

Blasco J, Martinez-Ferrer Q, et al. Effect of Vertebroplasty on Pain Relief, Quality of Life, and the Incidence of New Vertebral Fractures: A 12-Month Randomized Follow-up, Controlled Trial. J Bone Mineral Research 2012;27(5):1159–1166.

Design: Randomized clinical trial

Population/sample size/setting:

- 125 patients (97 women, 28 men, mean age 73) treated for painful osteoporotic vertebral fractures in a neurointerventional clinic in Barcelona
- Eligibility criteria were acute painful osteoporotic fracture from T5 to L5 within the past 12 months, confirmed by spine radiograph and edema on MRI (or activity on bone scan), and a VAS pain score ≥ 4
- Exclusion criteria were untreatable coagulopathy with, active infection, current malignancy, any encroachment in the vertebral canal by a vertebral fragment, fibromyalgia, spondyloarthropathies, or dementia interfering with assessment of pain and quality of life

Main outcome measures:

- Randomization was to percutaneous vertebroplasty (n=64) or conservative treatment (n=61)
- The vertebroplasty group received PMMA cement through a 10 or a 13 gauge needle, with 6 hours of strict bed rest after the procedure and a CT scan at 24 hours to check for cement leakage
- Conservative treatment consisted of analgesics on a standardized format and nasal calcitonin for the first month of treatment
- Both the vertebroplasty and the conservative group had standard analgesics and 1 month of calcitonin; both groups also began bisphosphonates after 1 month of treatment
- 2 patient-reported outcomes, pain VAS and the Qualeffo-41 (European Quality of Life questionnaire for osteoporosis,) were assessed at baseline, 2 weeks, and at 2, 6, and 12 months
- One radiologist-reported outcome, new vertebral fractures, were taken at 6 and 12 months by spinal x-ray; some suspected fractures were evaluated by MRI or bone scan
- 78% of patients completed the 6 month follow-up
- The 64 vertebroplasty patients received PMMA at 140 vertebrae (2.2 vertebrae per procedure); cement leakage was observed in 49% of procedures, but was not associated with immediate clinical complications
- Both groups had significant relief in VAS and improvement in Qualeffo scores at all follow-up time points, but the vertebroplasty group appeared to have greater improvement (42%) at 2 months than the control group improvement (25%)
 - o At the end of 12 months, the groups had similar levels of moderate and severe residual pain
 - Moderate (VAS ≥ 4) pain was reported in 36% of the vertebroplasty patients and 34% of the control group

- Severe (VAS \geq 7) pain was reported in 19% of the vertebroplasty patients and 18% of the control group
- The vertebroplasty group had an early improvement in Qualeffo scores, but the control group showed improvement only after 6 months
 - The difference in the fitness-mobility domain of the Qualeffo was greater for the vertebroplasty group at all time points, and improved only slowly for the control group
- Although the authors reported no statistically significant differences in analgesic use between the two groups, the vertebroplasty group had greater use of major opiates at baseline (28 patients) than the control group (14 patients); the number of patients on major opiates decreased in both groups, but the vertebroplasty group still had more patients on major opiates at 12 months (n=15) than the control group (n=7)
- If pain management failed, rescue therapy was offered in the form of intrathecal infusion of 25 mcg of fentanyl
 - This was done for 3 patients in the vertebroplasty group and 15 patients in the control group; 7 control patients underwent vertebroplasty at unspecified times during the trial
- The vertebroplasty group had 29 new fractures in 17 of the 64 patients; 8 of the 61 control patients had new fractures
 - Most (71%) of the new fractures in the vertebroplasty group were clinical; only 9% of the new fractures in the control group were clinical
 - 75% of the new fractures occurred in the first 3 months in the vertebroplasty group, and most occurred adjacent to the segment where vertebroplasty had been done; cement leakage into the inferior disc was frequently observed in the new fractures

Authors' conclusions:

- Both vertebroplasty and conservative treatment are associated with improvement in pain and quality of life in patients with osteoporotic vertebral fractures over a 1 year follow-up
- However, improvement occurred earlier for vertebroplasty
- The occurrence of new clinical fractures was strongly associated with vertebroplasty; other recent studies have not shown this association
 - This may have arisen from the fact that the mean number of vertebrae treated with vertebroplasty was greater than for previous studies; 61% of patients had at least 2 vertebrae treated, but a minority (18%) of patients in previous studies had treatment at more than one vertebra
 - It is also possible that the greater early mobility of the vertebroplasty group contributed to the development of more fractures
 - Cement leakages, especially to inferior discs, may also have been a factor in the development of new fractures

Comments:

- The timing of the crossovers from conservative treatment to vertebroplasty was not reported, but presumably occurred after several months and after the 2-month comparisons of treatment effects
- The radiographic evaluations for new fractures were scheduled for 6 and 12 months, but 75% of the new fractures in the vertebroplasty group occurred by the 3 month mark
 - o Presumably, these fractures presented with symptoms which prompted radiographic evaluation; presumably, the small numbers of new fractures in the control group were detected at the scheduled x-ray times
- Although 15 control patients had intrathecal fentanyl, only 7 of them crossed over to vertebroplasty; presumably, the others were able to remain with nonoperative treatment after the infusions
- The pain VAS and Qualeffo scores were not reported separately for the vertebroplasty patients with and without new fractures
 - o This would be useful information, since it could be used to examine the hypothesis that too much early mobilization enabled by vertebroplasty and detectable by the Qualeffo score was related to the risk for fracture
- Although not commented on, the high rate of use of strong opiates in the vertebroplasty group at the end of treatment is relevant to judgment of the procedure's success
- The evaluation of patients included "bone metabolic parameters," but these were not further specified; presumably, they included measures such as osteocalcin and bone-specific alkaline phosphatase, but were not used in any of the analyses
- Any recommendations for vertebroplasty should take into account the balance between early symptom relief and high adjacent segment fracture rates

Assessment: Adequate for evidence that vertebroplasty is associated with earlier pain relief and functional mobility than pharmacologic treatment alone, but that there may be a risk of new clinically significant vertebral fractures when more than 1 vertebra is treated