A Comparative Study of Two Types of Cryptic Scar Surgery for Congenital Hypertrophic Pyloric Stenosis: Tranumbilical Two-Port Laparoscopic Pyloromyotomy and Trans-Umbilical Ring Incision Open Pyloromyotomy

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Abstract

Objective: To evaluate the advantages and disadvantages of Tranumbilical two-port laparoscopic pyloromyotomy and tranumbilical ring incision open pyloromyotomy Methods A series of 109 cases from January 2012 to June 2018 were retrospectively analyzed. About 57 cases were treated with the method of tranumbilical two-port laparoscopic pyloromyotomy and 52 cases were treated with tranumbilical ring incision open pyloromyotomy. There was no difference in the time of duration of illness, body weight and age between the two groups. The operation time, blood loss, postoperative feeding time, postoperative cosmetic effect and complications between the two groups were recorded.

Results: The cosmetic effect of the two groups was nice, but the operation time and postoperative recovery time of the tranumbilical ring incision open pyloromyotomy group were longer than that of Tranumbilical two-port laparoscopic pyloromyotomy group.

Conclusion: Both of them have very hidden scars, and the Tranumbilical two-port laparoscopic pyloromyotomy only requires two holes through the umbilical to complete the laparoscopic pyloromyotomy, with less surgery time, barely visible trauma, the postoperative recovery is fast, it is worth promoting.

Keywords: Laparoscopy; Umbilicus; Hypertrophic pyloric stenosis; Therapy

Introduction

Congenital hypertrophic pyloric stenosis is a common disease in small infants. At present, the main methods of pyloromyotomy reported are as follows: laparoscopic pyloromyotomy, trans-umbilical ring incision open pyloromyotomy [1,2]. Tranumbilical two-port laparoscopic pyloromyotomy and trans-umbilical ring incision open pyloromyotomy can achieve almost no scar aesthetic effect. We've done both procedures in recent years. We find tranumbilical two-port laparoscopic pyloromyotomy has greater benefits, and the report is as follows:

Materials and Methods

Materials

We retrospectively analyzed a series of 109 cases of children with congenital hypertrophic pyloric stenosis treated by the same surgeon from January 2012 to June 2018. According to the surgical method, the patients were divided into two groups, tranumbilical Two-Port Laparoscopic Pyloromyotomy (TTLP) and Trans-Umbilical Ring Incision Open Pyloromyotomy (TROP). Inclusion criteria: preoperative pyloric muscle thickening was suggested according to the children’s non-biliary vomiting and ultrasonic pylorus muscle thickness ≥ 4.0 mm and upper gastrointestinal angiography were clearly diagnosed by pylorus obstruction or visible linear sign and beak sign. Routine preoperative intravenous nutrition, gastric lavage and other treatments. Exclusion criteria: there were 1 case of obvious infection of umbilical cord swelling, 2 cases of poor nutritional status and could not tolerate pneumoperitoneum, and 6 cases of children with combined inguinal hernia and umbilical hernia that added operation time, 9 cases were excluded in total. All other children diagnosed with congenital hypertrophic pyloric stenosis in the series were included in the study. All children were given routine preoperative fluid rehydration, electrolyte correction, gastric lavage,
gastrointestinal decompression and other treatments, and those infected with the disease should be treated with antibiotics. Among them, 52 cases were in the TROP group, including 45 males and 7 females. About 57 children were in the TTLP group, including 52 males and 5 females. There was no difference in age, weight, duration of illness and sex ratio between the two groups. We followed these children up to 3 months after surgery.

Surgical methods

Surgical methods were divided into two groups: 1) TTLP group: A 0.5 cm incision was made in a transverse direction along 3 o’clock, umbilical tissue was separated, a laparoscopy was placed and suture fixation were performed to establish pneumoperitoneum, and the pneumoperitoneum pressure was 8 mmHg. Another Trocar was inserted along the direction of the skin folds at 10 o’clock of the umbilical ring. Grasping forceps were inserted through the Trocar, and the transverse colon was pushed down and the stomach body was pulled up and left to expose the pylorus. Place a gauze strip on the right side of the pylorus to separate the pylorus from the liver and gallbladder while helping to expose the pylorus. The serous membrane and muscular layer of the pylorus were cut open in the region without the anterior pyloric blood vessels by hook, and then the pyloric separation forceps were used to separate the pyloric muscle, so that the mucosa was extruded. The pyloric pyloromyotomy was completed, and the gauze was taken out from abdominal cavity after homeostasis with pressed. Suture abdominal Trocar hole fascia layer, The skin is glued together with a bio-adhesive. 2) TROP group: The right upper part of the umbilical ring was made arc-shaped incision along the umbilical plica, and each layer of the abdominal wall was cut layer by layer, and the peritoneum was cut into the abdomen. The gastric antrum and the pylorus were put forward with oval forceps, and the blood vessels were electro coagulated. After the pylorus muscle is cut open, homeostasis is performed, the pylorus and stomach are incorporated into the abdomen, and the umbilical arc incision is closed.

After surgery, the children were routinely given intravenous nutrition, and were given drinking water 6 hours after surgery.
Congenital hypertrophic pyloric stenosis is a common disease in pediatric surgery with a morbidity of 20.09 (95% CI=19.87, 20.32) per 10,000 live births [3]. Pyloromyotomy is the main treatment of the disease, the effect is positive. TROP is a kind of cosmetic open surgery for this disease [4]. Compared with the traditional surgical method, it has the advantages of less tissue damage, small incision, and no need to establish pneumoperitoneum [4,5]. However, some authors reported that compared with laparoscopic pyloromyotomy, postoperative recovery of intestinal function was slower, and complications of open pyloromyotomy were higher, which were mainly related to postoperative intestinal paralysis and incomplete navel disinfection [6]. Our statistical data showed that compared with the two groups of laparoscopic surgery, the operative time of the two groups was prolonged instead, and the time to adequate feeding was prolonged after the operation, which caused prolonged hospital stay which was significantly different between the two groups. The reason for our analysis was that although the incision through the umbilical cord was small, it was still a kind of open surgery, and the postoperative recovery of intestinal function was slow. Although the pyloric Pyloromyotomy for open surgery is easy to grasp the muscle and there is no cases of mucosal damage, it is sometimes difficult to operate in the process of presenting the pylorus and the gastric antrum, and sometimes the intermediate lengthening incision is needed, and the incision time of suture after the pylorus is also longer, so the total operation time is prolonged. However, for some basic medical units with poor surgical instruments and anesthesia skills, the TROP can also achieve the aesthetic effect of the incision [2].

It has been reported in the past that laparoscopic pyloromyotomy has definite advantages in postoperative recovery, trauma and aesthetics compared with traditional surgery [1,7,8]. We also find that the TTLP has benefits in short hospital stay and in adequate feeding. At present, the mainstream methods of laparoscopic pylorotomy are as follows: 1. Three-hole method: Place the laparoscope through the umbilical, and use two holes on the left and right sides of a forceps to assist fixation, another forceps pylorotomy and separation. This method is simple to operate, suitable for beginners, but the abdomen in addition to the umbilical cord there are two incision, the wounds are still larger. 2. Two hole laparoscopic pyloromyotomy: This method does not need to fix the pylorus, but has the advantages of one Trocar and less trauma. However, certain experience is required for the operation [9]. After learning, the operation time and effect are similar to that of the three-hole method, but the aesthetic effect is better than the three-hole laparoscopic pyloromyotomy. 3. Transumbilical two-hole and three-hole method or through the umbilical single hole laparoscopy [10-11]. The procedure works well, but the umbilical cord has three trocars or one or two Trocar free channels. When homeostasis is needed to deal and to change instruments for other reasons, it is inconvenient. At the same time, three holes need to be made in the umbilical cord, which increases the operation steps and trauma. Some single - hole laparoscopy through the umbilical requires special equipment, multi - cavity access equipment is often larger for small infants, especially newborns to the incision is also large, is not applicable. Due to the shortcomings of the above surgical methods, we adopted the method of placing an observation hole inside the umbilicus and an operation hole through the umbilical ring. We do the exposure of the pylorus, electrotomy, and homeostasis through the operating hole is more convenient than trocar-free methods and reduces the trauma of one incision. The surgery is currently being reported with little experience. Our experience is as follows. 1. After anesthesia, appropriate intraperitoneal massage of the pylorus can help expose the pylorus muscle. 2. Make rational

### Results

All the 107 cases were successfully cured, and none of them was transferred to open laparotomy in TTLP. In 1 case, the pylorus was in a hook shape and could not be completely exposed. In order to avoid incomplete incision, a Trocar was added to complete the operation. The operation time of the TTLP group and the TROP group was 36.4 ± 10.1 min and 40.8 ± 10.0 min respectively. The operation time of the TROP group and the time to achieve adequate feeding were longer than that of the TTLP group. One child with single umbilical incision presented subcutaneous emphysema and was absorbed 2 days after the operation. Postoperative wound infection was found in 2 cases in TROP. No case of incomplete incision was found. Postoperative, we were followed up to three months after surgery. They were all symptom-free, and their growth and development increased rapidly to normal levels. The postoperative scars were not obvious in the two groups, and the postoperative aesthetic effect was better in the TTLP group (Figure 5,6).

### Discussion

<p>| Table 1: Comparison of clinical data among the two groups. |</p>
<table>
<thead>
<tr>
<th>TTLP group (n=57)</th>
<th>TROP (n=52)</th>
<th>T/χ²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.72 ± 0.82</td>
<td>3.72 ± 0.80</td>
<td>-0.037</td>
</tr>
<tr>
<td>Age</td>
<td>37.46 ± 20.78</td>
<td>43.38 ± 20.6</td>
<td>-1.241</td>
</tr>
<tr>
<td>Duration of illness</td>
<td>14.81 ± 12.3</td>
<td>16.46 ± 13.75</td>
<td>-0.663</td>
</tr>
<tr>
<td>The operation time</td>
<td>31.64 ± 9.5</td>
<td>43.24 ± 16.98</td>
<td>-3.747</td>
</tr>
<tr>
<td>The bleeding</td>
<td>1.54 ± 0.9</td>
<td>1.86 ± 1.46</td>
<td>-1.344</td>
</tr>
<tr>
<td>Hospital stay</td>
<td>6.23 ± 1.56</td>
<td>6.94 ± 1.87</td>
<td>-2.171</td>
</tr>
<tr>
<td>Adequate feeding time</td>
<td>1.89 ± 0.58</td>
<td>2.1 ± 0.48</td>
<td>-2.308</td>
</tr>
<tr>
<td>Gender(m/m/f/f)</td>
<td>52/5</td>
<td>45/7</td>
<td>0.61</td>
</tr>
<tr>
<td>Transit or complications (no/yes)</td>
<td>55/2</td>
<td>50/2</td>
<td>0.009</td>
</tr>
</tbody>
</table>

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use of the characteristics of the baby's umbilical cord, and place the laparoscopy in the incision of transverse incision of the umbilical cord to avoid instrument interference and avoid the natural pipeline of the newborn's umbilical cord, which is safer. Laparoscope placed in the lower left. Operating instruments were placed 10 points to the right of the umbilical ring, and the two trocars were generally about 0.5 cm to 1 cm apart. There was no or little collision between ordinary laparoscopic instruments and laparoscopic trocars. Put the Fiber optic cable of the 30° laparoscope toward the assistant side, can reduce the interference of laparoscope and operating equipment. 3. The placement of gauze strips helps to avoid the accidental injury of the liver and gallbladder by electric knife, and also helps to prevent the pylorus from shrinking under the liver, which is convenient for homeostasis after incision. 4. Electrical knife cut to fully, as well as a wide range, depth and appropriate, shallow will lead to a difficult separation of muscle, too deep can cause mucosa perforation, then you can refer to digital ultrasonic pylorus muscle thickness, generally between pylorus muscle can be slightly deep, time is short cut muscle for many times, don’t to do it at one time in the same place. It is useful to rotate the electric hook to feel the pylorus muscle strength. Once the muscles weaken, you can try to use pyloric pliers to separate muscle softly at the begin, then separate muscle thoroughly can prevent the mucous membrane. It is important to choose cut avascular area. Our experience suggests that the difficulty in separation is often caused by the position of the electric hook incision too close to the greater curvature of the pyloric muscle. The duodenal end is indeed exposed and difficult to be separated. The y-shaped incision on the side of the duodenal end can be used. 5. When muscle is separated pyloric separation forces should go deep into the muscle, and the pyloric separation forces with anti-slip stripes on the outside should be used to close the muscle below the incision to facilitate the separation. 6. For children with too small umbilical cord, 4-point tranumbilical loop folds and 10-point operation holes can be used to achieve a similar effect. 7. As the two trocars are close to each other, air leakage cause pneumoperitoneum pressure may be low during the operation. Therefore, low pneumoperitoneum pressure and high flow should be used to maintain the pneumoperitoneum pressure and better exposure.

**Conclusion**

It is feasible to perform trans-umbilical laparoscopic pyloromyotomy. Compared with TROP, this surgery also achieves the effect of cryptic scar surgery and is even more beautiful, which is worthy of promotion. Through TROP, although the postoperative scar endoscopic surgery is performed, the postoperative recovery is slower and the operation time is a little longer, which can be used as an alternative surgical method that cannot be carried out laparoscopic surgery.

**References**