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A Systematic Review and Meta-Analysis: Risk factors associated with recollapse of augmented vertebrae after percutaneous vertebral augmentation

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ADMINISTRATIVE INFORMATION

Support - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2024120035**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 9 December 2024 and was last updated on 9 December 2024.

INTRODUCTION

Review question / Objective This study is retrospectively aiming to investigate the incidence and risk factors of recollapse in augmented vertebra after PVP/PKP.

Condition being studied Osteoporotic vertebral compression fracture (OVCF) are commonly found in patients with osteoporosis. The rate this diseases is soaring with an aging population and increasing prevalence of osteoporosis. OVCF are characterized by persistent pain, kyphosis, neurological deficits and decreased quality of life . Percutaneous kyphoplasty (PKP) is a safe and effective minimally invasive surgical treatment for vertebral compression fracture (VCF). It can reduce pain and significantly improve the quality of life of patients compared with non-surgical treatment. ButHowever, in the light of previous reports, many studies have reported recollapse of the augmented vertebrae with significant vertebral height loss and aggravation of kyphotic deformity after a

postoperative follow-up period, which usually requires further treatment. Thus, it is important to clarify risk factors for recollapse of the augmented vertebrae after PVA treatment for OVCFs. This study is retrospectively aiming to investigate the incidence and risk factors of recollapse in cemented vertebra after PVP/PKP.

METHODS

Search strategy Two reviewers independently searched PubMed, EMBASE, Cochrane Library, OVID, Scopus and the Web of science for studies published up to November2024. Keywords for the study object: (((("Osteoporotic Fractures"[Mesh]) OR (((((((Osteoporotic Fractures[Title/Abstract]) OR (Fracture, Osteoporotic[Title/Abstract])) OR (Fractures, Osteoporotic[Title/Abstract])) OR (Osteoporotic Fracture[Title/Abstract])) OR (osteoporotic vertebral compression fractures[Title/Abstract])) OR (Osteoporotic spinal fractures[Title/Abstract])) OR (osteoporotic pathologic fracture[Title/Abstract])) OR (OVCF[Title/Abstract]))

OR (osteoporotic pathological fractures[Title/Abstract])) AND (("Recurrence"[Mesh]) OR (((((((recurrence[Title/Abstract]) OR (recollapse[Title/Abstract])) OR (refracture[Title/Abstract])) OR (recompression[Title/Abstract])) OR (subsequent vertebral fracture[Title/Abstract])) OR (recurrent fracture[Title/Abstract])) OR (vertebral height loss[Title/Abstract])) OR (gradual height decrease[Title/Abstract]))) AND (("Vertebroplasty"[Mesh]) OR (((((((((((Vertebroplasty[Title/Abstract]) OR (Kyphoplasty[Title/Abstract])) OR (Balloon Vertebroplasty[Title/Abstract])) OR (Vertebroplasty, Balloon[Title/Abstract])) OR (PKP[Title/Abstract])) OR (PVP[Title/Abstract])) OR (PVA[Title/Abstract])) OR (percutaneous vertebroplasty[Title/Abstract])) OR (vertebroplasty, percutaneous[Title/Abstract])) OR (vertebral augmentation[Title/Abstract])) OR (percutaneous vertebral augmentation[Title/Abstract])))).

Participant or population P: patients with osteoporotic vertebral compression fractures undergoing vertebral augmentation and followed up for at least 1 year postoperatively.

Intervention I: patients who underwent vertebral augmentation and recollapse in follow up.

Comparator C: Patients without recollapse in augmented vertebra in follow up.

Study designs to be included Retrospective study.

Eligibility criteria P: patients with osteoporotic vertebral compression fractures undergoing vertebral augmentation; I: patients who underwent vertebral augmentation and recollapse in follow up; C: Patients without recollapse in augmented vertebra; O: Patients with recollapse in augmented vertebra; S: Retrospective study.

Information sources Two reviewers independently searched PubMed, EMBASE, Cochrane Library, OVID, Scopus and the Web of science for studies published up to November 2024.

Main outcome(s) Age, gender, BMI, BMD, Vertebral compression rate, preoperative IVC, Vertebral recorection rate, Bone cement volume, Bone cement model, Anti-osteoporosis, Bone cement leak, None endplate contact, Smoke, Alcohol.

Quality assessment / Risk of bias analysis The following data were extracted from eligible studies by 1 investigator and reviewed by another. To

assess the quality of the studies, the NewcastleOttawa Scale with a 9-point system was used to assess each study. Those 2 evaluators also independently performed methodological quality evaluations and then cross-validated the results. When disagreement occurred between the 2 evaluators, a third evaluator was involved.

Strategy of data synthesis RevMan5.4.1 software was used to create forest maps and merge data. Dichotomous data are expressed as a Odd ratios (OR) and 95% confidence intervals (CI). Continuous dat are expressed as a mean difference (MD) and 95% CI. A P0.05 and I2<50%, indicated low heterogeneity, and a fixedeffects model (FD) was used. A P50% indicated high, and a random-effects model (RD) was used. RevMan5.4.1 software was used to create forest maps and merge data. Dichotomous data are expressed as a Odd ratios (OR) and 95% confidence intervals (CI). Continuous dat are expressed as a mean difference (MD) and 95% CI. A P0.05 and I2<50%, indicated low heterogeneity, and a fixedeffects model (FD) was used. A P50% indicated high, and a random-effects model (RD) was used.

Subgroup analysis none subgroups.

Sensitivity analysis Performed sensitivity analysis by removing one study at a time to ensure the stability of the results. Funnel plots were used applied to detect publication bias in more than ten trial.

Language restriction English.

Country(ies) involved China and Korea.

Keywords osteoporotic vertebral compression fractures; percutaneous vertebral augmentation; Recollapse; Risk factors; Meta-analysis.

Contributions of each author

Author 1 - Yuzhi Ning - Author 1 evaluated the manuscript, assess the quality of the studies.

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