequence of extravasation of the toxic cement monomer. [1],[2],[3] In our patient, the anaphylactic shock was due to a severe allergic reaction to the cement monomer. The fact that our patient underwent her procedure under general anesthesia wherein she was already intubated and had well-secured intravenous lines considerably helped in her rapid resuscitation.

In order to minimize the risk of extravasation of the PMMA into the vascular system, it is strongly recommended that the cement be injected when it has achieved the consistency of a toothpaste. A venography should be performed before injecting the cement in order to obviate the possibility of a rapid shunting of contrast from the vertebra to the inferior vena cava. [1] If the venogram detects a continuous and rapid shunting of the dye, then the fistula should be occluded by polyvinyl alcohol particles or a gelatin sponge pledget prior to injection of the PMMA cement.

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