Curative effect of transnasal ileus tube combined with early enteral nutrition and dachengqi decoction in early postoperative inflammatory ileus

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Abstract: Objective: To explore the treatment strategies of early postoperative inflammatory small bowel obstruction (EPISBO). Methods: 35 cases of EPISBO patients, according to the different treatment methods, were retrospectively divided into traditional Western medicine treatment group (WM group) and the Integrative medicine treatment group (IM group); IM group, in addition to traditional therapy, used ileus tube combined with early enteral nutrition and Dachengqi Decoction for treatment. Results: In WM group, the change in abdominal circumference (5.31 ± 3.26 cm) before and after treatment was significantly lower than that in the IM group (10.84 ± 5.01 cm, P < 0.05); On day 1, the gastrointestinal decompression amount in IM group (1796.25 ± 346.78 ml) was significantly more than that in WM group (977.89 ± 386.7 ml, P < 0.05), but bowel sound recovery time (2.34 ± 0.71 d), obstruction remission time (3.05 ± 1.01 d) and the obstruction-free time (8.07 ± 2.89 d) were significantly shorter compared with WM group respectively (3.37 ± 1.28 d, 3.82 ± 1.45 d, 12.89 ± 7.25 d) (P < 0.05). Conclusion: The combined treatment of ileus tube, early enteral nutrition and Dachengqi Decoction was better than the traditional Western medicine treatment in early postoperative inflammatory small bowel obstruction.

Keywords: EPISBO, Ileus tube, enteral nutrition, integrative medicine, dachengqi decoction

Introduction

Early postoperative inflammatory ileus (EPII) refers to the situation of mechanical (dynamic) adhesive bowel obstruction caused by bowel wall edema and exudation within an early period after peritoneal surgery (usually at 2 weeks postoperatively) as a result of operative trauma or peritoneal inflammation [1, 2]. Trauma caused by peritoneal surgery includes any bowel injury arising from the separation of extensive bowel adhesions, long-term bowel exposure and other surgical manipulations. Peritoneal inflammation mainly includes aseptic inflammation caused by hemoperitoneum, peritoneal effusion or other reasons [3]. This type of bowel obstruction can be attributed to mechanical factors and also to intestinal motility disorder without concurrent strangulation. EPII is distinct from other types of bowel obstruction in the following aspects [4]: (1) EPII generally occurs within an early period after surgery (at 2 weeks postoperatively) despite the temporary restoration of peristalsis. Some patients may have even resumed normal diet; (2) Abdominal distension is the common symptom with mild or no abdominal pain; (3) Although the patients may present with bowel obstruction, very few are combined with strangulation; (4) EPII has a close association with extensive adhesions caused by peritoneal inflammation; (5) X-ray scan usually shows several liquid interfaces with effusion in intestinal lumen. Abdominal CT scan may show thickening of bowel wall and entangling of bowel loops; (6) Non-surgical therapy is effective for most cases. According to the statistics by Tianjin Nankai Hospital, EPII accounts for about 2.32% of all bowel obstructions. EPII is featured by insidious onset and long course of disease and, if improperly handled, may lead to such complications as intestinal fistula, severe peritoneal infection and short bowel syndrome [5]. Surgical approaches were once the common treatment for EPII, but the curative effect was poor and the complications were frequent. Currently, non-surgical treatment is mo-
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Inclusion criteria: (1) 20 and 70 years old; (2) Complete clinical data; (3) Meeting the diagnostic criteria for EPII; (4) Receiving the treatment of somatostatin, adrenal cortical hormones and parenteral nutrition (PN) therapy.

Exclusion criteria: (1) Incomplete clinical data; (2) Mechanical bowel obstruction caused by volvulus, intussusception, intestinal angulation deformity, adhesive band compression and internal abdominal hernia; (3) Mesenteric vascular disease, paralytic ileus; (4) Severe basic diseases affecting the observation indicators, such as hematologic diseases, immunological diseases, late-stage tumors and history of radiotherapy and chemotherapy within 6 months; (5) Severe internal diseases, such as hepatic cirrhosis, chronic kidney diseases, diabetes and severe pulmonary infection.

Criteria for cure: (1) Restoration of flatus and defecation; (2) No need for GI decompression; (3) No need for targeted medication (e.g., hormones, somatostatin, traditional Chinese medicine, and blood-activating agents); no abnormal physical signs; (4) No recurrent bowel obstruction after resumption of diet; (5) Plain abdominal X-ray, abdominal B ultrasound, abdominal CT or GI angiography showing no abnormalities.

Grouping

According to the inclusion and the exclusion criteria, 35 cases of EPII (16 males and 19 females, 50.81 ± 12.44 years old) treated at Tianjin Nankai Hospital from January to October 2014 were recruited.

All cases received conventional treatments, including GI decompression, PN therapy and administration of somatostatin and adrenal
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cortical hormones. The cases were divided into 2 groups: western medicine treatment group (conventional treatments, including GI decompression, PN therapy and administration of somatostatin and adrenal cortical hormones.) and integrative medicine treatment group (conventional treatments, plus Dachengqi Decoction).

Observation indicators: (1) Time to the occurrence of postoperative obstruction: The period from the day of surgery to the occurrence of obstruction (d); (2) Number of previous surgeries; (3) Abdominal circumference at 24 h after GI decompression (cm); (4) GI decompression amount at 1-3 d after decompression (ml); (5) Time to the recovery of bowel sounds, relief of obstruction and removal of obstruction (d).

The cases of the two groups did not show significant differences in surgical approach, occurrence time of EPII and number of previous surgeries. See Tables 1-3.

Treatments

Conventional treatments: (1) The cases were fasted from liquids and solids, and the electrolytes and acid-base balance were maintained. (2) PN therapy: Nonprotein calories 105 KL/kg·d, nitrogen feeding 0.15 g/kg·d, ratio of energy to nitrogen 150:1. 30-40% of nonprotein calories were provided by fat emulsion, and 60-70% by glucose (ivd, QD, 4-14 days). (3) Somatostatin: Octreotide, 0.1 mg, SC, Q8H, 4-10 days. (4) Adrenal cortical hormones: dexamethasone, 5 mg, ivd, Q12H, 3-7 days.

Method of GI decompression: (1) Conventional gastric tube decompression: For cases showing inflammatory bowel obstruction and with indwelling gastric tube, GI decompression was further carried out; for those that had the gastric tube removed or received no preoperative decompression, GI decompression was performed by inserting the gastric tube. (2) Transnasal ileus tube decompression: If the drainage amount was below 400 ml and the abdominal symptoms were not mitigated or even aggravated after transnasal ileus tube decompression for 2-3 days, decompression was further carried out under the endoscope using three-channel two-balloon transnasal ileus tube (CREATE MEDIC). The picture of transnasal ileus tube is shown in Figure 1. (3) Method of the insertion of transnasal ileus tube.

The insertion was performed under the X-ray guidance. The decompression procedures were as follows: (1) The endoscope was inserted to the horizontal part of duodenum or even further. Then the guide wire was inserted into the upper jejunum and the endoscope was withdrawn. The guide wire was let out transnasally. (2) The tube was gently inserted into the upper jejunum using the guide wire. The ileus tube was advanced manually into the distal small bowels, and the tube entered the intestinal tract through peristalsis. Decompression was carried out simultaneously. (3) Urografin was injected for angiography, and the bowel dilation and obstruction were observed. Placing the front balloon to the site of obstruction, 10-15 ml of sterile distilled water was injected to cause the front balloon to expand. Then the guide wire was withdrawn. (4) The ileus tube was then inserted into the stomach and kept it slack there. The negative pressure aspirator was connected to the other end of the ileus tube for decompression.

Subsequent use of transnasal ileus tube: (1) GI angiography: After full decompression, Urografin angiography was performed electively. The expanded balloon at the back could help prevent the dilution of the contrast agent in dis-

Table 4. Therapeutic effect comparison between the two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Therapeutic effect</th>
<th>Effective</th>
<th>Ineffective</th>
<th>Total</th>
<th>Effective rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM</td>
<td></td>
<td>16</td>
<td>3</td>
<td>19</td>
<td>84.21%</td>
</tr>
<tr>
<td>IM</td>
<td></td>
<td>15</td>
<td>1</td>
<td>16</td>
<td>93.75%</td>
</tr>
</tbody>
</table>

Figure 1. Three-channel two-balloon ileus tube by CREATE MEDIC.

Table 4. Therapeutic effect comparison between the two groups
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Table 5. Changes of abdominal circumference after surgery (cm)

<table>
<thead>
<tr>
<th></th>
<th>WM group</th>
<th>IM group</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes of abdominal circumference (cm)</td>
<td>5.31 ± 3.26</td>
<td>10.84 ± 5.01</td>
<td>4.57</td>
<td>0.019</td>
</tr>
</tbody>
</table>

Table 6. GI decompression of the two groups (ml)

<table>
<thead>
<tr>
<th></th>
<th>WM group</th>
<th>IM group</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 d</td>
<td>977.89 ± 386.7</td>
<td>1796.25 ± 346.78</td>
<td>8.465</td>
<td>0.005</td>
</tr>
<tr>
<td>2 d</td>
<td>931.57 ± 314.49</td>
<td>1683.12 ± 395.89</td>
<td>7.598</td>
<td>0.004</td>
</tr>
<tr>
<td>3 d</td>
<td>713.15 ± 306.34</td>
<td>764.37 ± 236.75</td>
<td>0.787</td>
<td>0.454</td>
</tr>
</tbody>
</table>

Results

Treatment effect

Of 35 cases, 16 cases received treatment by ileus tube and 1 case failed. This case was transferred to other surgery and showed postoperative intestinal leakage. However, the case was finally transferred to other hospital after several surgeries that failed to improve the conditions. Among 19 cases receiving conventional gastric tube decompression, 3 cases failed, and 2 of them showed intestinal fistula after secondary surgery. These 2 cases were improved after conservative treatment. Abdominal closure was performed for the remaining 1 case without surgery. For this case, conservation treatment was adopted and the case was finally cured. See Table 4.

Comparison of measurement data

Changes of abdominal circumference in cases of the two groups at 24 h after GI decompression: The abdominal circumference decreased much more significantly in IM groups. See Table 5. Those who accepted transnasal ileus tube treatment had an obvious change of abdominal circumference.

GI decompression amount in two groups: GI decompression amount increased considerably at 1 day and 2 day after surgery, and the differences were of statistical significance compared with WM group. IM group showed no significant difference in GI decompression amount at 3 day after surgery. See Table 6.

The cases in IM group had a much shorter time to the recovery of bowel sounds, relief of obstruction and removal of obstruction compared with WM group, and the differences were of statistical significance. See Table 7.

Pathological changes in EPII overall observation: ① Extensive abdominal adhesion which was difficult to separate; ② Inflammatory edema and thickening of bowel wall; ③ A large number of filamentous substances found during the separation of adhesion. Under the microscope: submucosal edema and mucosal thickening of small bowels with fibrous tissue proliferation and inflammatory cell infiltration.

Discussion

For those with poor effect of GI decompression, transnasal ileus tube was inserted to the small bowels for decompression. The GI decompression amount and changes of abdominal circumference before and after decompression were observed. The results showed that the drainage amount was obviously higher using transnasal ileus tube than that using ordinary gastric tube. The changes of abdominal circumference...
were more conspicuous and could be observed by naked eyes. The small bowels proximal to obstruction were effectively decompressed with the ileus tube directly reaching the lesion. Moreover, the effusion in the bowels was quickly drained through the ileus tube, which shortened the time to alleviation and to bowel sound restoration. The findings prove that ileus tube is an effective method for decompression and the treatment for EPII.

Ileus tube needs to be further improved in the following aspects: (1) Ileus tube is designed with two balloons. The balloon at the front prevents the backflow of fluid, and the side holes at the proximal and distal end of the balloon absorb fluid from the small bowels proximal to obstruction. The balloon at the back has no side holes, and it is intended to prevent the backflow of the contrast agent; (2) The ileus tube also has an air supplement device, which is a capillary tube located on the inner wall of the suction tube. As the suction proceeds at negative pressure, a small amount of air will constantly enter the intestinal lumen. Meanwhile, a too large negative pressure is prevented in the small bowels, and the tube will not be attached to the wall [29].

In addition, the ileus tube cannot only achieve decompression, but also selective enterography along with the administration of EN and Dachengqi Decoction.

After full decompression, selective angiographic examination of GI can be performed. The balloon at the back is expanded by air to reach the size comparable to the inner diameter of the small bowel. The backflow of the contrast agent Urografin is prevented by the expanded balloon so that the contrast agent only goes into the distal small bowels. The localized high concentration of the contrast agent makes it easier to observe the morphology and movement of the bowels and the changes of the intestinal lumen.

Table 7. Time to recovery of bowel sounds, relief of obstruction and removal of obstruction in the two groups (d)

<table>
<thead>
<tr>
<th></th>
<th>WM group</th>
<th>IM group</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to recovery of bowel sounds</td>
<td>3.37 ± 1.28</td>
<td>2.34 ± 0.71</td>
<td>3.23</td>
<td>0.028</td>
</tr>
<tr>
<td>Time to relief of obstruction</td>
<td>3.82 ± 1.45</td>
<td>3.05 ± 1.01</td>
<td>3.14</td>
<td>0.030</td>
</tr>
<tr>
<td>Time to removal of obstruction</td>
<td>12.89 ± 7.25</td>
<td>8.07 ± 2.89</td>
<td>2.89</td>
<td>0.047</td>
</tr>
</tbody>
</table>

The hyperosmolar contrast agent Urografin can help relieve the bowel wall edema. The patients may have thin, watery stool within 24 hours after angiographic examination, indicating the normal movement of bowels. The drugs increasing GI motility can be given via the ileus tube, for example, EN and Dachengqi Decoction in this study. Thus ileus tube can be used for other treatment purposes besides decompression.

We have demonstrated the value of ileus tube in the diagnosis and further treatment of EPII. According to literature, the ileus tube is most suitable for simple adhesive bowel obstruction, especially EPII [30]. We believe that bowel wall edema and exudation in EPII are exactly the indications of decompression using ileus tube. With an innovative and practical design, ileus tube brings new solution for non-surgical treatment and diagnosis of EPII.

Doctors of traditional Chinese medicine believe that EPII is caused by the blockage of qi flow in the bowels and viscera, to which the method of dispelling interior pathogenic factors and purgation applies. The time to achieve the alleviation of bowel obstruction was obviously shortened in those treated by Dachengqi Decoction. We propose the action mechanism as follows: (1) Enhancing and regulating GI movement; (2) Killing and deactivating the endotoxins in GI tract; (3) Maintaining the normal functions of “intestinal barrier” and the important organs such as liver, kidney and lung; (4) Synergistic with western medicines as blood-activating and stasis-resolving medicine; (5) Reducing the over-production of cytokines and hence preventing excessive immune response; (6) Improving micro-circulation and increasing blood flow.

EPII can be effectively treated by modern medicine, and traditional Chinese medicine also has much to offer. The cases in our study were further treated by Dachengqi Decoction and EN in small quantity after decompression using ileus tube, and the curative effect was satisfactory. However, the sample size was small, and there was a lack of detailed observation and an indicator system for curative effect evaluation in our retrospective study. In the future, prospective trials can be performed for an objective
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Disclosure of conflict of interest

None.

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References

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