

# Acupoint Catgut Embedding as Adjunctive Therapy for Patients With Gallstones

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**Aims of This Study:** A randomized clinical trial was undertaken to investigate the efficacy of acupoint catgut embedding (ACE) as adjunctive therapy to tauroursodeoxycholic acid (TUDCA) therapy on gallbladder emptying and clinical symptoms in patients with gallstone disease.

**Materials and Methods:** Between August 2018 and January 2019, 70 patients with gallstones in our hospital were enrolled in this prospective clinical trial. All the patients were randomly divided into the ACE group (ACE+TUDCA treatment for 8 wk) and the Sham group (Sham ACE+TUDCA treatment for 8 wk). In the ACE group, all the patients were nightly given ACE every 2 weeks, and in 2 groups, every patient took TUDCA 500 mg at bedtime. The parameters about gallbladder emptying were detected by ultrasound before and after the treatment, and the clinical symptom scores were recorded at the same time points.

**Results:** A total of 63 patients with gallstone disease were included in our study, with 33 patients in the ACE group and 30 patients in the Sham group. In the ACE group, the empty volume (EV) and gallbladder ejection fraction (GBEF) were improved after treatment ( $P < 0.05$ ). Almost every symptom score (except symptom 7,  $P = 0.15$ ) and total score were decreased ( $P < 0.05$ ). In the Sham group, the symptom 1, 2, 4, 5 scores, and total score were significantly decreased ( $P < 0.05$ ). Moreover, the residual volume in the ACE group was significantly lower than in the Sham group ( $P = 0.008$ ). The EV and GBEF in the ACE group were higher than that in the Sham group ( $P < 0.05$ ). The score of symptom 6 in the ACE group was lower than that in the Sham group ( $P = 0.008$ ).

**Conclusion:** ACE therapy could more effectively improve the gallbladder emptying with a shorter treatment course. Therefore, ACE +TUDCA therapy might be a time-saving treatment for gallstones.

**Key Words:** gallstone, gallbladder emptying, cupoint catgut embedding, tauroursodeoxycholic acid, gallbladder ejection fraction, therapy (*J Clin Gastroenterol* 2022;56:e77–e83)

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J.D. enrolled patients, did ACE, and collected most of data. X.C. analyzed the data and wrote this manuscript. G.Z. contributed to data analysis. J.L., Y.G., and J.Z. contributed to the performance of ultrasound measures. X.W. critically reviewed the manuscript. Y.W. and L.L. provided critical revision of the manuscript. Y.C., L.L., and Y.W. designed the experiments and supervised the study.

This study was approved by the Ethics Committee of Shanghai East Hospital, Tongji University School of Medicine. All patients in this study gave informed consent.

The data sets used in this study are available from the corresponding author upon reasonable request.

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## BACKGROUND

Gallstone disease, also called cholelithiasis, is quite common in general populations, and over 20% of people with gallstones will develop symptoms in their lifetime.<sup>1</sup> Moreover, gallstone disease is one of the most frequent causes of hospital admissions among all gastrointestinal conditions.<sup>2</sup> The pathogenesis of gallstones is complex and associated with a series of factors; cholesterol stones account for about 80% of all types of gallstones.<sup>1</sup> Cholecystectomy is the preferred option for the treatment of symptomatic gallbladder stones, but it may be combined with a series of adverse complications.<sup>3</sup>

Currently, pharmacotherapy is an important supplementary method for gallstone, even though there is a high recurrence rate in pharmacological therapy.<sup>4,5</sup> As it has been proven that hepatic secretion of cholesterol and lithogenic bile are the main causes in gallstone formation,<sup>6</sup> previous studies on the treatment of gallstones mainly focus on governing the hepatic secretion of biliary cholesterol, phospholipids, and bile salts. Tauroursodeoxycholic acid (TUDCA), an amphiphilic bile acid, the taurine conjugate form of ursodeoxycholic acid (UDCA), is one of the effective agents for effective gallstone therapy,<sup>7</sup> also administration of oral TUDCA can promote dissolution of cholesterol crystals and gallstones through decreasing hepatic secretion of biliary cholesterol, but it has a long length of therapy time (at least 4 mo),<sup>8–10</sup> but it has been clinically shown to have low effect in relieving the symptoms or the motility of gallbladder in patients with gallstones; furthermore, a randomized controlled trial shows that high doses of TUDCA treatment for long periods in patients with primary sclerosing cholangitis may be toxic.<sup>11</sup> The clinical application value of TUDCA is mainly for preventing the relapse of lithiasis after the gallbladder-protected

lithotomy. Therefore, the treatment of gallstone disease with TUDCA is still not first-line treatment.

Recently, impaired gallbladder emptying has been identified as an important factor in the pathologic changes of gallstones.<sup>12</sup> It occurs at the very early stage of the gallstone process,<sup>11</sup> and animal studies have indicated that improving gallbladder motility with prokinetic agents can significantly reduce cholesterol crystallization.<sup>13</sup> However, there is a few effective prokinetic agent or therapy in western medicine to improve the gallbladder contractility.

In the field of traditional Chinese medicine, acupuncture is an effective method for the treatment of gallstone disease through improving the gallbladder contractility, and the therapy details have been recorded in “Clinical Practice Guidelines on the Diagnosis and Treatment of Gallstones with Integration of Traditional and Western Medicine” by the Chinese Association of Integrative Medicine.<sup>14</sup> As a new acupoint stimulation therapy, ACE is the clinical extension and development of traditional acupuncture to infix self-absorptive chromic catgut sutures into acupoints by a specialized needle. It has display efficacy for the treatment of obesity, diabetic gastroparesis, insomnia, and so on.<sup>15–18</sup> ACE has been considered a more effective treatment than electro-acupuncture for treating obesity because it results in continuous acupoint stimulation while the catgut is absorbed.<sup>19</sup> However, only very few retrospective studies focus on the effects of ACE therapy in patients with gallstones diseases reported in the Chinese language.<sup>20</sup> Therefore, this clinic trial aimed to investigate the efficacy of ACE as adjunctive therapy to TUDCA therapy on gallbladder emptying and clinical symptoms in patients with gallstones.

## MATERIALS AND METHODS

### Study Population

This is a prospective, randomized clinical study. Between August 2018 and January 2019, a total of 70 patients with gallstones in Shanghai East Hospital, Tongji University, were

enrolled in the study. All these patients were randomly divided into the ACE group (patients received ACE+TUDCA treatment for 8 wk) and the Sham group (patients received Sham ACE+TUDCA treatment for 8 wk). All patients were asked to take TUDCA at a daily dose of 500 mg (Taurolite, Bruschettini S. r. l. Gevova, Italy, Approved medicine of H20110233) at bedtime, plus treated with ACE or Sham ACE every 2 weeks lasting 4 sessions at the same period. The inclusion criteria were (1) patients suffering gallstone and dysfunctional gallbladder motility diagnosed by ultrasound assessment, (2) age 18 to 60 years, (3) informed consent. The exclusion conditions were (1) with history of cholecystitis or acute cholecystitis, (2) with gallbladder polyps or malignant change, (3) with gallstone obstruction or bile duct stone, (4) with acute or chronic pancreatitis, (5) with history of upper abdominal surgery, (6) with use of agents that might influence the gallbladder motility recently, (7) women under pregnancy or lactation, and (8) with serious primary diseases. This study was approved by the Ethics Committee of Shanghai East Hospital, Tongji University.

### Ultrasound Assessment

Gallbladder emptying was assessed with serial measurement of gallbladder volume using ultrasound (MyLab Twice, Esaote, Italy) by 2 well-trained ultra-sonographers who were blind to this study. The patients were measured in the morning in the right anterior oblique position after fasting for 12 hours. Gallbladder emptying was measured using the ellipsoid method.<sup>10</sup> The measurements of volume were taken before and 90 minutes after the test meal (2 fried eggs). The gallbladder was measured in 3 dimensions: 1 longitudinal (length) and 2 cross-sectional diameters (width and height) for determining the volume using the formula:  $\text{volume} = (\text{Length} \times \text{Width} \times \text{Height})\pi/6$ , and 3 parameters were calculated: (1) fasting volume (FV)—gallbladder volume before the test meal, (2) residual volume (RV)—gallbladder volume at 90 minutes after the test meal, (3) empty volume (EV)—change in gallbladder volume in response to the test meal

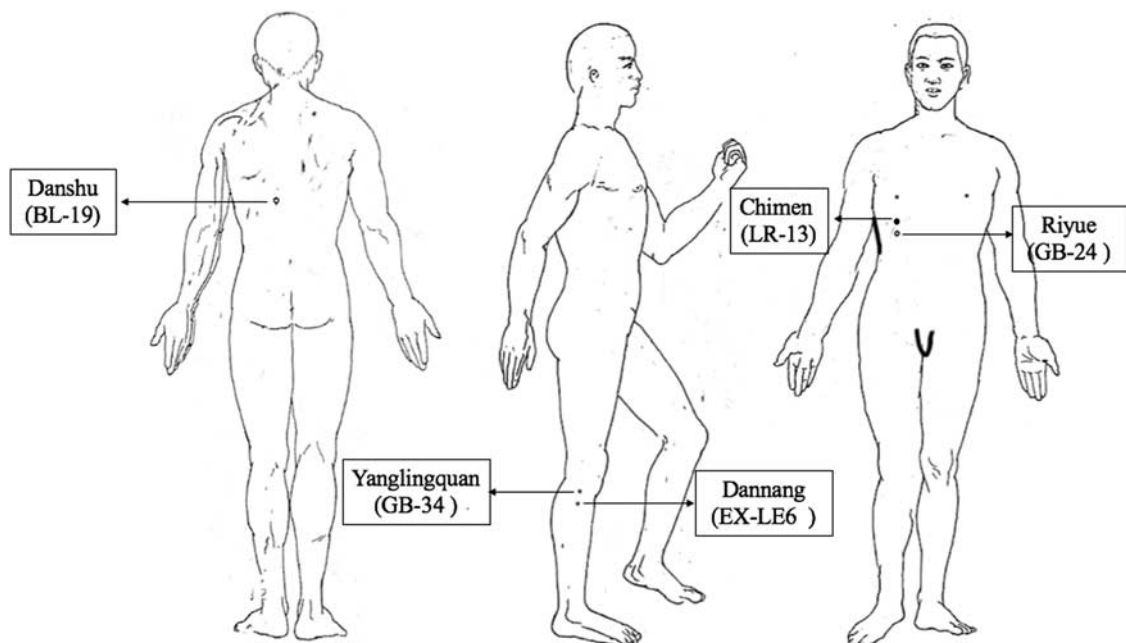


FIGURE 1. The acupoints.

**TABLE 1.** Traditional Medicine Clinical Symptoms Score Scale

Symptoms	0	1	2	3
Symptom 1: pain in middle and right upper abdominal	None	With mild pain but without resulting limitations of daily activities	With moderate pain resulting in slight limitation of daily activities	With severe pain resulting in marked limitation of daily activities
Symptom 2: bitter taste	None	Bitter taste occasionally	Bitter taste in the morning	Bitter taste whole day
Symptom 3: gallbladder tenderness	None	Mild pain	Moderate pain	Severe pain
Symptom 4: pain in back	None	With mild pain but without resulting limitations of daily activities	With moderate pain resulting in slight limitation of daily activities	With severe pain resulting in marked limitation of daily activities
Symptom 5: fullness in upper abdomen	None	Feel fullness only after greasy diet	Feel fullness after normal diet but no need for drug intervention	Feel fullness after normal diet and need drug intervention
Symptom 6: fecal characteristics	None	Loose stool, defecation more than once a day	Dry stool, defecation every 1 or 2 days	Dry stool, defecation < 3 times a week
Symptom 7: nausea and vomiting	None	With mild nausea and vomiting occasionally	With moderate nausea and vomiting	With severe nausea and vomiting
Total score				

(FV–RV), (4) and the percentage of gallbladder emptying—the gallbladder ejection fraction (GBEF), calculated using the following formula:  $GBEF = (1 - RV/FV) \times 100\%$ . All patients were assessed before (T1) and after (T2) the treatment.

**ACE Treatment**

For patients in the ACE group, 5 acupoints were selected: (1) “Danshu” (BL-19): located on the back, under the spinous process of the 10th thoracic vertebrae, 1.5 cun by the side; (2) “Yanglingquan” (GB-34): located on the outside of the calf, the anterior, and inferior depression of the peroneal head; (3) “Chimen” (LR-13): located on the chest, the 6th rib gap, 4 cun away from the front median line; (4) “Riyue” (GB-24): located on the chest, the 7th rib gap, 4 cun away from the front median line; (5) “Dannang” (EX-LE6): located between 1 and 2 cun below Yanglingquan point, tenderness is obvious (Fig. 1).

The acupoints were sterilized using Aneriodine for 3 times. 1.5-cm long strands PGLA self-absorptive sutures (Trade name: Huitong, Guangzhou Techpool Bio-Pharma Co., Ltd.; Approved medicine of 20143656222) was then embedded to a depth of 1.5 cm in the acupoints using a specialized catgut embedding syringe needle. The syringe needle would be withdrawn when the patients felt sourness and PGLA self-absorptive sutures would be left in the tissue. Then the embedding acupoints were compressed by cotton balls with tapes. The ACE treatment was performed every 2 weeks for a duration of 8 weeks. In the Sham group, patients were treated with needling the same acupoints at the same frequency and duration as in the ACE group, neither no retaining the needle nor chromic catgut sutures in the needle syringe. The acupuncturists in this study

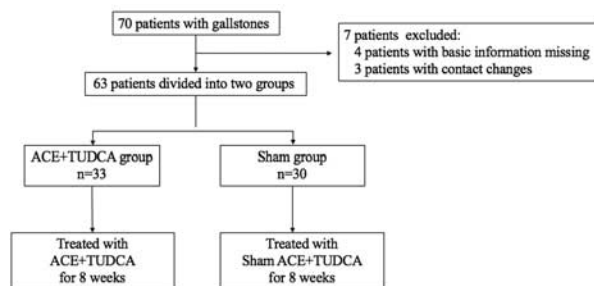
were all qualified with acupuncture affiliation and have > 5 years of clinical experience.

**Assessment of Clinical Symptoms**

We assessed the clinical symptoms associated with gallstones according to traditional Chinese medicine theory. Seven symptoms were included in the assessment, including pain in middle and right upper abdominal (symptom 1), bitter taste (symptom 2), gallbladder tenderness (symptom 3), pain in back (symptom 4), fullness in upper abdomen (symptom 5), fecal characteristics (symptom 6), and nausea and vomiting (symptom 7). The severity of every symptom was recorded in a score from 0 to 4 (Table 1). The assessment was performed by 2 Chinese medicine doctors who were blind to this study. All patients were assessed before (T1) and after (T2) the treatment (Table 1).

**Statistic Methods**

Previous studies have confirmed that TUDCA therapy for gallstones can only improve symptoms, but not gallbladder contraction function, whereas acupuncture can restore gallbladder contraction function in patients with gallstones to a certain extent. Preliminary experimental results (8 wk) showed that the effective rate ( $GBEF\% \geq 35\%$ ) of ACE combined with TUDCA was 40% and the effective rate ( $GBEF\% \geq 35\%$ ) of TUDCA alone was 10%. The sample size of this study was calculated with the following formula:  $n = \frac{p1 \times (1 - p1) + p2 \times (1 - p2)}{(p2 - p1)^2} \times (\mu_{\alpha/2} + \mu_{\beta})^2$ ,  $\alpha = 0.05$ ,  $\beta = 0.20$ , the loss rate was set as 10%, so the sample size of this study was 64.



**FIGURE 2.** Flowchart of this study. ACE indicates acupoint catgut embedding; TUDCA, tauroursodeoxycholic acid.

**TABLE 2.** Basic Information Between the ACE Group and the Sham Group

Parameter	ACE Group (N = 33)	Sham Group (N = 30)	P
Age (y)	40.3 ± 13.9	47.3 ± 14.4	0.06
Sex (male), n (%)	10 (30.3%)	12 (40.0%)	0.42
BMI (kg/m <sup>2</sup> )	23.7 ± 2.9	23.6 ± 5.1	0.93
Length of disease duration (mo)	50.1 ± 52.9	53.3 ± 55.7	0.82

ACE indicates acupoint catgut embedding; BMI, body mass index; TUDCA, tauroursodeoxycholic acid.

**TABLE 3.** Ultrasound Parameters and Symptoms Score Before Treatment between the ACE Group and the Sham Group

Parameter	ACE Group (N = 33)	Sham Group (N = 30)	P
Ultrasound assessment			
FV (mL)	18.8 ± 11.7	26.1 ± 12.2	0.02
RV (mL)	13.6 ± 8.7	19.5 ± 9.0	0.01
EV (mL)	5.2 ± 3.3	6.7 ± 3.7	0.11
GBEF (%)	27.7 ± 7.5	25.2 ± 7.1	0.17
Symptoms assessment			
Symptom 1	1.0 ± 0.8	0.9 ± 0.6	0.60
Symptom 2	0.7 ± 0.6	0.7 ± 0.5	0.80
Symptom 3	0.8 ± 0.9	0.6 ± 0.5	0.24
Symptom 4	0.9 ± 0.9	0.6 ± 0.5	0.94
Symptom 5	1.3 ± 0.9	1.1 ± 0.8	0.53
Symptom 6	1.0 ± 1.0	1.0 ± 1.05	1.00
Symptom 7	0.45 ± 0.9	0.4 ± 0.6	0.91
Total score	6.1 ± 3.7	5.7 ± 3.1	0.63

ACE indicates acupoint catgut embedding; EV, empty volume; FV, fasting volume; GBEF, gallbladder ejection fraction; RV, residual volume; symptom 1, pain in middle and right upper abdominal; symptom 2, bitter taste; symptom 3, gallbladder tenderness; symptom 4, pain in back; symptom 5, fullness in upper abdomen; symptom 6, stool; symptom 7, nausea and vomiting; TUDCA, tauroursodeoxycholic acid.

The analysis was performed using SPSS22.0 software (IBM SPSS, Armonk, NY). The continuous data are expressed as means with standard errors. The Mann-Whitney U test or Student's *t* test was used for comparing continuous variables. The categorical data were expressed as a number with percentage and analyzed with the  $\chi^2$  test. *P* < 0.05 was considered to be statistically significant.

**RESULTS**

There were no unexpected safety findings in this study. A total of 70 patients were formally enrolled into the trial, but 7 patients were excluded during the study period owing to basic

**TABLE 4.** Ultrasound Parameters and Symptoms Score in the ACE Group Before and After Treatment

Parameter	T1	T2	P
Ultrasound assessment			
FV (mL)	18.8 ± 11.7	19.8 ± 11.5	0.74
RV (mL)	13.5 ± 8.7	11.1 ± 6.2	0.19
EV (mL)	5.2 ± 3.3	8.7 ± 7.8	0.02
GBEF (%)	27.7 ± 7.5	41.0 ± 18.5	< 0.001
Symptoms assessment			
Symptom 1	1.0 ± 0.8	0.2 ± 0.4	< 0.001
Symptom 2	0.7 ± 0.6	0.2 ± 0.4	< 0.001
Symptom 3	0.8 ± 0.9	0.3 ± 0.5	0.005
Symptom 4	0.9 ± 0.9	0.4 ± 0.5	0.02
Symptom 5	1.3 ± 0.9	0.6 ± 0.7	0.001
Symptom 6	1.0 ± 1.0	0.4 ± 0.6	0.004
Symptom 7	0.45 ± 0.9	0.2 ± 0.4	0.15
Total score	6.1 ± 3.7	2.3 ± 2.2	< 0.001

ACE indicates acupoint catgut embedding; EV, empty volume; FV, fasting volume; GBEF, gallbladder ejection fraction; RV, residual volume; symptom 1, pain in middle and right upper abdominal; symptom 2, bitter taste; symptom 3, gallbladder tenderness; symptom 4, pain in back; symptom 5, fullness in upper abdomen; symptom 6, stool; symptom 7, nausea and vomiting; T1, before treatment; T2, after treatment; TUDCA, tauroursodeoxycholic acid.

**TABLE 5.** Ultrasound Parameters and Symptoms Score in the Sham Group Before and After Treatment

Parameter	T1	T2	P
Ultrasound assessment			
FV (mL)	26.1 ± 12.2	23.4 ± 11.5	0.38
RV (mL)	19.4 ± 9.0	18.8 ± 14.8	0.84
EV (mL)	6.7 ± 3.7	4.6 ± 8.6	0.23
GBEF (%)	25.2 ± 6.5	27.5 ± 19.6	0.56
Symptoms assessment			
Symptom 1	0.9 ± 0.6	0.4 ± 0.6	0.001
Symptom 2	0.7 ± 0.5	0.3 ± 0.5	0.001
Symptom 3	0.6 ± 0.5	0.5 ± 0.5	0.45
Symptom 4	0.6 ± 0.5	0.5 ± 0.7	0.06
Symptom 5	1.1 ± 0.8	0.5 ± 0.6	0.001
Symptom 6	1.0 ± 1.05	1.0 ± 1.0	0.90
Symptom 7	0.4 ± 0.6	0.2 ± 0.5	0.16
Total score	5.7 ± 3.1	3.4 ± 2.9	0.004

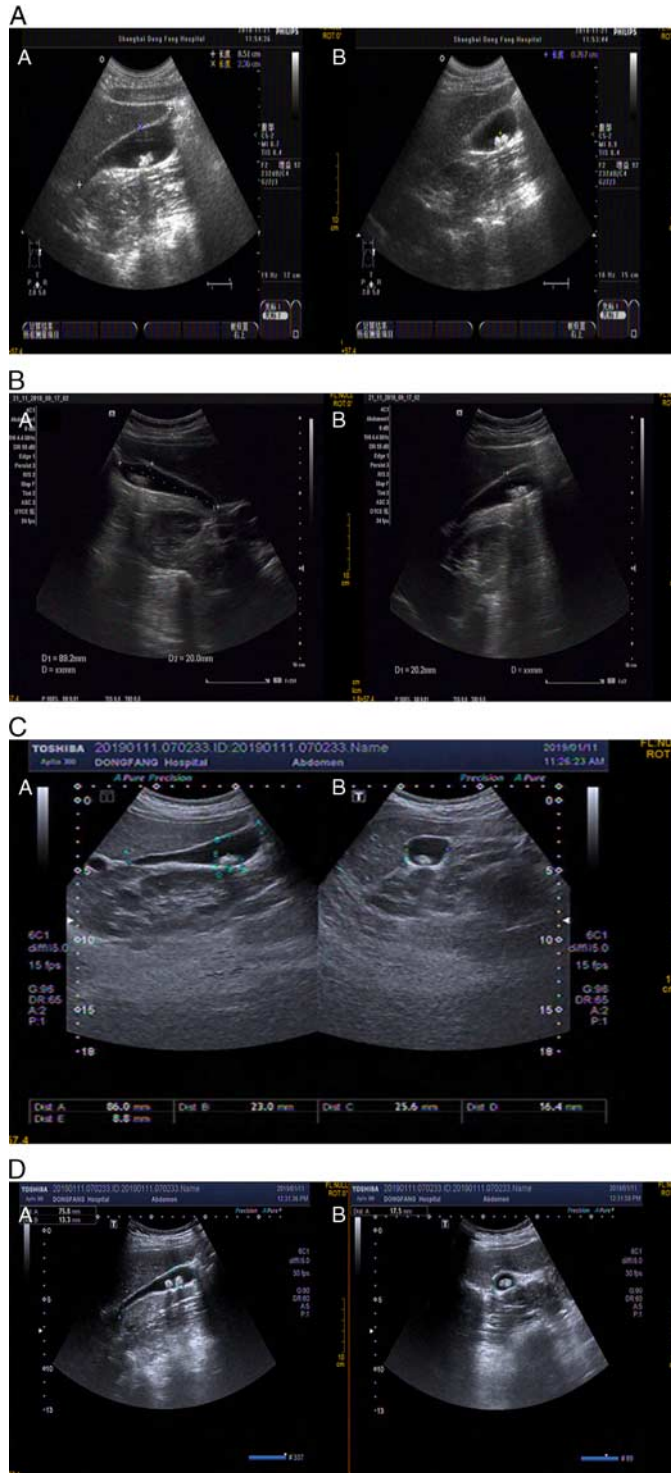
ACE indicates acupoint catgut embedding; EV, empty volume; FV, fasting volume; GBEF, gallbladder ejection fraction; RV, residual volume; symptom 1, pain in middle and right upper abdominal; symptom 2, bitter taste; symptom 3, gallbladder tenderness; symptom 4, pain in back; symptom 5, fullness in upper abdomen; symptom 6, stool; symptom 7, nausea and vomiting; T1, before treatment; T2, after treatment; TUDCA, tauroursodeoxycholic acid.

information missing (4 patients) or contact information changed (3 patients), so finally enrolled 63 patients were in the final analysis (Fig. 2). The average age of patients in this study was 43.6 ± 14.5 years and 34.9% of them were male individuals. Among them, 33 patients were treated with ACE+TUDCA (ACE group), 30 patients were treated with Sham ACE +TUDCA (Sham group). In the ACE group, the average age of the patients was 40.6 ± 13.9 years old and 10 (30.3%) of them were male individuals. In the Sham group, the average age of the patients was 47.3 ± 14.4 years and 12 (40.0%) were male individuals (Table 2). There was no statistical difference between the ACE group and the Sham group in age, sex, body mass index (BMI), and the length of disease duration (Table 2).

**TABLE 6.** Ultrasound Parameters and Symptoms Score After Treatment between the ACE Group and the Sham Group

Parameter	ACE Group (N = 33)	Sham Group (N = 30)	P
Ultrasound assessment			
FV (mL)	19.8 ± 11.5	23.4 ± 11.5	0.21
RV (mL)	11.1 ± 6.2	18.8 ± 14.8	0.008
EV (mL)	8.7 ± 7.8	4.6 ± 8.6	0.04
GBEF (%)	41.0 ± 18.5	27.5 ± 19.6	0.006
Symptoms assessment			
Symptom 1	0.2 ± 0.4	0.4 ± 0.6	0.14
Symptom 2	0.2 ± 0.4	0.3 ± 0.5	0.43
Symptom 3	0.3 ± 0.5	0.5 ± 0.5	0.14
Symptom 4	0.4 ± 0.5	0.5 ± 0.7	0.78
Symptom 5	0.6 ± 0.7	0.5 ± 0.6	0.64
Symptom 6	0.4 ± 0.6	1.0 ± 1.0	0.009
Symptom 7	0.2 ± 0.4	0.2 ± 0.5	0.86
Total score	2.3 ± 2.2	3.4 ± 2.9	0.11

ACE indicates acupoint catgut embedding; EV, empty volume; FV, fasting volume; GBEF, gallbladder ejection fraction; RV, residual volume; symptom 1, pain in middle and right upper abdominal; symptom 2, bitter taste; symptom 3, gallbladder tenderness; symptom 4, pain in back; symptom 5, fullness in upper abdomen; symptom 6, stool; symptom 7, nausea and vomiting; TUDCA, tauroursodeoxycholic acid.



**FIGURE 3.** The ultrasound pictures. A, Ultrasound pictures of a patient in the ACE group before treatment. (a) Before the test meal. (b) After the test meal. B, Ultrasound pictures of a patient in the ACE group after treatment. (a) Before the test meal. (b) After the test meal. C, Ultrasound pictures of a patient in the Sham group before treatment. (a) Before the test meal. (b) After the test meal. D, Ultrasound pictures of a patient in the Sham group after treatment. (a) Before the test meal. (b) After the test meal. [full color online](#)

Before treatment, there were no significant differences between the ACE group and the Sham group in GBEF. The results of symptom scores analyses also

displayed that there was also no significant difference in each clinical symptom score or total score in the 2 groups (Table 3).



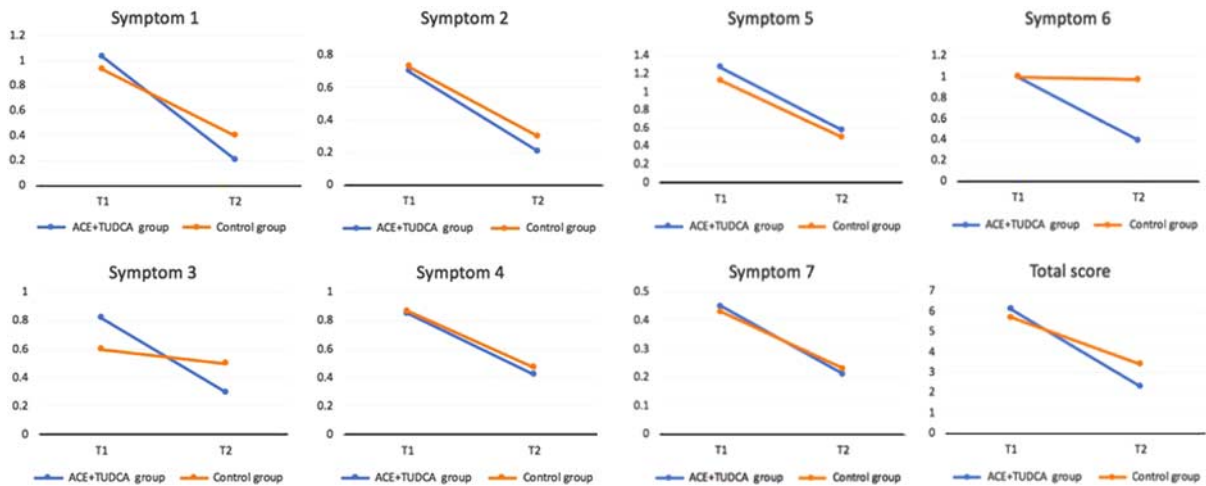


FIGURE 4. The tendency chart of symptom scores. [full color online](#)

In Table 4, the results of within-group analyses revealed that GBEF of the ACE group was significantly increased after 8-week ACE+TUDCA treatment, and all the symptom scores except symptom 7 reduced significantly and total scores reduced markedly from  $6.1 \pm 3.7$  to  $2.3 \pm 2.2$  in the ACE group. For the Sham group (Table 5), there was no significant difference in GBEF before and after treatment, neither no significant difference was found in symptom 3, 6, 7 scores, only symptom 1, 2, 4, 5 scores, and total score were significantly decreased after 8-week Sham ACE+TUDCA treatment.

Table 6 presents the result of between-groups analyses after treatment for 8 weeks. Regarding the ultrasound measurements, RV in the ACE group ( $11.1 \pm 6.2$ ) was significantly lower than that in the Sham group ( $23.4 \pm 11.5$ ), and EV and GBEF in the ACE group ( $8.7 \pm 7.8$  and  $41.0 \pm 18.5$ , respectively) were significantly higher than that in the Sham group ( $4.6 \pm 8.6$  and  $27.5 \pm 19.6$ , respectively) (Fig. 3). Furthermore, the symptoms assessment data showed that only the score of symptom 6 in the ACE group was significantly lower than that in the Sham group after treatment, however, there were no significant differences in scores of all the other symptoms between the 2 groups (Fig. 4).

## DISCUSSION

In the present study, we found that 8-week ACE+TUDCA therapy could significantly improve the gallbladder emptying and distinctly decrease the clinical symptoms that associated with gallstone. The TUDCA therapy could improve the clinical symptoms but not the gallbladder emptying. The total score of clinical symptoms was significantly decreased after 8-week TUDCA treatment compared with before treatment. TUDCA is a bile salt that naturally occurs in the human body. When regular bile salts made in the liver are excreted to the intestine they get metabolized by bacteria in the gut into UDCA and then it binds to a taurine molecule to become TUDCA. TUDCA has been proved to play antiapoptotic and cytoprotective effects in the experimental study,<sup>21</sup> and it has also been reported that TUDCA had the ability to provide protective effect under inflammatory conditions through holding the bile acid homeostasis and preventing early cell death.<sup>22,23</sup> In our study, patients treated with TUDCA could also achieve

some clinical effect after a half treatment course. Nevertheless, there are no significant changes in gallbladder emptying. This is in agreement with Portincasa et al<sup>24</sup> who reported that patients with gallstone had decreased postprandial emptying, and after 1 month's therapy of TUDCA, the gallbladder emptying remained unchanged.<sup>24</sup>

Acupuncture has been utilized as a useful therapy for a variety of diseases, and ACE is an updated and improved form of traditional acupuncture the process of ACE that can continuously stimulate acupoints while the catgut is absorbed; it has been considered a more effective therapy than traditional acupuncture for treating many health problems.<sup>25</sup> Poly lactic-co-glycolic acid (PGLA) line absorbent sutures is the new generation of self-absorbable sutures; the degradation products of PGLA are lactic acid and glycolic acid, both of which are metabolites of the human body. In this study, PGLA lines were used in ACE for the treatment of patients with gallstone with no side effects. The patients who received ACE treatment do not need to be treated as often as traditional acupuncture, almost all of the patients were glad to accept ACE in this study. ACE support a protect function of gallstone characterized by decreasing the total score of clinical symptoms and improving gallbladder emptying strikingly.

One of the critical factors for acupuncture and ACE is to select appropriate acupoints. According to clinical practice guidelines from CAIM and therapy details reported by Zhang, in our study the 5 acupoints including “Danshu” (BL-19), “Yanglingquan” (GB-34); “Chimen” (LR-13), “Riyue” (GB-24), and “Dannang” (EX-LE6) were selected for ACE treating gallstone. Acupuncture at these acupoints can result in the increase of cholecystokinin and motilin, gallbladder contraction, Oddi sphincter dilation, inflammation reduction, and achieving the effect of dispersing stagnated liver qi for promoting bile flow. Precious basic experimental studies have supported ACE paly strong anti-inflammatory and antiapoptotic effects by inhibitor p38 MAPK signaling.<sup>26,27</sup> Interestingly, it has been shown that both inflammatory and apoptosis are involved in the cholestasis pathologic process.<sup>28,29</sup> The present study shows that ACE protects the effect of gallstone. Nonetheless, there were still some limitations in this study such as limited cases, no serological indexes. Thus, large-scale and multicenter

studies with a longer follow-up time are still needed in the future to clarify these problems, and animal studies are also needed to verify the underlying mechanisms.

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