

Acupuncture versus metoclopramide in treatment of postoperative gastroparesis syndrome in abdominal surgical patients: a randomized controlled trial

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Background: Postoperative gastroparesis syndrome (PGS) is a common complication after abdominal surgery in patients with primary liver cancer. However, surgeons usually do not have effective treatment for them.

Objective: To explore the effects of acupuncture applied to Zusanli and other acupoints on PGS in patients after abdominal surgery.

Design, setting, participants and interventions: Sixty-three PGS patients of abdominal surgery, from Eastern Hepatobiliary Surgical Hospital, were randomized into acupuncture group (32 cases) and metoclopramide group (31 cases). The patients in acupuncture group were treated with acupuncture applied to Zusanli and other acupoints once a day, while the patients in metoclopramide group were intramuscularly injected 20 mg metoclopramide three times a day.

Main outcome measures: Volume of gastric drainage, number of treatment and cure rate in the two groups were measured and evaluated.

Results: Acupuncture and metoclopramide could significantly reduce gastric drainage volume. In acupuncture group, the cure rate was 90.6% and the number of treatment was 6.58 ± 4.26 , while in metoclopramide group, the cure rate and the number of treatment were 32.3% and 10.13 ± 3.60 respectively. There were significant differences in gastric drainage volume, cure rate and number of treatment between the two groups ($P < 0.05$, $P < 0.01$).

Conclusion: Acupuncture is a good treatment for PGS, with fewer treatments, high cure rate and rapid effect.

Keywords: acupuncture therapy; abdominal neoplasms; gastroparesis; randomized controlled trial

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针刺治疗腹部肿瘤外科术后胃轻瘫的随机对照试验

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背景: 手术后胃轻瘫综合征是腹部手术后常见的并发症, 外科医生往往无有效的治疗手段。

目的: 探讨针刺治疗腹部肿瘤外科术后胃轻瘫患者的效果。

设计、场所、对象和干预措施: 选择东方肝胆外科医院 63 例腹部肿瘤外科手术术后呃逆的患者, 随机分成针刺组 32 例和胃复安组 31 例。针刺组采用针刺足三里等穴位治疗, 1 次/d; 胃复安组肌肉注射胃复安 20 mg, 3 次/d。

主要结局指标: 观察治疗后胃液引流量及治疗次数和痊愈率。

结果: 针刺和胃复安均可显著减少胃液引流量。针刺组痊愈率为 90.6%, 平均治疗 (6.58 ± 4.26) 次; 胃复安组痊愈率为 32.3%, 平均治疗 (10.13 ± 3.60) 次。两组胃液引流量、临床痊愈率和治疗频次比较, 差异有统

计学意义($P < 0.05$, $P < 0.01$)。

结论: 针刺可有效治疗腹部肿瘤外科术后胃轻瘫, 具有治疗次数少、治愈率高、奏效快等优点。

关键词: 针刺疗法; 腹部肿瘤; 胃轻瘫; 随机对照试验

Postsurgical gastroparesis syndrome (PGS) is one type of gastric functional disorders mainly manifested as delayed gastric emptying. PGS often occurs after resection of stomach, pancreas, duodenum or gallbladder, which can be cured by conservative treatment and without mechanical obstruction^[1]. Because its main symptom is delay of stomach evacuation, it is also called gastroplegia, delayed gastric emptying disease, or gastrotonia, etc. PGS as a frequent postsurgical complication has an increasing incidence rate in recent years. Nearly 2% to 3% of the patients who had undergone abdominal operation suffered from PGS, which took 19% of the entire PGS incidence. As the symptoms of PGS would last for a relatively long time, it has a great impact on function recovery and treatment. In this study, we performed acupuncture therapy in 32 PGS patients and compared the results with metoclopramide group in volume of gastric drainage, treatment frequency and cure rate.

1 Clinical data and methods

1.1 Clinical data

1.1.1 Study subject A total of 63 PGS patients who had undergone abdominal surgery in Eastern Hepatobiliary Surgical Hospital between 2004 and 2007 were selected into this study. All of them had the relative symptoms such as abdominal distension, nausea, vomiting and refractory singultus, with dim tongue, white tongue coating and weak pulse.

1.1.2 Diagnostic criteria All patients in this study were qualified for PGS diagnostic criteria of China^[2]: (1) Nausea, vomiting, abdominal distension and with succussion splash after liquid or semi-liquid diet; (2) Drainage fluid from stomach of over 600 to 800 mL per day lasting for 6 to 10 days or even longer; (3) Tests determine no gastric mechanical obstruction; (4) Gastrointestinal motility decreases or disappears; (5) No severe water, electrolyte and acid-base imbalance; (6) No medication which may affect stomach smooth muscle contraction after operation; (7) No complicated basic disease which may cause PGS, such as diabetes. All patients in this study were confirmed with PGS via meglumine diatrizoate (oral administration or by using gastric tube) X-ray visualization motional observations.

1.1.3 Including criteria PGS patients meeting diagnostic criteria received consultation from Department of Acupuncture in Eastern Hepatobiliary Surgical Hospital. Clinicians considered that damage of spleen and stomach, weak spirit and poor blood supply were responsible for PGS,

which represented as upper abdominal discomfort, nausea, vomiting, intractable hiccups, dark or greasy tongue coating and thin pulse.

1.1.4 Excluding criteria Patients who could not tolerate acupuncture therapy or oral treatment, or were allergic to metoclopramide or suffered from active bleeding were excluded from this study.

1.2 Study methods

1.2.1 Study design The 63 PGS patients were randomly divided into acupuncture group and metoclopramide group.

1.2.2 Treatment methods Acupuncture group: main acupoints Zhongwan (RN12), Zusanli (ST36), Neiguan (PC6) and Sanyinjiao (SP6). Operations: sticking 0.30 mm × 40 mm or 0.30 mm × 50 mm stainless steel acupuncture needles into acupoints after regular disinfection; lifting and thrusting, twirling and rotating the needle at Neiguan with moderate to strong stimulation of reducing method; lifting and thrusting, twirling and rotating the needle at Sanyinjiao with reinforcing method; use mild supplementing and reducing manipulation of needles at the other acupoints. Retain the needles for 30 min. The above therapy was performed once a day. Metoclopramide group: intramuscular injection of 20 mg metoclopramide three times a day (Shanghai Hefeng Pharmaceutical Co. Ltd., lot No. H30121522). Gastric drainage volume (mL/d), therapeutic frequency and cure rate were recorded before and after treatment.

1.2.3 Observed indexes The efficacy was evaluated according to reference^[3]. Recovery: no gastric juice outflow, no nausea or vomiting after pulling out the stomach tube, and the patient can take semi-liquid diet. Effective: obvious decrease in gastric drainage volume, without vomiting but still have nausea, and still with stomach tube. Ineffective: no decrease in gastric drainage volume, still have nausea and vomiting, and still with the stomach tube.

1.3 Statistical analysis Data were shown in the format of $\bar{x} \pm s$, the differences within or between groups were analysed by variance analysis and chi-square test.

2 Results

2.1 Baseline data There were 32 patients (22 males and 10 females) in the acupuncture group, with average age of (52.23 ± 9.35) years, disease course of (10.45 ± 7.56) days, and gastric drainage volume of $(1\ 320.3 \pm 593.2)$ mL/d. There were 31 patients (24 males and 7 females) in the metoclopramide group, with average age of (50.34 ± 10.88) years, disease course of (9.56 ± 6.48) days, and gastric drainage volume of

(1 218.5 ± 498.7) mL/d. There was no significant difference between the two groups in baseline data, and none of the patients withdrew from this study. The flow diagram is shown in Figure 1.

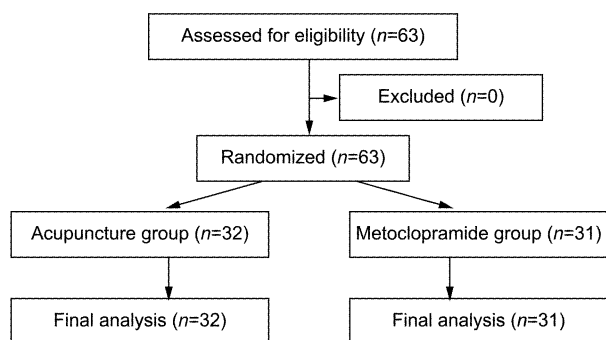


Figure 1 Flow diagram of this randomized trial

2.2 Volume of gastric drainage In homogeneity test of variance, there was no significant difference in gastric drainage volume between the two groups before treatment ($F = 0.563, P > 0.05$). There was significant difference between before and after treatment in the two groups ($F = 1.938, P < 0.01$). Meanwhile, after treatment there was significant difference in gastric drainage volume between the two groups ($F = 2.132, P < 0.05$).

2.3 Therapeutic frequency and efficacy All patients in the acupuncture group could take semi-liquid diet without vomiting and nausea after pulling out the stomach tube, and the average therapeutic frequency was (6.58 ± 4.26) times; in comparison, 4 patients in the metoclopramide group still had stomach tube but vomiting-free and with obvious reduction in gastric drainage volume, and the therapeutic frequency was (10.13 ± 3.60) times ($F = 13.01, P < 0.05$). Twenty-nine out of 32 (90.6%) patients in the acupuncture group were cured, the other 3 of them were well improved, whereas only 10 out of 31 (32.3%) patients in the metoclopramide group were cured, another 12 of them were improved and the other 9 of them did not get better. There was significant difference in cure rate between the two groups ($\chi^2 = 6.23, P < 0.01$).

3 Discussion

PGS often occurs after upper abdominal operation, especially after stomach and pancreas surgery, and is also seen after liver resection. The treatment is troublesome as exact mechanism is still unclear; however, nervous system and gastrointestinal motility disorders are often regarded as the main causes. Many factors can cause post-liver surgery PGS. (1) Mental and nerve factor: mental tension will cause stress reaction which evokes the vegetative nerve functional disturbance, especially activates sympathetic fibers, and can not only reduce the gastrointestinal motility through inhibiting gastrointestinal nerve plexus, but also

inhibit the smooth muscle contraction and delay the evacuation as catecholamine delivered by sympathetic nerve endings may bind receptors on membrane of smooth muscle cells^[4]. (2) Surgical trauma and stomach vagus nerve lesion: surgery will cause the increase of gastrointestinal sympathetic nerve excitation, while liver resection surgery may damage vagus nerve and affect the stomach peristalsis and evacuation. (3) Stomach overexpansion and muscular paralysis due to much air and oxygen during anesthesia but without gastrointestinal decompression treatment^[5]. (4) Inhibitory effect of anesthetic and improper postoperative food taking, especially high-fat diet will cause gastrointestinal hormone disturbance and PGS^[6]. (5) Gastrointestinal peptide hormones such as gastrin, secretin, somatostatin, neurotensin, calcitonin, calcitonin gene-related peptide, cholecystokinin, nalador E1 will cause gastric emptying delay^[7]. (6) Other factors: anemia, malnutrition, hypoproteinemia, anaphylaxis, severe peritoneal cavity infection and diabetes. Diabetes may cause the autonomic neuropathy which will result in gastric hypotonus. (7) Liu *et al*^[8] considered advanced age, long surgery duration, postoperative anodyne application were the high risk factors of PGS. In traditional Chinese medicine theory, PGS was caused by postsurgery spleen and stomach function damage, including dysplenism, stomach downward propelling disorders, arteries and veins hurt, energy stagnancy and blood stasis.

The acupoints were selected in this trial according to the traditional Chinese medicine rationale. Zhongwan is the acupoint of fu-convergence, front-mu acupoint of stomach, and crossing point of conception vessel, and Hand-Taiyang, Shaoyang and Foot-Yangming meridians. Neiguan is the connecting point of Hand-Jueyin meridian, and crossing point of yin link vessel as well. Hand-Jueyin meridian has the effect of smoothing. Zusanli is the sea point of Foot-Yangming meridian, while Sanyinjiao is the crossing point of Foot-Taiyin, Shaoyin and Jueyin meridians. Modern medicine researches found that acupuncturing Zusanli had two-way accommodation effect to stomach peristalsis: acupuncturing Zusanli in healthy volunteers enlarged the upper and lower inner diameters and anteroposterior diameter of gastric antrum and increased the frequency and extent of gastric peristaltic wave as well^[9]. Yang *et al*^[10] reported that electrostimulation on Zusanli increased the gastric electrical power of empty stomach and after meal which indicated the enhancement of gastric contraction. Puncturing Zusanli has the effects of adjusting energy activity, increasing gastric tonus, encouraging gastric peristalsis, thus shortening the gastric emptying time, reinforcing the gastric retention evacuation. Ear acupoints of sanjiao, stomach, spleen and small intestine could invigorate spleen to

eliminate dampness, and dredge triple energizer, and Shenmen and Jiaogan could regulate nerve functions, benefit spleen and regulate stomach, and encourage the gastrointestinal motility and functional rehabilitation of PGS patients.

Metoclopramide, an antagonist to dopamine D2 receptors, could not only affect the smooth muscle to motivate the gastric emptying, but also expand the pylorus and duodenum to activate their peristalsis, and increase the sphincter muscle tonus at inferior segment of esophageal to prevent the backstreaming of stomach contents as well. It was reported that^[11] intramuscular injection of 20 mg metoclopramide once a day could improve 40% to 60% patients' symptoms^[11]. However, long-time application also may cause mental symptoms. We applied in this trial 20 mg metoclopramide three times a day; and 32.3% patients were cured and approximately 40% improved.

We treated PGS patients with acupuncture. The results determined that acupuncture may be an effective way to treat PGS, with few treatment frequency and quick effect. It is recommended to apply acupuncture on PGS patients.

REFERENCES

- 1 Liu W. Experience of diagnosis and treatment of gastric atony after gastric operations. Shanxi Yi Ke Da Xue Xue Bao. 2001; 32(5): 448-449. Chinese.
刘玮. 胃手术后胃无力症诊治体会. 山西医科大学学报. 2001; 32(5): 448-449.
- 2 Yang WL, Zhao G, Zhang XC, Li G. Clinical analysis of postsurgical gastroparesis syndrome after gastrectomy. Zhonghua Wei Chang Wai Ke Za Zhi. 2002; 5(4): 249-251. Chinese with abstract in English.
杨维良, 赵刚, 张新晨, 李刚. 胃切除术后残胃胃轻瘫综合征的临床总结. 中华胃肠外科杂志. 2002; 5(4): 249-251.
- 3 Wu JP, Qiu FZ. Huang Jiasi surgery. Sixth ed. Beijing: People's Medical Publishing House. 2005. Chinese.
吴阶平, 裘法祖. 黄家驷外科学. 第 6 版. 北京: 人民卫生出版社. 2005.
- 4 Qin XY. Gastrointestinal motility disorders after subtotal gastrectomy. Zhongguo Shi Yong Wai Ke Za Zhi. 1999; 19(6): 325-326. Chinese.
秦新裕. 胃大部切除术后胃肠动力紊乱. 中国实用外科杂志. 1999; 19(6): 325-326.

- 5 Ren JJ, Li TP, Wang HL, Zhang JY. Clinical analysis of postsurgical gastroparesis syndrome after cholecystectomy: a report of 16 cases. Fu Bu Wai Ke. 2003; 16(4): 238. Chinese.
任建军, 李太品, 王弘略, 张金银. 胆囊切除术后胃轻瘫综合征的诊治(附 16 例报告). 腹部外科. 2003; 16(4): 238.
- 6 Tang WL, Bai P. Diagnosis and treatment of postsurgical gastroparesis syndrome after subtotal gastrectomy. Shaanxi Yi Xue Za Zhi. 2005; 34(6): 673-674. Chinese.
唐文龙, 白鹏. 胃大部切除术后残胃排空障碍的诊断和治疗. 陕西医学杂志. 2005; 34(6): 673-674.
- 7 Qin XY. Study progress on postsurgical gastroparesis syndrome. Zhonghua Wei Chang Wai Ke Za Zhi. 2002; 5(4): 243-244. Chinese.
秦新裕. 手术后胃轻瘫综合征的研究进展. 中华胃肠外科杂志. 2002; 5(4): 243-244.
- 8 Liu H, Huang TC, Cai YK, Zhang HK. Gastroparesis after abdominal operation: a clinical analysis of 16 cases. Zhongguo Lin Chuang Yi Xue. 2003; 10(3): 297-298. Chinese with abstract in English.
刘辉, 黄陶承, 蔡元坤, 张厚康. 腹部手术后胃轻瘫的原因及诊治(附 16 例报告). 中国临床医学. 2003; 10(3): 297-298.
- 9 Liu FL, Qin XY. Clinical analysis of 20 cases with postsurgical gastroparesis syndrome after radical subtotal gastrectomy. Zhonghua Wei Chang Wai Ke Za Zhi. 2002; 5(4): 245-248. Chinese with abstract in English.
刘凤林, 秦新裕. 根治性胃大部切除术后胃轻瘫综合征的回顾性研究. 中华胃肠外科杂志. 2002; 5(4): 245-248.
- 10 Yang CM, Zhang XR, Mao GP. Gastric electrogram activity after medium frequency electric stimulation at Zusanli acupoint on healthy volunteers. Zhonghua Li Liao Za Zhi. 2001; 24(1): 33. Chinese.
杨春敏, 张秀荣, 毛高平. 足三里穴中频电刺激对健康人胃电活动的影响. 中华理疗杂志. 2001; 24(1): 33.
- 11 Yang GX, Yang JZ, Wu DY. Diagnosis and treatment of functional delayed gastric emptying after subtotal gastrectomy. Luzhou Yi Xue Yuan Xue Bao. 2007; 30(3): 195-197. Chinese with abstract in English.
杨贵祥, 杨静兆, 吴大勇. 胃大部切除术后残胃功能性排空障碍的诊断和治疗. 泸州医学院学报. 2007; 30(3): 195-197.