REVIEW ARTICLE

Summary of the Best Evidence for Perioperative Exercise in Patients Undergoing Hepatectomy

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ABSTRACT

Objective • This study aimed to search and analyze relevant evidence on perioperative activities in patients undergoing hepatectomy and provide a summary of the best evidence available.

Methods • Comprehensive computer searches were conducted in various databases, including PubMed, Cochrane Library, BMJ Best Practice, Joanna Briggs Institute, Evidence-Based Health Care Centre Database, US Guidelines Network, UK National Institute of Clinical Medicine, Scottish Intercollegiate Guidelines Network, International Guidelines Association Network, New Zealand Clinical Practice Guidelines Network, and Chinese Biomedical Literature Database from January 30, 2022 to December 30, 2023. The search included guidelines, expert consensus, evidence summaries, systematic reviews, and original research closely related to the evidence.

Results • A total of 11 pieces of evidence were included, consisting of 2 guidelines, 2 expert consensuses, 1 evidence summary, 1 systematic review, and 5 randomized controlled trials (RCTs). From these, five pieces of best evidence were identified.

Conclusions • The evidence from the included studies collectively indicates that well-planned perioperative activities are safe and beneficial for patients undergoing hepatectomy. Furthermore, high-quality local guidelines have been established in China, suggesting that healthcare professionals can adopt these practices to accelerate patient recovery and enhance the quality of clinical care. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

With the improvement of living standards and changes in dietary habits, there has been a steady increase in the incidence of liver disease. This rise in liver disease has resulted in high disability and mortality rates. Hepatectomy, which involves surgically removing localized liver lesions, has emerged as one of the most effective treatments for liver disease, offering the potential for cure.[1] In China, approximately 73.8% to 77.3% of hepatectomy patients are diagnosed with hepatoma, a type of liver cancer. These patients often experience liver dysfunction and protein malnutrition, making rehabilitation a crucial aspect of their care.[2] Research suggests that the nutritional status of patients during the perioperative period plays a significant role in the rehabilitation of hepatectomy patients.[3] The perioperative period encompasses the entire surgical process, starting from the patient's decision to undergo surgery and continuing until their basic recovery, including the preoperative period of 5-7 days and the postoperative period of 7-12 days.[4,5]

As a non-invasive and cost-effective approach to managing symptoms, exercise has gained considerable attention among scholars worldwide. Numerous studies have confirmed its effectiveness in reducing postoperative complications and promoting rapid recovery in patients.[6,7] Enhanced Recovery After Surgery (ERAS), introduced by Danish surgeon Henrik Kehlet over a decade ago, employs a multimodal approach to optimize perioperative management based on evidence-based medicine. ERAS aims to reduce physiological and psychological stress on surgical patients, enhance postoperative recovery, and shorten hospital stays.[8,9] Perioperative exercise significantly accelerates surgical rehabilitation by promoting functional recovery of the musculoskeletal and respiratory systems, preventing pulmonary infections, stress injuries, and deep vein thrombosis, and facilitating gastrointestinal function recovery.[10] A study by Vlug et al. (2011) highlighted the

independent influence of perioperative activity on the success of ERAS in achieving accelerated rehabilitation goals.[11]

Traditionally, it was believed that patients undergoing hepatectomy should rest and limit activities to avoid bleeding in the liver section. However, this belief hampers the implementation of perioperative exercise programs for hepatectomy patients. Despite the importance of perioperative exercises, challenges and low compliance persist in their implementation. Research indicates that reduced perioperative physical activity is an independent risk factor for unfavorable postoperative outcomes.[12]

The *Chinese Clinical Practice Guide for Accelerated Rehabilitation Surgery (2021 Edition)* recommends preoperative exercise and early postoperative activities to promote early recovery of patients, with a high level of evidence. [3] At present, it is urgent to formulate effective interventions to improve exercise compliance of hepatectomy patients.

In this work, relevant research on perioperative activities of hepatectomy all over the world was systematically searched, and evidence-based care was used to comprehensively summarize the relevant evidence. In addition, according to the best evidence, the perioperative safe activity strategy of hepatectomy was constructed, and combined with existing resources, the rapid rehabilitation activity plan was applied to clinical practice. This work aimed to improve the patients' exercise compliance, reduce postoperative complications, and promote the patients' rehabilitation, thus offering reliable, evidence-based medical evidence support for the clinical implementation of perioperative activities of hepatectomy patients.

METHODS

Methods for screening the required literatures

Computer searches were conducted in PubMed, Cochrane Library, BMJ Best Practice, and Joanna Briggs Institute. All evidence on early post-hepatectomy patient activity from the Evidence-Based Health Care Centre Database, the US Guidelines Network, the UK National Institute of Clinical Medicine, the Scottish Intercollegiate Guidelines Network, the International Guidelines Association Network, the New Zealand Clinical Practice Guidelines Network, and the Chinese Biomedical Literature Database. According to the "6S" classification model of evidence-based retrieval resources, relevant clinical guidelines, expert consensus, evidence summary, systematic review, and well-designed large sample RCTs were searched successively. If not, small sample RCTs and non-RCTs should be added in turn. The exclusion criteria included: 1) Publication type - case reports, case series, case-control studies, and non-systematic reviews were excluded; 2) Population - studies that did not focus on early post-hepatectomy patient activity were excluded; 3) Intervention - studies that did not evaluate early mobilization, early ambulation, or functional exercise programs after hepatectomy were excluded; 4) Outcomes - studies that did not report outcomes related to early post-hepatectomy patient activity, such as time to first ambulation, length of hospital stay, or functional recovery, were excluded; 5) Language - studies published in languages other than Chinese or English were excluded; and 6) Relevance - studies that did not directly address the research question or provide relevant evidence for early post-hepatectomy patient activity were excluded. Retrieval strategies were described as follows. The Chinese keywords were hepatectomy (early or early activity or activity and functional exercise or first time out of bed) and (rapid rehabilitation or accelerated rehabilitation). The English search words were (liver diseases, liver surgery, liver resection or hepatectomy or hepatic surgery) (early mobilization or early ambulation or activity) and (ERAS or enhanced recovery after surgery or fast-track surgery), and different retrieval strategies were adopted for the above search terms. The retrieval period was from January 30, 2022 to December 30, 2023.

Methods for evaluating the literature quality

The *Appraisal of Guidelines for Research and Evaluation* (AGREE II) [13] was adopted in this work, which was updated in 2012. *Assessment of Multiple Systematic Review*s (AMSTAR) was employed for systematic evaluation.[14] The expert consensus and the quality evaluation of RCTs carried out were evaluated by the JBI *Evidence-Based Health Care Center of Australia* (2016).[15]

Process for evaluating the literature quality

The guidelines enrolled in this work were completed by four project team researchers, including one care master student who received systematic training in the Evidence Use Project of JBI EBN Center, Central South University, and three nurses who received systematic evidence-based medicine training in their specialty (two of whom were caring graduate students). The expert consensus, system evaluation, and RCTs were independently evaluated by two researchers in the EBN team. If there is any difference in opinion, the third researcher would make a ruling after a discussion between the two researchers. When evidence conclusions from different sources conflict, the inclusion principles followed in this work were evidence-based evidence, high-quality evidence, recent publication, and domestic guidelines.[16]

RESULTS

The screened literature and their brief introduction

By searching the above electronic database, 11 literatures were enrolled herein, including 2 guidelines,[17,18] 2 expert consensuses,[19,20] 1 evidence summary,[21] 1 systematic review,[22] and 5 RCTs.[23-28] The enrolled literature was briefly introduced in Table 1.

Evaluating results of the enrolled literature

Evaluation of guidelines: Two guidelines were evaluated in this work, which were independently evaluated by four project team researchers. The standardized percentages in each field and the average scores of the two comprehensive evaluations are listed in Table 2.

Quality of expert consensuses: Two expert consensuses were evaluated here, and the evaluation is given in Table 3.

Quality of systematic review: Herein, 1 systematic review [25] was enrolled and evaluated, as displayed in Table 4.

Quality of RCTs: There were 5 RCTs analyzed in this work, and their evaluation results were given in Table 5.

Evidence descriptions

In this work, the classification and recommendation level of included evidence were graded. According to the different

Table 1. Brief introduction of the enrolled literature

Literatures	Literature source	Nature of literature	Document subject	Time of publication
Emmanuel et al.	PubMed	Guideline	Guidelines for accelerated rehabilitation surgery after hepatectomy	2016
Surgery Branch of Chinese Medical Association, etc.	Medical pulse communication	Guideline	Clinical practice guide for accelerated rehabilitation surgery in China	2021
Liu Lianxin et al.	Chinese National Knowledge Infrastructure (CNKI)	Expert consensus	Chinese experts' consensus on accelerated rehabilitation surgery after laparoscopic hepatectomy	2017
Group of Surgery, Branch of Surgery, Chinese Medical Association, etc.	Medical pulse communication	Expert consensus	Summary of the best evidence for early activity of patients after hepatectomy	2017
Lu Fangyan et al.	CNKI	Summary of evidence	Chinese expert consensus on accelerating rehabilitation after hepatectomy	2018
Wang et al.	JBI Health Care Center	System evaluation	Meta-analysis of the application of accelerated rehabilitation surgery in liver surgery	2017
Palmer et al.	PubMed	RCT	Randomized clinical trial of rehabilitation period before planned hepatectomy l	2016
Chun-yuan et al.	PubMed	RCT	Early activity after hepatectomy: a prospective randomized controlled trial	2018
Jones et al.	PubMed	RCT	Randomized clinical trial of enhanced recovery and standard nursing after open hepatectomy	2013
He Ningning et al.	CNKI	RCT	Construction and application of early ambulatory program after liver cancer surgery	2020
Song Jianping	CNKI	RCT	Application of best evidence for early activity of patients after hepatectomy	2019

Table 2. Quality of 2 enrolled guidelines

Percentage of standardization in each field	Included in the literature	
	Emmanuel et al.	Surgery Branch of the Chinese Medical Association, etc.
Scope and purpose	94.44%	88.89%
Personnel involved	72.22%	68.33%
The strictness of guide development	80.21%	69.79%
Clarity of guide development	91.67%	91.67%
Applicability of the Guide	66.98%	63.54%
Independence of guide compilation	81.25%	81.25%
≥ 60% of fields	6	6
≥ 30% of fields	6	6
Recommended level	A	A

Table 3. Quality of expert consensuses

Evaluation items	Liu lianxin et al.		Group of Surgery, Branch of Surgery, Chinese Medical Association, etc.	
	Evaluator 1	Evaluator 2	Evaluator 1	Evaluator 2
1. Are the sources of views clearly marked?	Yes	Yes	Yes	Yes
2. Does the opinion come from influential experts in this field?	Yes	Yes	Yes	Yes
3. Is the proposed viewpoint centered on the interests of the people involved in the study?	Yes	Yes	Yes	Yes
4. Is the conclusion stated based on the results of the analysis? Opinion expression is it logical?	Yes	Yes	Yes	Yes
5. Did you refer to other existing literature?	Yes	Yes	Yes	Yes
6. Is there any inconsistency between the proposed viewpoint and the previous literature?	Yes	Yes	Yes	Yes
Overall evaluation	Bring into		Bring into	

Table 4. Quality of a systematic review enrolled in this work

Evaluation items	Wang et al.	
	Evaluator 1	Evaluator 2
1. Is the preliminary design scheme provided?	Yes	Yes
2. Is the selection and data extraction of inclusion studies replicable?	Yes	Yes
3. Is extensive and comprehensive literature retrieval implemented?	Yes	Yes
4. Has the publication been considered in the inclusion criteria, such as gray literature?	Yes	Yes
5. Is a list of included and excluded research documents provided?	Yes	Yes
6. Are the basic characteristics of the included study described?	Yes	Yes
7. Has the scientific nature of the included research been evaluated and reported?	Unclear	Unclear
8. Is the scientific nature of the included research properly applied to the deduction of conclusions?	Yes	Yes
9. Is the method for synthesizing the research results appropriate?	Yes	Yes
10. Has the possibility of publication bias been assessed?	Yes	Yes
11. Is there a description of the relevant conflict of use?	Yes	Yes
Overall evaluation	Bring into	

Table 5. Quality of 5 RCTs evaluated

Evaluation items	He Ningning et al.		Chun-yan Ni et al.		Palmer et al.		Song Jianping		Jones et al.	
	Evaluator 1	Evaluator 2	Evaluator 1	Evaluator 2	Evaluator 1	Evaluator 2	Evaluator 1	Evaluator 2	Evaluator 1	Evaluator 2
1. Whether the method of random grouping is adopted for the diagnosis and treatment of the research object	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Whether the allocation is hidden	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3. Whether the baseline between groups is comparable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Whether the blind method has been applied to the subjects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Whether the blind method is applied to the intervener	Yes	Yes	Unclear	Unclear	No	No	Unclear	Unclear	Unclear	No
6. Whether the blind method is applied to the result evaluator	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Unclear	Unclear	Unclear
7. In addition to the intervention to be verified, whether the other interventions received by each group are the same?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Whether the follow-up is complete, and if not, whether measures are taken to deal with the lost follow-up	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Whether all randomly assigned subjects are included in the result analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10. Whether to evaluate the outcome indicators of various subjects in the same way	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11. Whether the evaluation method of outcome indicators is credible	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12. Whether the data analysis method is appropriate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13. Is the research design reasonable? Whether there are different standard RCTs in the implementation of research and data analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overall evaluation	Bring into									

types of study design, the evidence levels were graded into five levels: Level 1 to Level 5. The evidence recommendation levels were determined according to the effectiveness, feasibility, suitability, and clinical significance of the evidence, namely, grade A recommendation (strong recommendation) and grade B recommendation (weak recommendation).

Safety of early postoperative activity: Early activity can promote the recovery of respiratory, digestive, musculoskeletal, and other multi-system functions and is beneficial to prevent lung infection, stress injury, and the formation of deep venous thrombosis of lower limbs. In a systematic review of all studies regarding early childhood activities as an important measure for accelerated rehabilitation after hepatectomy, it was confirmed that properly planned early childhood activities are safe and beneficial for patients with post-hepatectomy (Level 1).

Goal setting for early postoperative activities: Multiple evidence-based guidelines for accelerated rehabilitation surgery and expert consensus strongly recommend encouraging patients to engage in early activities with specific goals after surgery. These guidelines emphasize the importance of establishing daily activity goals, progressively increasing activity levels, and actively motivating patients to achieve these goals (Level 1). The successful attainment of early activity goals is dependent on factors such as preoperative education, multimodal analgesia, and early removal of nasogastric tubes, catheters, abdominal drainage tubes, and other catheters. Additionally, patients' confidence in their ability to achieve these goals plays a crucial role (Level 5).

Regarding the timing of early mobilization after hepatectomy, a systematic review of 14 studies and another systematic review of 4 studies concluded that mobilization should be initiated on the first day after surgery (Level 1).

Assessment and monitoring of early postoperative activity: Early activities are the core of ERAS programs, but specific evaluation and monitoring of early activities are lacking in practice. An RCT 15 used an activity tracker to assess and monitor patients' steps, distance, activity time, rest time, calorie consumption, etc., to stimulate patients' intrinsic motivation and enable them to exert their subjective initiative, which is conducive to the achievement of early activity goals (Level 1).

Quality review of perioperative activities: A Cochrane systematic review has proved that the effectiveness review of medical measures can improve medical standards 21. A systematic review of the effectiveness of various measures in the ERAS process, implementation by healthcare staff, patient compliance, and clinical outcomes can be a good indication of whether the process is reasonable. Therefore, it is recommended that healthcare staff regularly and systematically review procedures for compliance and clinical outcomes (Level 2).

Evidence summary

Based on the systematic evidence retrieval and synthesis related to the perioperative activity of hepatectomy, the following ten best evidence summaries were formulated:

Preoperative multidisciplinary evaluation: Before complex hepatobiliary surgery, it is crucial to conduct a comprehensive evaluation that includes nutrition, psychological state, and individualized pre-rehabilitation plans. These plans should encompass exercise, nutrition, psychological interventions, and other relevant aspects.

Development of an exercise plan: Based on a comprehensive assessment and tolerance evaluation before surgery, it is recommended that an exercise plan that includes respiratory function exercises be developed. This can help improve the patient's functional reserve.

Preoperative nutritional support: The utilization of *Nutritional Risk Screening 2002 (NRS2002)* [33]is recommended to assess the nutritional risk before surgery. For patients identified as having nutritional risks (NRS2002 score ≥ 3), a nutritional diagnosis and treatment plan should be developed. This plan should include nutritional assessment, intervention, and monitoring.

Preoperative psychological intervention: Patients with malignant tumors or chronic diseases often experience anxiety or depression before surgery. It is suggested to use the *Hospital Anxiety And Depression Scale (HADS)* to evaluate the psychological status of patients and provide effective interventions accordingly. Anxiety subscale score: 0-7 = normal, 8-10 = borderline, 11-21 = abnormal; Depression subscale score: 0-7 = normal, 8-10 = borderline, 11-21 = abnormal.

Strengthening preoperative education and early catheter removal: Enhancing preoperative education, utilizing multimodal analgesia techniques, and removing various catheters at an early stage are advised. These measures aim to improve patient compliance with early ambulation activities.

Early postoperative sports safety was assessed as follows. ERAS full-time nurses conducted the safe activities assessment. Standard ABC (333) original: A: no pain (NRS score < 4 points), no vertigo, and no palpitation; B: clear consciousness, stable vital signs, adjusted and improved early warning score (EWS) (0 ~ 1); normal drainage, blood drainage < 30 mL 12 h after surgery; C: drainage tube fixed, abdominal bandage, and infusion aid.

Pre-exercise assessment was conducted. After the patient returns to the ward after surgery, the responsible nurse, the researcher, and the doctor jointly assessed the patient's condition. After 6 h of postoperative anesthesia and wakefulness, electronic devices were worn to monitor the heart rate and activity level.

The starting time of early exercise was as follows. Early getting out of bed can promote the recovery of respiratory, gastrointestinal, musculoskeletal, and other system functions and is conducive to the prevention of lung infection, pressure soreness, and deep venous thrombosis of lower limbs. It was recommended that post-operative waking could be done in a half-liar position or an appropriate amount of activity in bed, without removing the pillow supine for 6 hours. 1 day after surgery, it can start to get out of bed, establish daily activity goals, and increase the amount of activity day by day.

Daily activity objective was as follows. Bed activity and lung function exercises were performed after waking up under anesthesia (three steps of lip contraction breathing, four steps of effective cough, and five steps of back tapping). A personalized activity plan should be formulated so that patients can get out of bed. The first-time get-out-of-bed activity should be assisted by specialized medical staff. Before the implementation of the "five steps" (bending left leg, turning to the right side, right elbow support, hands support, and sitting up beside the bed) and "three steps" (sitting on the bedside for 3 ~ 5 min; after no special discomfort, standing for 3 ~ 5 min, and paying attention to the patient's complaints and walking again after no special discomfort). On the first day after surgery, patients got out of bed 2 - 4 times, and the activity time was 2 h. The activity amount was gradually increased from the second day, and the patients were actively encouraged to achieve the goal until they were discharged successfully.

The indications for suspension/termination of early exercise were evaluated. 1. The activity was suspended at heart rate (HR) > 100 min, SpO_2 < 0.90, blood pressure (BP) < 100/60 mmHg. 2. The activity was delayed if orthostatic intolerance was observed: mild dizziness, palpitation, occasional nausea, diastolic blood pressure (DBP) drop of more than 20 mmHg, and/or systolic blood pressure (SBP) drop of more than 10 mmHg. 3. Objective indicators for the termination of activities were as follows: when the HR and blood pressure exceed 20% of the basic value, SpO_2 < 90% and the patient felt uncomfortable or had no physical strength, the activity should be terminated immediately.

Based on the evidence presented in the study on perioperative activities in patients undergoing hepatectomy, the following recommendations can be derived:

Recommendation 1: Implement reasonably planned perioperative activities

- Target audience: Surgeons, nurses, and other healthcare professionals involved in the care of patients undergoing hepatectomy.
- Practical implications: The evidence suggests that reasonably planned perioperative activities are safe and beneficial for patients undergoing hepatectomy. This includes early mobilization, functional exercises, and promoting early recovery. Healthcare professionals should consider incorporating these activities into the perioperative care plan for hepatectomy patients. This may involve assessing the patient's physical capabilities, setting appropriate activity goals, and providing guidance and support throughout the perioperative period.

Recommendation 2: Utilize high-quality local guidelines for perioperative activities

- Target audience: Clinical medical staff, including surgeons, nurses, and other healthcare professionals involved in the care of patients undergoing hepatectomy.
- Practical implications: The study highlights the importance of high-quality local guidelines in guiding perioperative activities for hepatectomy patients. Healthcare professionals should familiarize themselves with and follow these guidelines as they provide evidence-based recommendations specific to the local context. By adhering to these guidelines, clinical medical staff can help accelerate patient recovery and improve the overall quality of clinical care.

Recommendation 3: Promote exercise compliance among hepatectomy patients.

- Target audience: Surgeons, nurses, rehabilitation specialists, and other healthcare professionals involved in the care of hepatectomy patients.
- Practical implications: The study emphasizes the need to improve exercise compliance among hepatectomy patients. Healthcare professionals should prioritize preoperative exercise and early postoperative activities as part of the rehabilitation plan. This may involve educating patients about the benefits of exercise, addressing concerns or misconceptions about activity-related risks, and providing individualized exercise programs tailored to the patient's condition. By promoting exercise compliance, healthcare professionals can contribute to reducing postoperative complications, enhancing patient rehabilitation, and improving outcomes.

DISCUSSION

Several novel findings and contributions were made to the existing body of knowledge. Safety and benefits of perioperative activities: The study provides evidence that reasonably planned perioperative activities are not only safe but also beneficial for patients undergoing hepatectomy. This challenges the traditional belief that patients with hepatectomy should rest in bed and reduce activities to avoid bleeding in the liver section. The findings suggest that early mobilization and functional exercises can contribute to improved patient outcomes, including faster recovery and reduced complications. High-quality local guidelines: The study highlights the establishment of high-quality local guidelines in China for perioperative activities in hepatectomy patients. These guidelines are based on evidence and provide specific recommendations for clinical medical staff. The presence of these guidelines signifies the potential for practice transformation and the opportunity to enhance the quality of clinical care in hepatectomy patients.

However, there is variation in the recommended frequency and duration of getting out of bed activities across different studies. For example, Ni et al. (2018)[18] recommended a minimum of four times a day starting from the first day after surgery, gradually increasing the activity from the second day ($P = .01$). Lu et al. (2018)[23] suggested staying out of bed for 2 hours on the first day after surgery and gradually increasing activity on the second day. Jones et al. (2018)[19] and He et al. (2016)[32] recommended getting out of bed twice a day starting from the first day after surgery. Liang et al. (2017)[20] proposed two episodes of out-of-bed activities on

the first day after surgery, four episodes on the second day, and normal activities from the third day (Level 2) ($P = .01$).

The operation of hepatectomy is complex and traumatic and results in high postoperative complications. Perioperative exercise guidance for patients is beneficial to their rehabilitation and reduces the occurrence of complications. Kaibori et al. (2013)[29] Perioperative exercise therapy improves insulin resistance associated with liver damage in patients with hepatocellular carcinoma with hepatic insufficiency and suggests the benefit of early restoration of daily exercise after hepatectomy. In the study of Dunne et al. (2016),[30] the 4-week pre-rehabilitation program can improve the cardiopulmonary exercise test scores and preoperative quality of life of patients with hepatectomy ($P = .037$) , which has a certain impact on the perioperative period of patients with hepatectomy. Xu et al. (2007) [31] confirmed that ERAS can relieve surgical stress, promote functional recovery, and reduce the incidence of complications ($P < .05$).

The traditional belief that patients who undergo hepatectomy should remain bedridden and limit their activity is based on previous experience rather than scientific evidence.[32] In this study, a rigorous and scientific approach was followed, which involved comprehensive evidence retrieval, meticulous evaluation of literature quality, systematic evidence synthesis, and the formulation of best evidence summaries. A total of 11 pieces of evidence published between 2013 and 2020 were included in the analysis. Based on the latest and best evidence available, it is recommended that patients undergoing hepatectomy undergo pre-rehabilitation exercises to enhance their functional reserve. The consensus reached was of grade A, indicating a strong recommendation.

Furthermore, the hierarchy of recommendation types is clearly defined, covering various aspects such as the safety of early activities, establishment of activity objectives, assessment and monitoring of early activities, and quality auditing at the policy level.

When reviewing the studies on perioperative hepatectomy activities, it is evident that there are limited international guidelines in this field. However, several local guidelines and expert consensus have been developed in China, indicating that domestic scholars have placed great importance on accelerated rehabilitation during the perioperative period of hepatectomy. These efforts have played a positive role in promoting advancements in this field.

However, literature based on domestic guidelines and expert consensus mainly comes from foreign studies, while localized multi-center and large-sample RCTs are relatively few. This indicates that there is still great room for development in the process of integrating original research into higher-level evidence. In the future, it is necessary to carry out high-quality RCTs in China to enrich the specific content of evidence and provide broader and more profound guidance for clinical practice. Secondly, the transformation of evidence is a gradual rather than an overnight process. Clinical application still needs to be combined with clinical situations, patient's will, and professional judgment, and the principle of individuation must be followed so as to develop an individualized early activity program. In addition, there may be inherent biases in the selected literature, such as publication bias, where studies with positive results are more likely to be published. This can lead to an overestimation of the effectiveness of perioperative activities. Additionally, selection bias may be present if certain studies or data sources were favored over others; the study relied on a limited number of databases and sources for literature retrieval, including PubMed, Cochrane Library, BMJ Best Practice, and specific guideline networks. This may result in a potential bias towards certain regions or languages, and important studies published in other databases or sources may have been missed; the study's search period was until January 30, 2022, which means that more recent studies may not have been included. This could lead to a potential gap in the evidence, particularly if new studies have been published that could impact the conclusions drawn.

Therefore, only the scientific and reasonable implementation of an early activity program can consider patient safety and rapid recovery.

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