

New material for vertebral fractures repair

Vertebroplasty, the injection of bone cement into fractured vertebra in order to restore its original height and shape, is the most popular and effective treatment of vertebral compression fractures. However, the long term success of this kind of procedures is totally entitled to the ability of the bone cement to behave similarly to bone tissue. Bone cements are synthetic materials generally based on acrylic polymers as polymethylmethacrilate (PMMA). While bone tissue is a tough material, that is a material that deforms before it breaks; PMMA shows a brittle behavior as it breaks without deforming. Osteoporotic bone tissue tends to be more fragile than healthy bone and acrylic bone cements. This means that if a certain vertebra has been repaired using this

This article describes the development of a comb-like polymer with polyisoprene (biopolymer) backbone and short PMMA side chains. This same material having entrapped barium sulphate nanoparticles is also described. The idea is to achieve an even distribution of the nanoparticles, as they are needed in order to perform the surgery. Additionally, it avoids large agglomerates of the nanoparticles. Different techniques were used in order to describe the chemical structure of the material, establishing that in average there are four units of methylmethacrilate per unit of isoprene. Different mechanical tests indicated that the new material without nanoparticles is tougher than polymethylmethacrilate thus being a good replacement in bone cement formulations. The homogeneous distribution of the Barium Sulphate nanoparticles was determined through Scanning Electron Microscopy.

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