

RAPID COMMUNICATION

Indwelling catheter and conservative measures in the treatment of abdominal compartment syndrome in fulminant acute pancreatitis

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Abstract

AIM: To study the effect of combined indwelling catheter, hemofiltration, respiration support and traditional Chinese medicine (e.g. Dahuang) in treating abdominal compartment syndrome of fulminant acute pancreatitis.

METHODS: Patients with fulminant acute pancreatitis were divided randomly into 2 groups of combined indwelling catheter celiac drainage and intra-abdominal pressure monitoring and routine conservative measures group (group 1) and control group (group 2). Routine non-operative conservative treatments including hemofiltration, respiration support, gastrointestinal TCM ablation were also applied in control group patients. Effectiveness of the two groups was observed, and APACHE II scores were applied for analysis.

RESULTS: On the second and fifth days after treatment, APACHE II scores of group 1 and 2 patients were significantly different. Comparison of effectiveness (abdominalgia and burbulence relief time, hospitalization time) between groups 1 and 2 showed significant difference, as well as incidence rates of cysts formation. Mortality rates of groups 1 and 2 were 10.0% and 20.7%, respectively. For patients in group 1, celiac drainage quantity and intra-abdominal pressure, and hospitalization time were positively correlated ($r = 0.552, 0.748, 0.923, P < 0.01$) with APACHE II scores.

CONCLUSION: Combined indwelling catheter celiac drainage and intra-abdominal pressure monitoring, short veno-venous hemofiltration (SVVH), gastrointestinal TCM ablation, respiration support have preventive and treatment effects on abdominal compartment syndrome of fulminant acute pancreatitis.

INTRODUCTION

There are certain guidelines for treatment of severe acute pancreatitis (SAP). However, about 11% of SAP patients suffer from the complication of abdominal compartment syndrome (ACS), and about 25% of SAP patients are fulminant acute pancreatitis (FAP). Incidence rate of ACS is higher in FAP, and its mortality rate is as high as 60%. Up till now, there have been no standard treatments for ACS^[1,2]. In the present study, we used combination of celiac indwelling catheter drainage and intra-abdominal pressure monitoring, several short veno-venous hemofiltration (SVVH), respiration support and gastrointestinal TCM ablation for treatment and predicting patient's conditions of ACS in FAP. Through comparison with the control group, we demonstrate that the combined therapy is effective for treatment of ACS.

MATERIALS AND METHODS

Patients

A total of 110 FAP patients were received and treated in First Aid Center and Hepato-biliary Surgery Department of Affiliated Hospital of Guiyang Medical College^[3,4]. When they were hospitalized, the cumulative scorings of CT serious index (CTSI), APACHE II and SAP were 7.85 ± 1.10 , 17.51 ± 4.51 and grade II respectively.

Methods

Patients were divided randomly into groups of indwell-

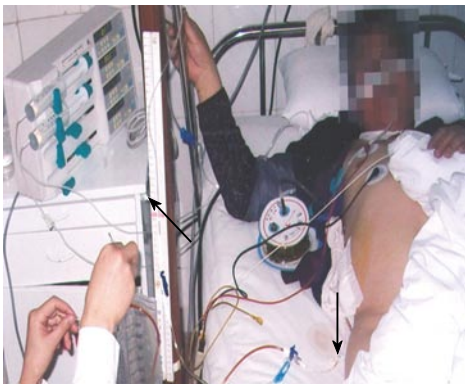


Figure 1 Indwelling catheter. (↙) Celiac drainage; (↘) Intra-abdominal pressure detection.

ing catheter celiac drainage and intra-abdominal pressure monitoring and routine non-operative conservative treatment measures (Figure 1) group (group 1, 45 cases) and control group (group 2, 65 cases). There was no significant difference ($P > 0.05$) in gender, age, cumulative scorings of CTSI and APACHE II between the two groups. Routine non-operative conservative treatment measures, including SVVH, gastrointestinal TCM ablation, respiration support and drug therapy, were conducted in group 2 patients. For group 1 patients centesis in right side or two sides of abdominal cavity, installation of indwelling catheter for continuous drainage (drain quantity was recorded daily) were conducted on the first day of hospitalization, and intra-abdominal pressure was monitored and recorded on the first, second and fifth days since installation of indwelling catheter. The decision of time for hemofiltration was based on the indications of systemic inflammatory response syndrome (SIRS). On the day of hospitalization Dahuang or Qingyitang was infused by gastric canal or anus drip (3 times daily).

Observation of clinical effectiveness: Abdominalgia, burbulence time, hospitalization time for groups 1 and 2 were observed. Celiac drainage and intra-abdominal pressure were monitored for group 1; APACHE II cumulative scores before treatment, on the second and fifth days after treatment in groups 1 and 2 were recorded.

Statistical analysis

Data are expressed as mean \pm SD. SPSS 12.0 was used for statistical analysis. $P < 0.05$ means significant.

RESULTS

Patients' conditions

During hospitalization and treatment period, there was no significant difference in the two groups for cumulative scorings of CTSI and APACHE II. On the second and fifth days after treatment with combined indwelling catheter drainage, gastrointestinal TCM ablation, SVVH, respiration support and drugs, the cumulative scorings of APACHE II in group 1 were significantly lower than in group 2 ($P < 0.01$); cumulative scorings of APACHE II were significantly decreased compared with before treatment ($P < 0.01$, Table 1).

Table 1 Patient's conditions of severity transformation (mean \pm SD)

Group	State of illness when hospitalized		Change of APACHE II during treatment	
	CTSI scoring	APACHE II scoring	2 d after treatment	5 d after treatment
1	7.61 \pm 0.67	16.44 \pm 2.28	9.66 \pm 1.88 ^b	4.63 \pm 1.46 ^b
2	7.59 \pm 0.86	15.74 \pm 1.91	13.46 \pm 1.93	10.78 \pm 2.01

^b $P = 0.000$ vs group 2.

Table 2 Celiac drainage and intra-abdominal pressure (mean \pm SD)

	1st	2nd	3rd	<i>P</i>
Drain quantity (mL)	1817 \pm 639	815 \pm 423 ^a	85 \pm 40 ^a	0.000
IAP (cmH ₂ O)	29.29 \pm 5.53	13.95 \pm 4.05 ^b	6.71 \pm 1.68 ^b	0.000
APACHE II scorings	16.44 \pm 2.28	9.66 \pm 1.88	4.63 \pm 1.46	0.000

^a $r = 0.55$ vs IAP, ^b $r = 0.92$ vs APACHE II scorings.

Table 3 Local symptoms and treatment effect (mean \pm SD)

Group	Relief time		Treatment effect		
	Abdominalgia (d)	Burbulence (d)	Hospitalization (d)	Mortality rate (%)	Rate of cyst (%)
1	3.27 \pm 0.87 ^b	6.90 \pm 1.18 ^b	15.59 \pm 3.89 ^b	10.0 ^b	8.9 ^b
2	14.13 \pm 2.14	23.36 \pm 3.76	28.28 \pm 4.61	20.7	37.9

^b $P < 0.01$ vs group 2.

Celiac drainage and intra-abdominal pressure

Drains of 45 cases in group 1 were all dematiaceous bloody liquid. Drainage period was 3.5 ± 0.85 d; drain quantity was positively correlated ($r = 0.552$, $P < 0.01$) with intra-abdominal pressure (IAP) ($r = 0.552$, $P < 0.01$). While IAP was positively correlated with cumulative scorings of APACHE II ($r = 0.748$, $P < 0.01$, Table 2).

Relief time for abdominalgia and burbulence, and hospitalization time

The relief time of abdominalgia, burbulence, and hospitalization time in group 1 were significantly shorter than those in group 2 ($P < 0.01$). Mortality rates in group 1 were decreased compared to group 2, with no significant difference. Incidence rates of cysts in group 1 were significantly decreased compared to group 2 ($P < 0.01$, Table 3).

DISCUSSION

FAP is characterized by rapid deterioration of patient's conditions. Multi-organ (specially pancreas and gastrointestinal tract) dysfunction appeared in early stage.

ACS in FAP is divided into four grades according to IAP: first grade is 10-14 cm H₂O, second grade is 15-24 cm H₂O, third grade is 25-35 cm H₂O, and fourth grade is > 35 cm H₂O. In group 1 of our experiment, celiac intra-abdominal pressure of 45 cases was 29.29 ± 5.53 cm H₂O, diagnosed as ACS clinically^[4-6]. Currently, ACS is detected mainly by bladder manometry method, which is an indirect

method. However, there are certain influencing factors. Therefore we used indwelling catheter celiac laying canal to directly detect intra-abdominal pressure, and performed canal drainage. It could prevent celiac dropsy ACS, avoid disturbance of celiac function when operating, and the effect of anesthesia on laparotomy and celiac operation, and consequently prevent ACS^[7-12]. In our study, the combined approach of indwelling catheter drainage, SVVH and gastrointestinal TCM ablation, respiration support and use of other drugs was employed to treat ACS in FAP. We found that drain quantity was positively correlated with intra-abdominal pressure ($r = 0.55$), and intra-abdominal pressure was correlated with hospitalization time and APACHE II cumulative scorings ($r = 0.75, 0.92$). In comparison of effectiveness, that of the group 1 was significantly better than that of group 2 regarding abdominalgia disappearing time, burbulence relief time, and hospitalization time ($P = 0.000$); mortality rates were 10% and 20.7% in group 1 and 2, respectively; incidence rates of cysts between the two groups were significantly different ($P = 0.001$). The reasons for the better effect of group 1 might be that: (1) indwelling catheter drainage eliminated ACS caused by celiac dropsy; (2) hemofiltration or drainage improved paralysis of gastrointestinal tract caused by a variety of inflammatory cytokines, inflammation mediators, all kinds of enzymes and necrosis materials (including large, moderate and small molecular weight materials). As a consequence, damage of tissues and organs in dropsy (mesentery, epiploon, gastrointestinal and parietal peritoneal membrane) type of ACS was greatly reduced; (3) It was eliminated that the celiac disturbance and the effect on systemic multi-organs (especially gastrointestinal tract) caused by laparoscopic operation or laparotomy and anesthesia; (4) TCM, eg Da-huang could effectively reduce intestinal tract endotoxin and bacterial shift, alleviate intestinal mucosal membrane damage, and facilitate gastrointestinal movement and emptying^[9,13-16]. As far as we know, such study has not been reported.

In summary, combined indwelling catheter celiac drainage, intra-abdominal pressure monitoring, multi-SVVH, gastrointestinal TCM ablation, respiration support and use of drugs can prevent and treat ACS in FAP effectively. However, the problem of slow speed of indwelling catheter celiac drainage has still to be resolved^[13].

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