INPLASY

Efficacy and safety of enhanced recovery after surgery in the perioperative period of Lumbar interbody fusion: A systematic review and Meta-analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2023110052

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 November 2023 and was last updated on 12 November 2023.

INTRODUCTION

Review question / Objective P:Patients undergoing lumbar interbody fusion; I: experimental group, Applying ERAS to patients undergoing lumbar interbody fusion; C: Control group: lumbar fusion patients undergoing traditional perioperative management; O: Evaluation indicators included the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate, complication rate, Intraoperative blood loss, operative time, fusion rate, reoperation rate; S: This study is intended to include randomized controlled studies and cohort studies.

Condition being studied Enhanced recovery after surgery (ERAS) is a perioperative patient management model based on evidence-based medicine, which accelerates postoperative recovery and restores the normal physiological functions of patients as early as possible by minimizing their perioperative stress and complications. In the late 20th century, Danish surgeon Kehlet proposed enhanced postoperative recovery (ERAS), which has been widely used in the surgical field. However, It is only in the last few years that ERAS has been used in Lumbar fusion surgery. Some studies suggest that patients undergoing lumbar interbody fusion surgery benefit from enhanced recovery after surgery protocol. Lumbar fusion has become the gold standard for the treatment of lumbar degenerative diseases, including degenerative lumbar stenosis, degenerative lumbar scoliosis, and lumbar spondylolisthesis, due to its significant advantages in providing decompression, stabilizing the spinal structure, promoting fusion rate and improving rehabilitation outcomes in the early stages. Lumbar spinal fusion has the disadvantages of long operation time, high trauma, and long

postoperative bed rest time, which seriously affects the functional recovery of patients. Therefore, perioperative management is crucial. There are more and more reports of ERAS in lumbar fusion, but all of them are small sample studies. it is unclear whether ERAS is superior to traditional perioperative management in terms of clinical outcomes after lumbar spinal fusion surgery. At present, there are no guidelines or evidence-based medicine to show that ERAS is better than traditional perioperative management in terms of lumbar fusion. Based on the above, this study used meta-analysis to systematically evaluate the efficacy and safety of ERAS in lumbar fusion to provide a clinical reference.

METHODS

Search strategy This meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. We systematically searched Pubmed, Embase, Web of Science, and Cochrane databases to collect relevant articles.The retrieval period of the literature was from the creation of the database until September 2023.We conducted a comprehensive search strategy using a combination of Medical Subject Headings and free text terms.The search keywords were as follows: “fast track surgery” or “FTS”or “enhanced recovery after surgery”or “ERAS” , “Spinal fusion” or “Lumbar fusion” or “lumbar interbody fusion”. (Table 1).Two investigators independently screened the titles and abstracts of all initially identified studies against the selection criteria and extracted the required data.If there was a dispute, it was appreciated that a third party would make the final decision.

pubmed:

#1 (Enhanced Postsurgical Recovery) OR "Enhanced Recovery After Surgery"[Mesh]

#2 ((fast track surgery) OR (FTS)) OR (ERAS)

#3 #1 OR #2

#4 (Spondylodesis) OR "Spinal Fusion"[Mesh]

#5 (lumbar interbody fusion) OR (lumbar fusion)

#6 #4 OR #5

#7 #3 AND #6

Embase

#1 'lumbar interbody fusion':ab,ti OR 'lumbar fusion':ab,ti OR spondylodesis:ab,ti OR 'spinal fusion':ab,ti

#2 'enhanced postsurgical recovery':ab,ti OR 'enhanced recovery after surgery':ab,ti OR 'fast track surgery':ab,ti OR fts:ab,ti OR eras:ab,ti

#3 #1 AND #2

Cochrane library

#1 (Enhanced Postsurgical Recovery):ti,ab,kw OR (Enhanced Recovery After Surgery):ti,ab,kw OR (fast track surgery):ti,ab,kw OR (ERAS):ti,ab,kw OR (FTS):ti,ab,kw (Word variations have been searched)

#2 (Spondylodesis):ti,ab,kw OR (Spinal Fusion):ti,ab,kw OR (lumbar interbody fusion):ti,ab,kw OR (lumbar fusion):ti,ab,kw OR (FTS):ti,ab,kw (Word variations have been searched)

#3 #1 AND #2

Web of Science

#1 ((((TS=(Enhanced Postsurgical Recovery)) OR TS=(Enhanced Recovery After Surgery)) OR TS=(fast track surgery)) OR TS=(FTS)) OR TS=(ERAS)

#2 (((TS=(Spondylodesis)) OR TS=(Spinal Fusion)) OR TS=(lumbar interbody fusion)) OR TS=(lumbar fusion)

#3 #1 AND #2.

Participant or population In this study, inclusion criteria were defined as follows:(1) contrastive study that compared ERAS with non-ERAS (conventional postoperative management) for the treatment of Lumbar interbody fusion. (2) Study type: Randomized control trials, retrospective studies, and observational studies were included. (3) The search was limited to papers published in the English language. (4) Evaluation indicators included at least one of the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate, complication rate, Intraoperative blood loss, operative time, fusion rate, reoperation rate.The exclusion criteria were as follows: (1) Articles published repeatedly;(2) articles without non-ERAS (conventional postoperative management) in the control group;(3)Non-clinical comparison studies. (4)Non-clinical studies, such as reviews, experimental literature, conference papers, etc.(5)Studies in which data could not be collected.

Intervention In this study, inclusion criteria were defined as follows:(1) contrastive study that compared ERAS with non-ERAS (conventional postoperative management) for the treatment of Lumbar interbody fusion. (2) Study type: Randomized control trials, retrospective studies, and observational studies were included. (3) The search was limited to papers published in the English language. (4) Evaluation indicators included at least one of the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate, complication rate, Intraoperative blood loss, operative time, fusion rate, reoperation

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Comparator In this study, patients undergoing lumbar interbody fusion surgery were divided into two groups, the eras group and the non-ERAS group, with the eras group receiving ERAS management and the non-ERAS group receiving the traditional perioperative management modality.

Study designs to be included In this study, inclusion criteria were defined as follows:(1) contrastive study that compared ERAS with non-ERAS (conventional postoperative management) for the treatment of Lumbar interbody fusion. (2) Study type: Randomized control trials, retrospective studies, and observational studies were included. (3) The search was limited to papers published in the English language. (4) Evaluation indicators included at least one of the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate.

Eligibility criteria inclusion criteria were defined as follows:(1) contrastive study that compared ERAS with non-ERAS (conventional postoperative management) for the treatment of Lumbar interbody fusion. (2) Study type: Randomized control trials, retrospective studies, and observational studies were included. (3) The search was limited to papers published in the English language. (4) Evaluation indicators included at least one of the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate, complication rate, Intraoperative blood loss, operative time, fusion rate, reoperation rate.The exclusion criteria were as follows: (1) Articles published repeatedly;(2) articles without non-ERAS (conventional postoperative management) in the control group;(3)Non-clinical comparison studies. (4)Non-clinical studies, such as reviews, experimental literature, conference papers, etc. (5)Studies in which data could not be collected.

Information sources This meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement. We systematically searched Pubmed, Embase, Web of Science, and Cochrane databases to collect relevant articles(Including domestic and foreign published journals and grey literature such as academic conferences and dissertations.).The retrieval period of the literature was from the creation of the database until September 2023.We conducted a comprehensive search strategy using a combination of Medical Subject Headings and free text terms.

Main outcome(s) Evaluation indicators included at least one of the following results: length of stay (LOS) and leaving bedtime, Postoperative visual analog scale (VAS), Postoperative Oswestry Disability Index (ODI), readmission rate, complication rate, Intraoperative blood loss, operative time, fusion rate, reoperation rate.A total of 21 studies and 4519 patients met the inclusion criteria for this meta-analysis, 2155 in the ERAS group and 2364 in the non-ERAS group. The result showed that ERAS could significantly shorten the length of stay (LOS) and leaving bedtime, decrease the Postoperative visual analog scale (VAS)and Postoperative Oswestry Disability Index (ODI), reduce the readmission rate, complication rate, and Intraoperative blood loss.There were no significant differences between the two groups in terms of operative time, fusion rate, and reoperation rate.

Quality assessment / Risk of bias analysis Quality assessment of included studies - The literature included in this meta-analysis are all cohort studies, Therefore, The Newcastle-Ottawa Scale (NOS) was used to evaluate the quality of cohort studies. The scoring system consisted of three parts (selection of the population, comparability between groups, and exposure factors), and the scores ranged from 0 to 9, with higher scores representing a better quality of the literature. Publication bias - The funnel plot was used to analyze the publication of the outcome indicators. In the analysis of publication bias, the number of papers included in each of the 10 outcome indicators was ≥10, and the funnel plots were symmetrical, indicating that there was no publication bias.

Strategy of data synthesis We performed statistical analysis using Review Manager (RevMan) Version 5.4.1. Dichotomous variables were analyzed by estimating the risk odds ratio with 95% confidence interval (CI), and continuous variables were analyzed using the mean difference (MD) with 95%CI.If the heterogeneity of data was not significant ($p > 0.05$, $I^2 < 50\%$), a fixed-effects model was used for meta-analysis; If the heterogeneity of data was significant heterogeneity

among the data (p <0.05, I 2 > 50%), a random-effects model was used for meta-analysis.

Subgroup analysis Heterogeneity was present in 6 of the 10 outcome indicators included in this meta-analysis, and the source of heterogeneity was identified by sensitivity analyses after excluding literature on a case-by-case basis, and heterogeneity was reduced by excluding the literature that contributed to the heterogeneity; therefore, heterogeneity was reduced by the sensitivity analyses, and subgroup analyses were not required.

Sensitivity analysis Heterogeneity was present in 6 of the 10 outcome indicators included in this meta-analysis, and after excluding the literature one by one, the source of heterogeneity was identified through sensitivity analyses and reduced through the exclusion of the literature leading to heterogeneity.

Country(ies) involved China.

Keywords enhanced recovery after surgery (ERAS), Lumbar interbody fusion, Meta-analysis, conventional postoperative management.

Contributions of each author

Author 1 - Wenli Ge - drafted the manuscript;Interpretation of the data;Writing—original draft.
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