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Acupoint stimulation for postoperative gastrointestinal functions: a protocol for systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 January 2024 and was last updated on 10 January 2024.

INTRODUCTION

Review question / Objective The aim of this systematic review and meta-analysis is to investigate whether acupoint stimulation is effective in improving postoperative gastrointestinal functions. The primary research questions include whether patients receiving acupoint stimulation have better bowel functions. Additionally, we are interested in the following questions: 1. Are there differences in the effectiveness of different acupoint stimulation techniques for gastrointestinal recovery? 2. Does the stimulation of different acupoints result in different treatment effects? 3. Does the type of surgery performed on patients affect the efficacy of acupoint stimulation treatment for gastrointestinal dysfunction?

Rationale This meta-analysis protocol meets the PRISMA-P criteria and aims to investigate the efficacy of acupoint stimulation on postoperative gastrointestinal recovery. We plan to search the literature in databases such as PubMed, CENTRAL, China Biomedical (CBM) and Embase. The type of study should be randomized controlled trials (RCTs). We will only include patients who have undergone gastrointestinal surgery. The primary outcomes of the study include first exhaust time and first defecation time, and secondary outcomes include Incidence of postoperative gastrointestinal adverse events, time to first dietary tolerance, overall complication risk, postoperative length of stay and quality of life. We will perform statistical analyses using a random effects meta-analysis model.

Condition being studied Gastrointestinal motility dysfunction, characterized by temporary cessation of gas and stool discharge, are a common complication following gastrointestinal surgery. The etiology is believed to involve damage to the vagal nerve pathways that control the stomach and pylorus, disrupting the structure and physiological function of the gastrointestinal system. This complication delays enteral nutrition, prolongs hospitalization, and causes discomfort to patients. Current interventions considered helpful in

restoring gastrointestinal motility include nutritional support, blood glucose control, prokinetics, antiemetic drugs, endoscopic self-expanding stent placement, and surgical intervention in severe cases. However, drug therapy has many side effects, such as metoclopramide potentially causing extrapyramidal reactions. Invasive treatments, including secondary surgery, are generally not the first choice for postoperative patients. Therefore, non-drug therapies like acupoint stimulation are a potentially beneficial adjunctive treatment for postoperative gastrointestinal motility disorders.

Acupoint stimulation is a traditional Chinese medicine treatment primarily focused on regulating the body's meridian system. Meridians are pathways through which the body's qi and blood circulate, connecting various parts of the body like a network. Acupoint stimulation can restore and regulate the function of the body's organs and blood. Research indicates that acupoint stimulation, including acupuncture, transcutaneous electrical acupoint stimulation (TEAS), and acupressure massage, can improve gastrointestinal dysfunction. The mechanism involves activating large myelinated nerve fibers, including the vagus nerve, releasing gamma-aminobutyric acid, adenosine, and nitric oxide, thereby alleviating pain. This reduces anesthesia dosage, releases gastrin to increase small intestinal peristalsis, and reduces inflammation through the cholinergic anti-inflammatory pathway. A meta-analysis reported that patients undergoing gastric resection had shorter gastrointestinal recovery time, lower complication risks, and shorter hospital stays after receiving electro acupuncture. Acupoint stimulation has been proven effective in treating postoperative gastroparesis syndrome, with a meta-analysis showing significantly higher overall efficacy in the acupoint stimulation group compared to the control group, regardless of medication use. In animal models, electroacupuncture (EA) can improve gastric motility by accelerating solid gastric emptying through the vagal nerve mechanism and ameliorate chemotherapy-induced dyspepsia. Transcutaneous electroacupuncture (TEA) is an improvement on traditional acupuncture, combining specific acupoint stimulation with skin electrode patches. Limited clinical studies suggest that TEA significantly improves gastric emptying in patients with dyspepsia. A randomized controlled study indicated that TEA improved post-gastrectomy bowel movements and alleviated postoperative intestinal obstruction[16].

Current published meta-analyses have displayed a limited scope in their focus, with studies either concentrating on patients exclusively post-gastrectomy, solely on those undergoing colorectal surgery, or merging these patient groups together. Moreover, some analyses have incorporated studies beyond randomized controlled trials (RCTs), diluting the specificity of their findings. In contrast, our team is committed to methodically investigating RCTs across all types of gastrointestinal surgeries. Our objective is to distinctly analyze the effects of acupoint stimulation on postoperative gastrointestinal functions, ensuring each type of gastrointestinal surgery is evaluated independently and comprehensively.

Postoperative gastrointestinal dysfunction is a common complication of gastrointestinal surgery. Acupuncture has long been used in traditional Chinese medicine to treat gastrointestinal diseases and has shown benefit as an alternative therapy for the management of digestive ailments. In this study, we aim to explore the effects of acupoint stimulation on improving postoperative gastrointestinal functions, ensuring each type of gastrointestinal surgery is evaluated independently and comprehensively.

METHODS

Search strategy For each database, the search date, search strategy, and result quantity will be recorded. The databases to be searched include PubMed, Cochrane Central Registry of Controlled Trials (CENTRAL), China Biology Medicine (CBM), and Embase databases. In addition to the formal search strategy, authors will review relevant citations included in the studies to limit the possibility of omitting related published works. Authors will attempt to translate and include all non-English studies screened through titles and abstracts to comprehensively capture research in this field.

The literature search strategy will use subject headings and text words related to gastrointestinal surgery and acupoint stimulation.

Participant or population Eligible study populations include patients aged over 18 undergoing gastrointestinal surgery. For each database, the search date, search strategy, and result quantity will be recorded. The databases to be searched include PubMed, Cochrane Central Registry of Controlled Trials (CENTRAL), China Biology Medicine (CBM), and Embase databases. In addition to the formal search strategy, authors will review relevant citations included in the studies to limit the possibility of omitting related published works. Authors will attempt to translate and include all non-English studies screened through

titles and abstracts to comprehensively capture research in this field.The literature search strategy will use subject headings and text words related to gastrointestinal surgery and acupoint stimulation.

Intervention Studies comparing the treatment effects of acupoint stimulation and conventional care for improving postoperative gastrointestinal functions will be included.

Comparator Acupoint stimulation interventions include acupuncture, acupressure, electroacupuncture, and transcutaneous electrical acupoint stimulation.

Study designs to be included We will include RCTs. We will exclude quasi-RCTs or cross-over trials. We will exclude non-randomized cohort studies because they are prone to bias due to confounding by indication or by residual confounding – both of which may influence the results of the studies. There are no restrictions on publication date, language, or study duration.

Eligibility criteria Types of studiesWe will include RCTs. We will exclude quasi-RCTs or cross-over trials. We will exclude non-randomized cohort studies because they are prone to bias due to confounding by indication or by residual confounding – both of which may influence the results of the studies. There are no restrictions on publication date, language, or study duration. Types of participantsEligible study populations include patients aged over 18 undergoing gastrointestinal surgery. Types of interventionsStudies comparing the treatment effects of acupoint stimulation and conventional care for improving postoperative gastrointestinal functions will be included. Acupoint stimulation interventions include acupuncture, acupressure, electroacupuncture, and transcutaneous electrical acupoint stimulation. Studies where patients receive additional treatments for improving postoperative gastrointestinal function will be excluded. Studies where patients have known causes of gastrointestinal dysmotility unrelated to gastrointestinal surgery will be excluded.

Information sources The databases to be searched include PubMed, Cochrane Central Registry of Controlled Trials (CENTRAL), China Biology Medicine (CBM), and Embase databases.

Main outcome(s) 01) Time to first passage of stool; 02) Time to first passage of flatus.

Additional outcome(s) 01) Incidence of postoperative ileus, nausea, or vomiting; 02) time to first tolerance of semiliquid diet; 03) time to first tolerance of solid food; 04) Overall complication risk; 05) Length of postoperative hospital stay; 06) Quality of life.

Quality assessment / Risk of bias analysis Two reviewers will assess the risk of bias for each included study using the Cochrane Risk of Bias (RoB 2) tool for randomized studies and the Cochrane Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tool for non-randomized intervention studies. The ROB 2 approach to assessing risk of bias covers the following five standard areas: bias arising from the randomization process, bias due to deviations from the intended interventions, bias due to missing outcome data, bias in measurement of outcomes, and bias in selection of the reported result. Each domain will be judged as "low risk of bias," "some concerns," or "high risk of bias." The ROBINS-I tool covers seven domains that might introduce bias in non-randomized studies: bias due to confounding, bias in selection of participants into the study, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of outcomes, and bias in selection of the reported result. Each domain level's answer options are "low risk of bias," "moderate risk of bias," "serious risk of bias," "critical risk of bias," and "no information." A low rating indicates a higher study quality, while a high rating suggests lower study quality, and evidence may be less reliable. Inconsistent ratings will be resolved based on the opinion of a third reviewer.

Strategy of data synthesis We will use RevMan software (Nordic Cochrane Centre in Copenhagen, Denmark) to perform the meta-analysis. We will use a random effects meta-analysis model to pool the study data. For binary data, we will use the Risk Ratio (RR) or Peto Dominance Ratio (OR) when the outcome event accounts for less than 10%. When analyzing continuous data, we will use mean difference (MD) if studies use the same scale, or standardised mean difference (SMD) if they use a different scale, with a 95% CI for all.

Subgroup analysis If sufficient data are available, we will plan to conduct pre-specified subgroup analyses based on the population type and the surgery type, within each subgroup we will study the effect of different acupoint stimulation methods and different acupoint stimulation sites.

Sensitivity analysis We will assess statistical heterogeneity through forest plots and use I^2 and Chi^2 statistical tests to check for significant

differences between study results, as indicated in the Cochrane Handbook for the Evaluation of Intervention Systems. A low value of I^2 suggests a small amount of heterogeneity that may be ignored, while a high value of I^2 implies considerable heterogeneity and may lead to unavailability of the study. In addition, the Chi^2 test with a p-value below 0.1 indicates possible statistical heterogeneity.

Language restriction Authors will attempt to translate and include all non-English studies screened through titles and abstracts to comprehensively capture research in this field.

Country(ies) involved China.

Keywords acupoint stimulation; postoperative gastrointestinal dysfunction.

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