Current Science
CS 5 (4), 3807-3816 (2025)
Received 15 May 2025 | **Revised 12 June** 2025 | **Accepted 20 July**. 2025 | **Online Available 3 August** 2025
https://doi.org/ 10.52845/CS/2025-5-4-40

Current Science

Current Science

OPEN ACCESS

ISSN(O)2795-8639

Original Article

The Effect of Zusanli and Sanyinjiao Acupuncture on Abdominal Distension after Liver Cancer Surgery

Zhou Zhou[1], Yangjing Ou[2], Shengpeng Li[3], Xin Li[1,*]

[1]Department of Hepatobiliary surgery, Affiliated Hengyang Hospital of Hunan Normal University & Hengyang Central Hospital, Hengyang, 421001, Hunan, China

[2]Department of Infectious Diseases, Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University, Zhuzhou, 412000, China

[3]Department of Rehabilitation, Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University, Zhuzhou, 412000, China

[*]Corresponding Author: Xin Li

Abstract:

Objective: This study aimed to explore the effect of Zusanli and Sanyinjiao acupuncture on postoperative gastrointestinal dysfunction (POGD), inflammatory factors, and postoperative quality of recovery after liver cancer surgery.

Methods: This retrospective study analyzed clinical data from 46 liver cancer patients who underwent surgery at Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University, between January 2022 and January 2023. Patients were divided into two groups: an acupuncture group (n=20) receiving postoperative stimulation at Zusanli (ST36) and Sanyinjiao (SP6), and a control group (n=26) without acupuncture intervention. The following outcomes were compared between groups: incidence of postoperative gastrointestinal dysfunction (POGD); length of hospital stay; serum inflammatory biomarkers—including granulocyte count, C-reactive protein (CRP), procalcitonin (PCT), interleukin-6 (IL-6), and tumor necrosis factor-α (TNF-α)—measured on postoperative days 3, 5, and 7. Additionally, Quality of Recovery-15 (QoR-15) scores were assessed on postoperative day 3 and 7.

Results: Acupuncture at Zusanli (ST36) and Sanyinjiao (SP6) significantly reduced incidences of POGD on postoperative day 3 (5.56% vs 27.78%, p=0.007) and on postoperative day 7 (0% vs 11.11%, p=0.006), while shortening hospital stay (8.0±2.56 vs 10.2±2.34 days, p<0.01). Significant reductions in inflammatory biomarkers (granulocyte count, CRP, PCT, IL-6, TNF-α) were observed in the acupuncture group versus the control group at postoperative days 3 and 5 (all p<0.05). These reductions persisted and remained significant for all biomarkers at postoperative day 7 (p<0.05). QoR-15 scores were significantly higher in the acupuncture group at postoperative day 3 (81.67±19.71 vs 98.40±11.05, p<0.05) and postoperative day 7 (93.89±12.53 vs 120.38±12.11, p<0.001).

Conclusions: Acupuncture of Zusanli and Sanyinjiao helps reduce POGD incidence and postoperative inflammatory factor levels, including granulocyte count, CRP, PCT, IL-6, and TNF-α levels, improves the patient's quality of life, and shortens hospitalization time after laparoscopic surgery for liver cancer.

Keywords: Acupuncture, Abdominal distension, Liver cancer, Sanyinjiao acupoint, Zusanli acupoint

1. Introduction

Liver cancer, the sixth most prevalent malignancy globally, accounted for 905,677 new cases and 830,180 deaths in 2020 alone, representing 4.7% and 8.3% of total cancer burden respectively [1,2]. With projections indicating >1 million annual cases by 2025 [3], hepatocellular carcinoma

(HCC)—constituting 90% of liver cancers [4]—presents a critical healthcare challenge. Major risk factors include chronic alcohol use, metabolic dysfunction-associated steatohepatitis (MASH), and viral hepatitis [5]. While treatment modalities range from trans-arterial chemoembolization (TACE) to systemic therapies (e.g., immune-checkpoint inhibitors) [6], surgical resection remains the gold standard for eligible patients, achieving 70-80% 5-year survival [7,8].

The adoption of laparoscopic surgery (LS) has grown substantially due to technological advances [9]. However, LS for HCC carries significant morbidity, with postoperative gastrointestinal dysfunction (POGD) affecting up to 38% of patients and often progressing to bowel obstruction [10]. This complication is closely linked to surgically induced inflammation, characterized by elevated CRP, PCT, IL-6, and TNF-α, which impairs motility, prolongs hospitalization, and increases costs [11]. Current management—relying on antibiotics and nutritional support—fails to adequately address inflammation-triggered abdominal distension and delayed recovery.

Acupuncture, an evidence-based component of traditional Chinese medicine [12], demonstrates therapeutic potential in postoperative settings. Robust clinical data confirm its efficacy in accelerating GI recovery [13], reducing inflammatory markers [14], and improving quality of life [15]. Notably, stimulation of Zusanli (ST36) and Sanyinjiao (SP6) acupoints modulates vagal activity and cytokine production, suggesting mechanistic synergy with postoperative recovery goals [16,17].

Given the high incidence of abdominal distension after liver resection and limitations of conventional approaches, this study therefore evaluated whether postoperative acupuncture at ST36/SP6 reduces POGD incidence, inflammatory biomarkers (including CRP, PCT, IL-6, TNF-α), and hospital stay while enhancing recovery quality in HCC patients undergoing LS. To address this objective, we specifically analyzed clinical data from 54 cases receiving either acupuncture at Zusanli (ST36)/Sanyinjiao (SP6) or routine treatment at Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University, between January and June 2022.

2. Methods and Material

2.1 Patients

Thirty-six patients were diagnosed with HCC and admitted to Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University, between January 2022 and January 2023. All patients were treated by LS and the left lateral lobe of the liver was resected. No patient had any significant medical history. On postoperative day 1, all patients developed abdominal distension with absent anal exhaust; no patient had fever or vomiting. All patients provided written informed consent for treatment, and the treatment protocol was approved by the Ethics Committee of Zhuzhou Hospital (approval no.: KY2021121-01).

2.2 Study Design

The 46 patients were randomly divided into two groups: an acupuncture group (n=20) and a control group (n=26). Both groups received standard postoperative care including fasting, fluid restriction, intravenous maintenance of water-electrolyte balance, and oral administration of 30 mL liquid paraffin as a laxative. Furthermore, the acupuncture group additionally received electroacupuncture stimulation at Zusanli (ST36) and Sanyinjiao (SP6) (Figure 1), administered for 30 minutes daily. For all participants, we systematically recorded: inflammatory biomarkers (granulocyte count, CRP, PCT, IL-6, and TNF-α) preoperatively and on postoperative days 1, 3, 5, and 7. Along with clinical recovery metrics including time to resolution of abdominal distension, time to oral intake, and hospital stay duration. As well as POGD assessed using the I-FEED scoring system (Table 1) evaluating nausea, emesis, physical exam findings, and symptom duration [16]. Finally, quality of recovery was measured using the QoR-15 questionnaire [17] on postoperative days 3 and 7.

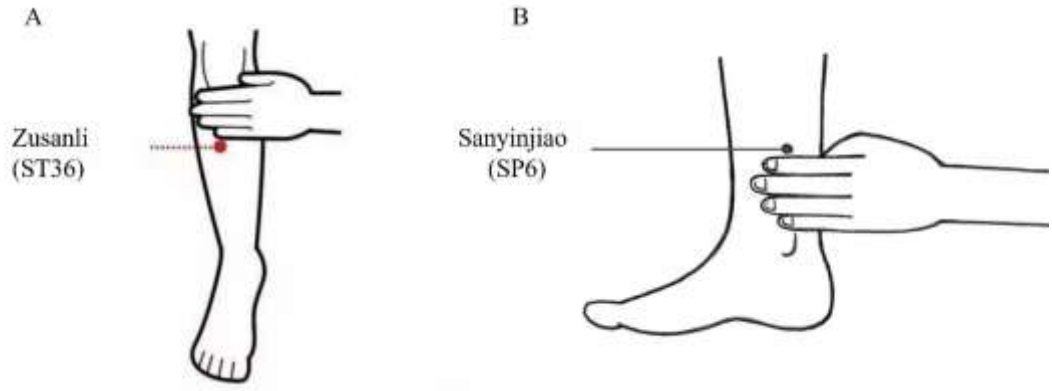

Figure 1, Zusanli and Sanyinjiao acupoint positions. A: Zusanli (ST36): Located approximately one hand's width below the depression on the lateral aspect of the knee, just lateral to the anterior border of the tibia. B: Sanyinjiao (SP6): Located on the medial aspect of the lower leg, approximately 3 cun (about four finger-breadths superiors to the tip of the medial malleolus, posterior to the medial border of the tibia).

Table 1, I-FEED Scoring System

Scoring Item	Intake	Feeling Nauseated	Emesis	Exam	Duration of symptoms
Description (Score)	Tolerating oral diet (0)	None (0)	None (0)	No distension (0)	0-24 hours (0)
	Limited tolerance (1)	Responsive to treatment (1)	≥1 episode of volume(＜100ml) and non-bilious (1)	Distension without tympany (1)	24-72 hours (1)
	Complete Intolerance (3)	Resistant to treatment (3)	≥1 episode of volume (>100ml) and non-bilious (1)	Significant distension with tympany (3)	>72 hours (3)
Total Score	0-2 (Normal) 3-5 (postoperative Gastrointestinal Intolerance (POGI) ≥6 (postoperative Gastrointestinal Dysfunction (POGD)				

2.3 Granulocyte, CRP, PCT, IL-6 and TNF-α levels detect

Blood was withdrawn from all patients preoperatively and on postoperative days 1, 3, 5, and 7 before fasting in the morning, and the samples were sent to our hospital's laboratory for testing. Granulocytes were detected by blood cell instrument(Automatic blood cell analyzer SL-1000, Shanghai Hanfei Medical Instrument), and PCR was detected by Full range C-reactive protein Determination Kit(Sigma, US). PCT, IL-6, and TNF-α levels were detected by Human PCT, IL-6, and TNF-α ELISA Kits (Sigma, US), respectively.

2.4 Statistical Analysis

SPSS 19.0 statistical software was used for data analysis. Measurement data were expressed as x ± s. Comparison between the two groups was performed by t-test; comparisons between multiple groups were performed using the one-way analysis of variance, and pairwise comparisons between the groups were performed by LSD-t-test.

3. Results

3.1 Clinical Baseline Data Characteristics

Between January 2022 and January 2023, 46 liver cancer patients underwent laparoscopic left lateral sectionectomy at Zhuzhou Hospital Affiliated to Xiangya School of Medicine, Central South University. Among them, 26 patients received conventional treatment alone, while the other 20 received conventional treatment combined with acupuncture therapy. Analysis of the clinical characteristics of the 46 patients—including age, gender distribution, tumor stage, tumor size, operative duration, intraoperative blood loss, and

preoperative levels of inflammatory biomarkers (granulocyte count, CRP, PCT, IL-6, and TNF-α)—revealed no significant differences between the conventional treatment (control) group and the acupuncture group ($p > 0.05$; Table 2).

Table 2, 46 patients of clinical characteristics

Variable	Control groups n (%)	Acupuncture groups n (%)	p
Age (years)			0.854
≤55	8 (30.77)	8 (40)	
> 55	18 (69.23)	12 (60)	
Sex			0.876
man	14 (53.85)	9 (45)	
women	12 (46.15)	11 (55)	
Tumor stage			0.317
I	18 (69.23)	13 (65)	
II	8 (30.77)	7 (35)	
Tumor size (cm)			0.317
＜2	18 (69.23)	13 (65)	
2-5	8 (30.77)	7 (35)	
Operation times (h)			0.222
＜4	21 (80.77)	17 (85)	
＞4	5 (19.23)	3 (15)	
Intraoperative bleeding (ml)			0.669
＜200	11 (42.31)	12 (60)	
200-500	10 (38.46)	4 (20)	
＞500	5 (19.23)	4 (20)	
Granulocyte (%)	62.21±10.29	61.31±7.89	0.211
CRP (mg/l)	5.6256±2.89	6.3322±2.97	0.182
PCT (ng/mL)	0.015±0.01	0.016±0.01	0.746
IL-6 (pg/ml)	85.21±22.98	81.26±23.96	0.741
TNF-α (pg/ml)	1055.58±210.45	1023.6±230.68	0.752

3.2 Postoperative gastrointestinal intolerance and POGD incidences and hospital stay duration were less in the acupuncture group

At postoperative day 3, the acupuncture group had significantly higher normal GI function rates (score 0-2: 60.0% vs. 30.8%; p= 0.029, Table 3) and lower moderate-to-severe dysfunction rates (score ≥6: 5.0% vs. 23.1%; p=0.032, Table 3) than controls. By day 7, acupuncture patients achieved dramatically higher normal function rates (95.0% vs. 42.3%; p<0.001, Table 3) with minimal mild dysfunction (score 3-5: 5.0% vs. 50.0%; p<0.001, Table 3). Between the two groups, the acupuncture group had a significantly shorter hospital stay duration than the control group (p<0.01, Figure 2). This suggests that acupuncture facilitates gastrointestinal function recovery and reduces hospital stay duration.

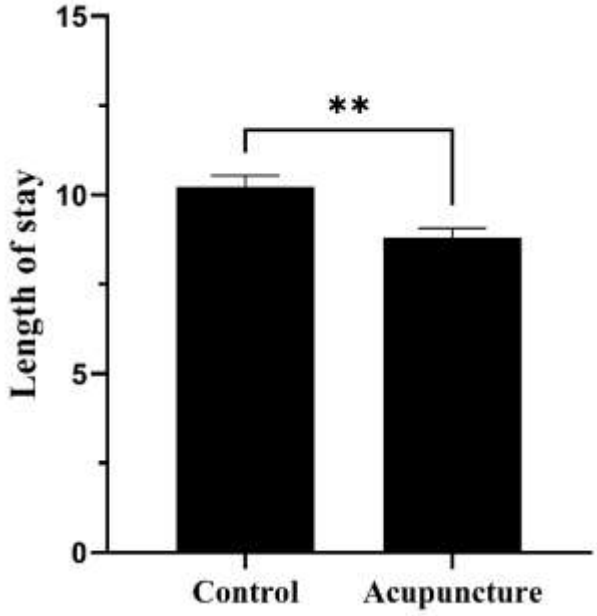

Figure 2, The average hospital stay of routine and acupuncture group were 10.2±2.34 days and 8±2.56 days, respectively. Compare two groups, the acupuncture group significant shorten than routine(p＜ 0.01).

Table 3, I-FEED scoring system in routine group and acupuncture group after 3 and 7 days of surgery

Group	3 days			7 days		
	I-FEED scoring system			I-FEED scoring system		
	0-2	3-5	≥6	0-2	3-5	≥6
Control	8 (30.77%)	12(46.15%)	6 (23.08%)	11 (42.31%)	13 (50%)	2 (7.69%)
Acupuncture	12 (60%)	7 (35%)	1 (5%)	19 (95%)	1 (5%)	0
p	0.029	0.124	0.032	<0.001	<0.001	0.502

3.3 Granulocyte, CRP, PCT, IL-6, and TNF-α levels had decreased in the acupuncture group

We analyzed the granulocyte, CRP, PCT, IL-6, and TNF-α levels preoperatively and on postoperative days 1, 3, 5, and 7 days in the two groups (Figure 3). The preoperative granulocyte, CRP, PCT, IL-6, and TNF-α levels and those on postoperative day 1 day were similar. However, these levels showed a significant decrease on postoperative days 3, 5, and 7 days in the acupuncture group ($p<0.05$, Figure 3 A, B, C, D, E). However, on postoperative day 7 day, the granulocyte levels were similar in both groups (Figure 3 A).

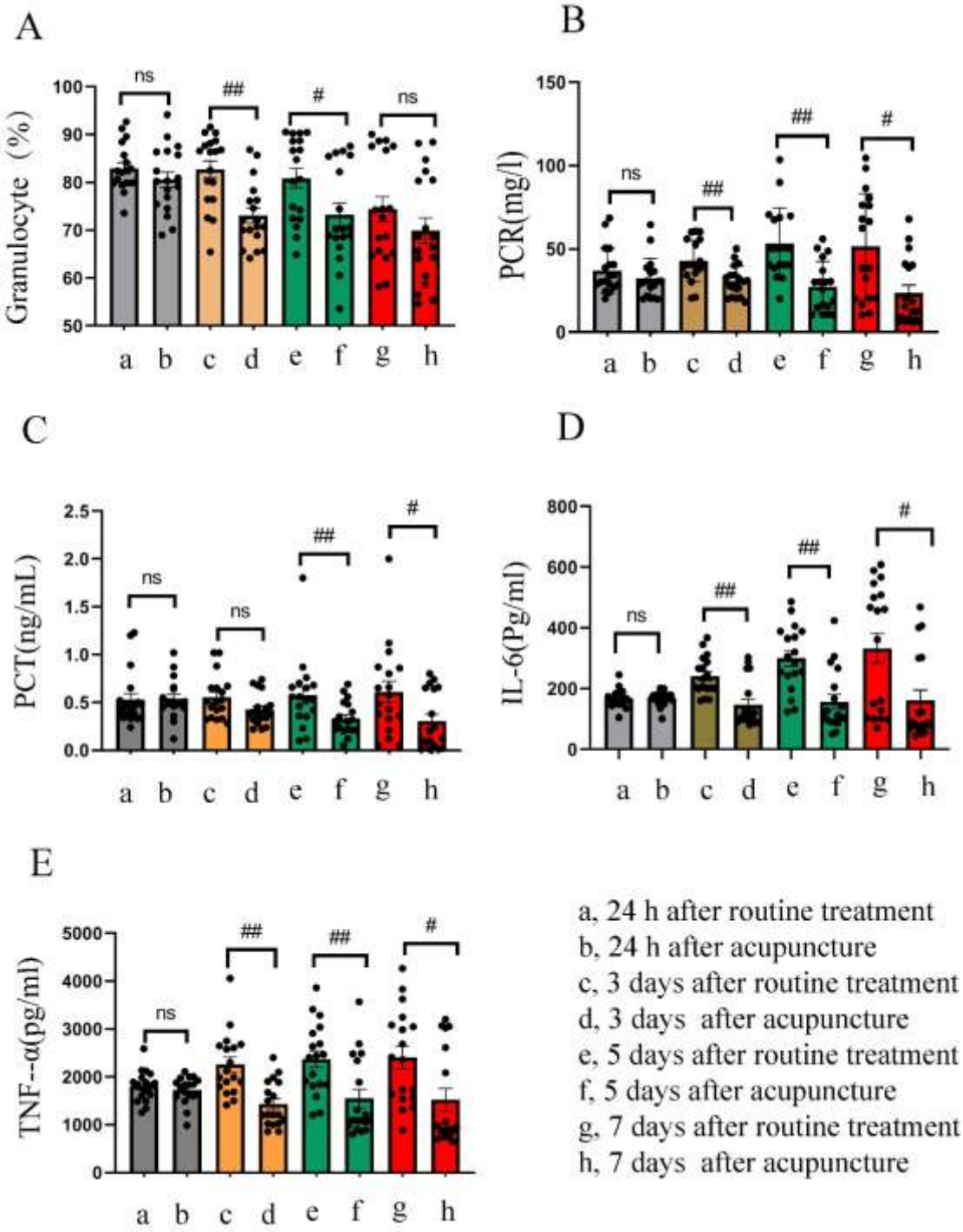

Figure 3, The granulocyte, CRP, PCT, IL-6 and TNF-α levels before surgery and after 24h, 3 days, 5 days and 7 days of surgery in routine and acupuncture groups. Before surgery and after 24h of surgery, granulocyte, CRP, PCT, IL-6 and TNF-α levels no difference. Compare two groups, these levels significant decrease after 3 days, 5 days, 7 days of surgery in acupuncture group ($p<0.05$, Figure 3 A, B, C, D, E). However, the granulocyte no difference in two groups after 7 days of surgery (Figure 3 A).

3.4 The quality of recovery score (QoR)-15 questionnaire scoring was evaluated for both groups

We evaluated the QoR-15 scores on postoperative days 3 and 7 (Figure 4). The QoR-15 scores of the acupuncture group were 81.67±19.71 and 93.89±12.53 on postoperative days 3 and 7, respectively. Additionally, The QoR-15 scores of the control group were 98.40±11.05 and 120.38±12.11 on postoperative days 3 and 7 days, respectively. The QoR-15 scores of the acupuncture group were significantly higher than

that of the control group on postoperative days 3 and 7 days ($p<0.05$ and $p<0.001$, respectively, Figure 4).

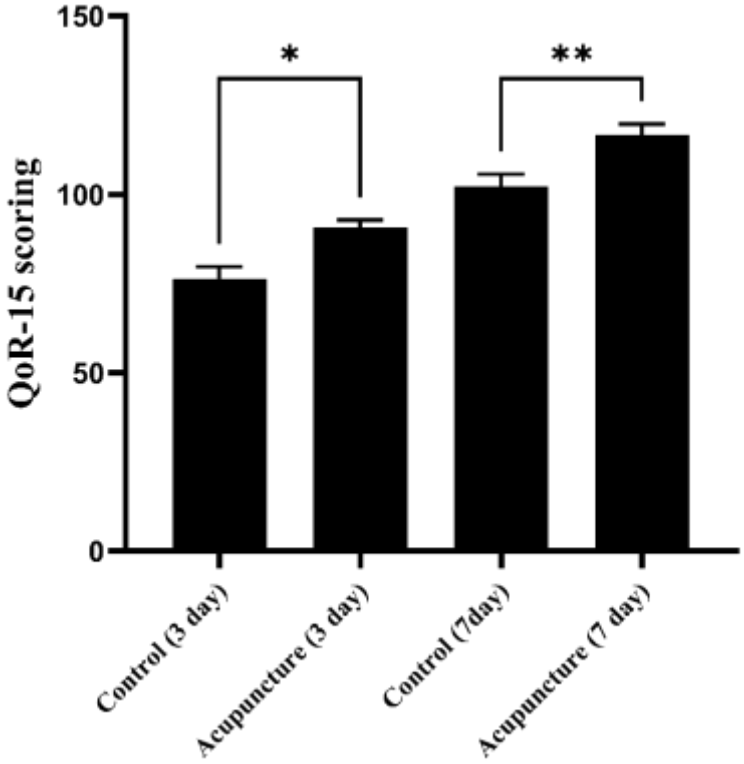

Figure 4, The QoR-15 scoring evaluated by after 3 and 7days of surgery. After 3 days of surgery, the QoR-15 scoring are 81.67±19.71 and 93.89±12.53, respectively, in routine and acupuncture groups,. Compare two groups, they have significant difference($p<0.05$). After 7 days of surgery, the QoR-15 scoring are 98.40±11.05 and 120.38±12.11, respectively, in routine and acupuncture groups. Compare two groups, they have significant difference($p<0.01$).

Discussion

Acupuncture therapy is a type of traditional Chinese medicine, which shows appreciable effects [18]. It is a therapeutic method wherein a needle is inserted into a specific part of the body to generate a response. The stimulation caused due to the needle may activate all types of tactile and mechanically sensitive pain fibers, as well as various types of lesser-known deep tissue receptors [19]. Acupuncture is effective in treating chronic pain [20] and is commonly used to treat various functional gastrointestinal disorders [21-22].

In our study, we found that the acupuncture group had decreased POGI and POGD incidences and hospital stay duration. Additionally, in the acupuncture group, acupuncture improved the postoperative quality of recovery, which was assessed using the QoR-15 questionnaire. Interestingly, the evaluated inflammatory factors, including granulocyte, CRP, PCT, IL-6, and TNF-α levels, had significantly decreased after acupuncture treatment.

Acupuncture treatment for POGD had already been proven to be effective [23-25]. Shao JK et al. [26], have demonstrated the effectiveness of electroacupuncture at Tianshu (ST25) and Zhusanli (ST36) for treating postoperative ileus (POI). They confirmed that electroacupuncture at ST25 and ST36 accelerated the POI recovery time. In a study by Liu M et al. [27], acupuncture at ST 36 and Zhongwan (CV 12) was found to significantly improve chronic atrophic gastritis in rats. Furthermore, acupuncture can also alleviate inflammation. Low-intensity stimulation of ST36 can activate the parasympathetic nerve and inhibit severe inflammation [28]. Ulloa L [29] found that stimulation of ST36 could control sepsis in a mouse model.

POGD after LS occurs due to numerous reasons,

most of which are related to the operation time, amount of intraoperative bleeding, and postoperative inflammatory [11]. The possible reasons are as follows [30]: (1) LS requires the administration of CO2, and prolonged high abdominal pressure affects gastrointestinal tract peristalsis. (2) A large amount of intraoperative bleeding and failure to clean the abdominal cavity postoperatively can cause intestinal adhesions. (3) Postsurgical infections cause inflammatory stimulation, which can lead to intestinal paralysis. (4) Separation of adhesions and release of adhesion factors can also lead to further intestinal adhesions. (5) A large surgical wound can easily cause intestinal adhesion. Based on the above reasons, we believe that the causes of postoperative intestinal obstruction are intra-abdominal bleeding and foreign bodies causing sterile inflammation in the abdominal cavity, which leads to intestinal wall edema, inflammatory cell aggregation, and release of various inflammatory mediators, including interleukins, increased the exudation of fibrin, finally leading to intestinal motility disorder and abdominal inflammatory adhesion. Lastly, postoperative analgesia can also lead to intestinal obstruction.

Boelens et al [31]. pointed out that the incidence of early postoperative inflammatory small bowel obstruction(EPISBO) in patients with colorectal cancer who were administered opioid analgesia was significantly higher than that in patients who were not administered opioid analgesia. Conservative management is the first choice of treatment for postoperative intestinal adhesion. Prevention of postoperative intestinal obstruction, shortening the LS duration, cleaning the abdominal cavity frequently, and reducing the amount of intraoperative bleeding are measures to avoid such complications. Additionally, postoperatively, the patient should be assisted in getting out of bed as soon as possible, intestinal peristalsis should be promoted, and oral liquid paraffin should be administered as a laxative. If abdominal distension occurs, drugs that inhibit intestinal secretion can be used early on. For infectious diseases, anti-infective treatment should be initiated. Postoperative acupoint therapy can treat gastrointestinal dysfunction, reduce inflammation, improve the postoperative quality of recovery, and shorten hospital stay duration.

Authors' Contribution

Zhou Zhou participated in the design, performed statistical analyses, and drafted the manuscript. Yangjing Ou and Shengpeng Li collected clinical data, blood detected, helped to draft the manuscript and performed statistical analyses. Xin Li conceived and design the study, revise the manuscript. All authors read and approved the final manuscript.

Ethics Approval: The protocol and methodology of the present study were approved by the Ethics Committee of Zhuzhou Central Hospital (approval no.: KY2021121-01)..

Acknowledgment: We thank Bullet Edits Limited for providing English editing services.

Conflicts of Interest: The authors state no conflict of interest.

Reference

1. Gilles H, Garbutt T, Landrum J. Hepatocellular Carcinoma. Crit Care Nurs Clin North Am. 2022 Sep;34(3):289-301.
2. Villanueva A. Hepatocellular Carcinoma. N Engl J Med. 2019 Apr 11;380(15):1450-1462.
3. International Agency for Research on Cancer. GLOBOCAN 2018. IARC https://gco.iarc.fr/today/online-analysis-map?v=2020&mode=population& mode_population=continents&population=900&populations=900&key=asr&sex=0&cancer=11&type=0&statistic=5&prevalence=0&population_groupearth&color_palette=default&map_scale=quantile&map_nb_colors=5&continent=0&rotate= %255B10%252C0%255D (2020).
4. Llovet JM, Kelley RK, Villanueva A, et al. Hepatocellular carcinoma. *Nat Rev Dis Primers* . 2021;7(1):6.
5. Demir T, Lee SS, Kaseb AO. Systemic therapy of liver cancer. *Adv Cancer Res*. 2021; 149:257-294.
6. Vogel A, Meyer T, Sapisochin G, Salem R, Saborowski A. Hepatocellular carcinoma . *Lancet*. 2022;400(10360):1345-1362.
7. European Association for the Study of the Liver. Electronic address: easloffice@easloffice.eu; European Association for the Study of the Liver. EASL Clinical Practice Guidelines: Management of hepatocellular carcinoma [published correction appears in J Hepatol. 2019 Apr;70(4):817]. *J Hepatol*. 2018;69(1):182-236.

8. Marrero JA, Kulik LM, Sirlin CB, et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2018; 68(2):723-750.
9. Zhang, S. Y. and Y. Q. Du. Effects of warming needle moxibustion on improvement of gastrointestinal and immune function in patients with post operation of colorectal cancer. Zhongguo Zhen Jiu, 2011. 31(6): 513-517.
10. Mazzotta E, Villalobos-Hernandez EC, Fiorda-Diaz J, Harzman A, Christofi FL. Postoperative Ileus and Postoperative Gastrointestinal Tract Dysfunction: Pathogenic Mechanisms and Novel Treatment Strategies Beyond Colorectal Enhanced Recovery After Surgery Protocols. Front Pharmacol. 2020;11:583422. Published 2020 Nov 24.
11. He GZ, Bu N, Li YJ, et al. Extra Loading Dose of Dexmedetomidine Enhances Intestinal Function Recovery After Colorectal Resection: A Retrospective Cohort Study. *Front Pharmacol*. 2022;13:806950. Published 2022 Apr 25.
12. Sun ZG, Pi YL, Zhang J, Wang M, Zou J, Wu W. Effect of acupuncture at ST36 on motor cortical excitation and inhibition. *Brain Behav*. 2019;9(9):e01370.
13. Zhuang Y, Xing JJ, Li J, Zeng BY, Liang FR. History of acupuncture research. *Int Rev Neurobiol*. 2013;111:1-23.
14. Zhang Y, Du L, Wu G, Cao X. Electro-acupuncture (EA) induced attenuation of immunosuppression appearing after epidural or intrathecal injection of morphine in patients and rats. *Acupunct Electrother Res*. 1996; 21 (3-4):177-186.
15. Ceccherelli F, Lovato A, Piana E, Gagliardi G, Roveri A. Somatic acupuncture versus ear acupuncture in migraine therapy: a randomized, controlled, blind study. *Acupunct Electrother Res*. 2012;37(4):277-293.
16. Hedrick TL, McEvoy MD, Mythen MMG, et al. American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Postoperative Gastrointestinal Dysfunction Within an Enhanced Recovery Pathway for Elective Colorectal Surgery. *Anesth Analg*. 2018;126 (6):1896-1907.
17. Stark PA, Myles PS, Burke JA. Development and psychometric evaluation of a postoperative quality of recovery score: the QoR-15. *Anesthesiology*. 2013;118(6):1332-1340.
18. Huo, Xinhui; Liang, Lili; Ding, Xia; Bihazi, Angshaer; Xu, Haiyan. Efficacy and Safety of Acupuncture with Western Medicine for Rheumatoid Arthritis: A Systematic Review and Meta-analysis. Acupuncture & Electro-Therapeutics Research, Volume 46, Number 4, 2021, pp. 371-382(12).
19. Zhao ZQ. Neural mechanism underlying acupuncture analgesia. *Prog Neurobiol*. 2008; 85(4):355-375.
20. Vickers AJ, Vertosick EA, Lewith G, et al. Acupuncture for Chronic Pain: Update of an Individual Patient Data Meta-Analysis. *J Pain*. 2018;19(5):455-474.
21. World Health Organization. Programme on Traditional Medicine. WHO traditional medicine strategy 2002-2005. World Health Organization, 2002.
22. Chen JDZ, Ni M, Yin J. Electroacupuncture treatments for gut motility disorders . *Neurogastroenterol Motil*. 2018;30(7):e13393.
23. Liu Z, Yan S, Wu J, et al. Acupuncture for Chronic Severe Functional Constipation: A Randomized Trial. *Ann Intern Med*. 2016; 165(11):761-769.
24. Liang C, Wang KY, Gong MR, Li Q, Yu Z, Xu B. Electro-acupuncture at ST37 and ST25 induce different effects on colonic motility via the enteric nervous system by affecting excitatory and inhibitory neurons . *Neuroga - stroenterol Motil*. 2018;30(7): e13318.
25. Fang JF, Fang JQ, Shao XM, et al. Electroacupuncture treatment partly promotes the recovery time of postoperative ileus by activating the vagus nerve but not regulating local inflammation. *Sci Rep*. 2017;7:39801. Published 2017 Jan 4.
26. Shao JK, Liu Q, Pei W, et al. Electroacupuncture for postoperative ileus after laparoscopic surgery on colorectal cancer: study protocol for a randomized controlled trial. *Trials*. 2021;22(1):610. Published 2021 Sep 9.
27. Liu M, Shen J, Liu C, et al. Effects of moxibustion and acupuncture at Zusanli (ST

36) and Zhongwan (CV 12) on chronic atrophic gastritis in rats. *J Tradit Chin Med*. 2020;40(5):827-835.
28. Torres-Rosas R, Yehia G, Peña G, et al. Dopamine mediates vagal modulation of the immune system by electroacupuncture. *Nat Med*. 2014;20(3):291-295.
29. Ulloa L. Electroacupuncture activates neurons to switch off inflammation. *Nature*. 2021;598 (7882):573-574.
30. Chen B, He Y, Xiao Y, et al. Heated fennel therapy promotes the recovery of gastrointestinal function in patients after complex abdominal surgery: A single-center prospective randomized controlled trial in China. *Surgery*. 2020;168(5):793-799.
31. Boelens PG, Heesakkers FF, Luyer MD, et al. Reduction of postoperative ileus by early enteral nutrition in patients undergoing major rectal surgery: prospective, randomized, controlled trial. *Ann Surg*. 2014;259(4):649-655.