INPLASY PROTOCOL

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None declared.

The efficacy of platelet-rich plasma applicated in spinal fusion surgery: a meta-analysis

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Review question / Objective: **Population: Patients with degenerative or traumatic spinal disorders require spinal fusion surgery; Intervention: Platelet-rich plasma (PRP) was applied during spinal fusion, and the final fusion rate, revision surgery rate due to non-fusion, changes in the visual analogue scale (VAS), estimated blood loss (EBL), operative time were observed at the end of follow-up; Comparison: PRP was not applied in the process of spinal fusion, and the observation indexes were the same as the intervention group; Outcome: The primary outcome indicator was the final spinal fusion rate, and the secondary outcome measures were revision surgery rate due to non-fusion, changes in the visual analogue scale (VAS), estimated blood loss (EBL), operative time; Study design: meta-analysis.**
Condition being studied: **There is no comprehensive review of the efficacy of PRP in spinal fusion surgery**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 May 2022 and was last updated on 10 May 2022 (registration number INPLASY202250055).

INTRODUCTION

Review question / Objective: **X Population: Patients with degenerative or traumatic spinal disorders require spinal fusion surgery; Intervention: Platelet-rich plasma (PRP) was applied during spinal fusion, and the final fusion rate, revision surgery rate due to non-fusion, changes in the visual analogue scale (VAS), estimated blood loss (EBL), operative time were observed at the end of follow-up; Comparison: PRP was not applied in the process of spinal fusion, and the observation indexes were the same as the intervention group; Outcome: The primary outcome indicator was the final spinal**

fusion rate, and the secondary outcome measures were revision surgery rate due to non-fusion, changes in the visual analogue scale (VAS), estimated blood loss (EBL), operative time; Study design: meta-analysis.

Rationale: Spinal fusion is a common orthopedic surgery procedure that has a large patient base. Although this surgical procedure is widely used, it can lead to poor bone healing or pseudoarthrosis. Osseous nonunion can occur in 5% to 35%of patients treated, leading to orthopedic loss as well as failure of internal fixation, and even to patients undergoing secondary surgery. To address these multiple issues, many bone graft alternatives have been developed.Bone Morphogenetic Proteins-2(BMPs-2) has been proved to have unique induced bone activity, which plays an important role in repairing bone defects and promoting bone healing.However, with the widespread clinical use of BMP-2, adverse side effects have also been observed, such as postoperative infection, ectopic bone formation, and increased incidence of some tumors, etc.Therefore, the search for new safe and effective bone extender is of great clinical importance. Platelet-rich plasma(PRP) is that contains various growth factors, having excellent hemostatic, anti-inflammatory, analgesic, and cell proliferation and differentiation capabilities. And it is safe, cheap and easy to get, widely used in bone defect repairment. PRP is proposed as a potential bone extender for patients to improve spinal fusion rates. Some clinical trials have been conducted to evaluate the therapeutic effect and safety of PRP in patients after spinal fusion . However, the theoretical benefits of PRP have not been clinically recognized, and the clinical outcomes are always negative. Therefore, the objective of this meta-analysis is to investigate the effect of application of PRP on spinal fusion surgery, which can aid in decision-making regarding the use of PRP in spinal fusion.

Condition being studied: There is no comprehensive review of the efficacy of PRP in spinal fusion surgery.

METHODS

Search strategy: ("platelet rich plasma"[MeSH Terms] OR ("platelet rich"[All Fields] AND "plasma"[All Fields]) OR "platelet rich plasma"[All Fields] OR ("platelet"[All Fields] AND "rich"[All Fields] AND "plasma"[All Fields]) OR "platelet rich plasma"[All Fields] OR ("pharmacol res perspect"[Journal] OR "prp"[All Fields]) OR (("blood platelets"[MeSH Terms] OR ("blood"[All Fields] AND "platelets"[All Fields]) OR "blood platelets"[All Fields] OR "platelet"[All Fields] OR "platelets"[All Fields] OR "platelet s"[All Fields] OR "plateletes"[All Fields]) AND "gel"[All Fields])) AND ("spinal fusion"[MeSH Terms] OR ("spinal"[All Fields] AND "fusion"[All Fields]) OR "spinal fusion"[All Fields] OR (("spinal"[All Fields] OR "spinalization"[All Fields] OR "spinalized"[All Fields] OR "spinally"[All Fields] OR "spinals"[All Fields]) AND ("surgery"[MeSH Subheading] OR "surgery"[All Fields] OR "surgical procedures, operative"[MeSH Terms] OR ("surgical"[All Fields] AND "procedures"[All Fields] AND "operative"[All Fields]) OR "operative surgical procedures"[All Fields] OR "general surgery"[MeSH Terms] OR ("general"[All Fields] AND "surgery"[All Fields]) OR "general surgery"[All Fields] OR "surgery s"[All Fields] OR "surgerys"[All Fields] OR "surgeries"[All Fields]))).

Participant or population: Patients with degenerative or traumatic spinal disease requiring spinal fusion surgery.

Intervention: Addition of PRP to graft bone.

Comparator: Graft bone only.

Study designs to be included: Randomized controlled trials or cohort studies.

Eligibility criteria: The following include criteria were used: (1) randomized controlled trials (RCTs) and observational cohort studies that compared PRP with non-PRP in spinal spinal fusion; (2) The

criteria for fusion need to meet one of the following two: Continuous bridging trabeculae pass between the fused vertebrae and the bridging area is greater than 50% of the fusion interface area on radiographs No measurable motion was noted at the fused level on dynamic flexion– extension radiographs; (3) studies included at least one of the following data: final fusion rate, revision surgery rate due to non-fusion, changes of VAS, EBL, and operative time (4) studies that were published at any time, and only written in English. The exclusion criteria are as follows : (1) Spinal fusion conducted due to tumors, tuberculosis, infectious diseases; (2)Duplicate studies or studies considered, by consensus, to be of low quality were excluded.

Information sources: A comprehensive literature search was performed through the following databases: PubMed, EMBASE, Cochrane Library, and ScienceDirect.

Main outcome(s): Final fusion rate.

Additional outcome(s): Revision surgery rate due to non-fusion, changes in the visual analogue scale (VAS), estimated blood loss (EBL), operative time.

Data management: The following data were extracted from the included studies: (1) study design: first author, country, publication time, publication journal, and study type; (2) sample demographics: number of patients and fused levels, follow-up time, age, and sex; (3) fusion details: surgical procedure, bone graft material, and fusion criteria; and (4) analysis variables: final fusion rate, revision surgery rate due to non-fusion, changes of VAS, EBL, and operative time.

Quality assessment / Risk of bias analysis: Two reviewers evaluated bias risk in the RCTs using the Cochrane collaboration tool and evaluated bias risk in the cohort studies using the Newcastle–Ottawa scale . Publication bias was detected by Funnel diagram and Egger's analyse implemented using Stata 16.0.

Strategy of data synthesis: The continuous data were calculated by weighted mean differences (WMDs) with 95% confidence intervals (CIs), and dichotomous variables were calculated by using odds ratios (ORs) with 95% confidence intervals (CIs). Statistical heterogeneity was calculated by using a chi-square test and I2 test. When I2 ≤ 50%, we performed a fixed-effect model for the meta-analysis. Otherwise, the random-effect model was performed. The meta-analysis was performed using RevMan 5.3 for Windows (Cochrane Collaboration, Oxford, UK). If the result of the meta-analysis was a probability of $p < 0.05$, it was statistically significant.

Subgroup analysis: There is no subgroup analysis.

Sensitivity analysis: Sensitivity analysis was performed by excluding a single study from each study and reanalyzing the data. Sensitivity analysis was implemented using Stata 16.0.

Language: only English.

Country(ies) involved: China.

Other relevant information: No.

Keywords: platelet-rich plasma, PRP, platelet gel, spinal fusion, spinal surgery.

Dissemination plans: Publicly available.

Contributions of each author:

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