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SURGICAL COMPLICATIONS FOLLOWING PULL-THROUGH FOR HIRSCHSPRUNG'S DISEASE: A RETROSPECTIVE SINGLE-CENTER COHORT STUDY

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Hirşprunq xəstəliyinin minimal invaziv cərrahi müalicəsindən sonra yaranan fəsadlar: retrospektiv tək mərkəzli kohort tədqiqatı
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Xülasə. Uşaqlarda Hirşprunq xəstəliyinin minimal invaziv cərrahi müalicə üsulları: transanal endorektal endirilmə (TERPT) və laparoskopik köməklə transanal endorektal endirilmə (L-TERPT) son illərdə geniş tətbiq olunmaqdadır. Ənənəvi açıq cərrahi müalicə üsulları ilə müqayisədə az travmatik olması, əməliyyat müddətində qan itirmənin az olması, əməliyyatdan sonrakı dövrdə ağrıkəsicilərə daha az ehtiyac duyulması, çarpayı günlərinin az olması, daha yaxşı kosmetik nəticə və reabilitasiya müddətinin azalması minimal invaziv cərrahi müalicə üsullarının üstünlükləridir. Bununla belə, minimal invaziv cərrahi əməliyyatlardan sonra mümkün fəsadların ətraflı araşdırılması, gələcəkdə fəsadların qarşısının alınması və daha yaxşı nəticələrin əldə olunması baxımından xüsusilə əhəmiyyətlidir.

Açar sözlər: Hirşprunq xəstəliyi, minimal invaziv cərrahiyyə, transanal endorektal endirilmə, laparoskopik transanal endorektal endirilmə.

Хирургические осложнения после минимально инвазивного хирургического лечения при болезни Гиршпрунга: ретроспективное одноцентровое когортное исследование
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Резюме. Миниḿально инвазивные методы хирургического лечения болезни Гиршпрунга у детей — трансанáльное эндоректальное низведение (TERPT) и лапароскопически ассистированное трансанáльное эндоректальное низведение (L-TERPT) — в последние годы получили широкое распространение. По сравнению с традиционными открытыми хирургическими методами, минимально инвазивные вмешательства характеризуются меньшей травматичностью, снижением интраоперационной кровопотери, меньшей потребностью в анальгетиках в послеоперационном периоде, сокращением продолжительности госпитализации, более выраженным косметическим эффектом и ускоренной реабилитацией. Вместе с тем, детальное изучение возможных осложнений после минимально инвазивных хирургических вмешательств имеет особую значимость с точки зрения профилактики осложнений в будущем и достижения более благоприятных клинических результатов.

Ключевые слова: болезнь Гиршпрунга, минимально инвазивная хирургия, трансанáльное эндоректальное низведение, лапароскопически ассистированное трансанáльное эндоректальное низведение.

Keywords: *Hirschsprung's disease, pull-through surgery, transanal endorectal pull-through, laparoscopic-assisted transanal endorectal pull-through*

Introduction. Hirschsprung's disease (HD) is a rare congenital enteric neuropathy characterized by the absence of parasympathetic ganglion cells within the submucosal (Meissner), deep submucosal (Henle), and myenteric (Auerbach) plexuses of the distal intestine. This developmental defect results in functional intestinal obstruction and most commonly manifests as chronic constipation [1,2].

In neonates, HD typically presents with delayed passage of meconium, abdominal distension, and bilious vomiting. During infancy and early childhood, clinical features include persistent constipation, inability to defecate spontaneously without supportive measures (such as rectal stimulation or cleansing enemas), abdominal distension, recurrent episodes of Hirschsprung-associated enterocolitis (HAEC), and impai-red somatic growth [1–3]. Based on the length of the aganglionic segment, HD is classified into short-segment disease, long-segment disease, total colonic aganglionosis, and the rare form of total intestinal aganglionosis [3].

Delayed diagnosis may result in postponement of definitive surgical treatment, leading to progressive proximal colonic dilatation and increasing morbidity in the developing child.

Surgical correction remains the cornerstone of HD management. In addition to traditional open procedures, minimally invasive techniques—most notably transanal endorectal pull-through (TERPT) and laparoscopic-assisted transanal endorectal pull-through (L-TERPT)—have gained widespread acceptance [5]. Compared with open surgery, minimally invasive approaches are associated with reduced surgical trauma, decreased intraoperative blood loss, lower postoperative analgesic requirements, shorter hospital stay, improved cosmetic outcomes, and faster recovery [1,6].

TERPT is generally considered appropriate for short-segment HD, particularly in children younger than three years of age [9,10]. In contrast, L-TERPT can be applied to both short- and long-segment disease and is suitable across all pediatric age groups. Importantly, the laparoscopic component allows intraoperative colonic biopsies, enabling precise identification of the transition zone [5,7,8].

The primary aim of this study was to compare postoperative outcomes and complications following TERPT and L-TERPT in children with Hirschsprung's disease.

Materials and research methods. This retrospective cohort study included children with short-segment Hirschsprung's disease who underwent minimally invasive surgical treatment at the Department of Pediatric Surgery, Educational-Surgical Clinic of Azerbaijan Medical University, between 2014 and 2025. A total of 72 patients met the inclusion criteria. Patients with a preexisting protective stoma were excluded from the analysis.

Patients were stratified into two groups according to the surgical approach: transanal endorectal pull-through (TERPT; $n = 30$) and laparoscopic-assisted transanal endorectal pull-through (L-TERPT; $n = 42$).

The study population comprised 43 males and 29 females, ranging in age from 2 months to 14 years. Patients in the TERPT group were younger (2 months to 3 years), whereas those in the L-TERPT group ranged from 2 months to 14 years. A family history of HD was identified in three patients, parental consanguinity in four patients, one patient had Mowat–Wilson syndrome, and one patient was under follow-up for acute leukemia in hematological remission.

Preoperative evaluation included abdominal radiography, abdominal ultrasonography, contrast enema, and routine laboratory investigations. In cases with inconclusive contrast enema findings ($n = 20$), the diagnosis was confirmed by full-thickness rectal biopsy.

Preoperative Hirschsprung-associated enterocolitis was diagnosed in 12 patients (40%) in the TERPT group and in 8 patients (19%) in the L-TERPT group ($p = 0.05$). All patients received standardized preoperative management, including metronidazole therapy, synbiotics, and bowel irrigation according to institutional protocol.

Primary outcome measures included operative time, estimated intraoperative blood loss, postoperative analgesic requirements, time to first bowel movement, time to initiation of oral feeding, and length of postoperative hospital stay.

Research results: The mean operative time was significantly shorter in the TERPT group (115 ± 17 minutes) compared with the L-TERPT group (143 ± 18 minutes). Estimated intraoperative blood loss was comparable between groups, ranging from 30 to 50 mL.

Postoperative analgesic requirements were lower in the L-TERPT group, with analgesia required for 1–3 days, compared with 2–4 days in the TERPT group. The mean length of postoperative hospital stay was 12.3 days for patients undergoing TERPT and 11 days for those undergoing L-TERPT. The first postoperative bowel movement occurred within 1–3 days in both groups, and oral feeding was initiated within 2–4 days. One L-TERPT procedure required conversion to open surgery due to technical difficulties.

Early postoperative complications (≤30 days) included pelvic abscess and anastomotic leakage (Table 1). In the TERPT group, both complications occurred in two patients each (6.7%), whereas in the L-TERPT group, each complication occurred in one patient (2.4%). These differences were not statistically significant ($p = 0.370$). Reoperation was required in three patients with pelvic abscesses. Among patients with anastomotic leakage, two required surgical intervention, while one was managed conservatively.

Late postoperative complications (>30 days) included anastomotic stricture in one patient (3.3%) in the TERPT group, which required reoperation after failed dilatation. No late complications were observed in the L-TERPT group. No statistically significant differences were identified between the two groups for early or late complications ($p > 0.05$).

Table 1.

Postoperative complications after TERPT and L-TERPT surgeries

Surgical group	Pelvic abscess, n (%)	Anastomotic leakage, n (%)	Anastomotic stricture, n (%)
TERPT (n=30)	2 (6.7%)	2 (6.7%)	1 (3.3%)
L-TERPT (n=42)	1 (2.4%)	1 (2.4%)	0 (0%)
p-value	0.370	0.370	0.233

Values are presented as a number (percentage). Comparisons were performed using Fisher's exact test. A p-value < 0.05 was considered statistically significant.

Postoperative HAEC occurred in 16.7% of patients in the TERPT group and 7.1% of patients in the L-TERPT group ($p = 0.205$). Among patients with preoperative HAEC, recurrence was observed in 10% of TERPT patients and 2.3% of L-TERPT patients. New-onset postoperative HAEC developed in 6.7% of TERPT patients and 4.8% of L-TERPT patients. None of these differences reached statistical significance (all $p = 0.354$).

Table 2.

Preoperative and postoperative Hirschsprung-associated enterocolitis (HAEC)

Surgical group	Preoperative HAEC, n (%)	Postoperative HAEC recurrence, n (%)	New-onset postoperative HAEC, n (%)
TERPT (n=30)	12 (40.0%)	3 (10%)	2 (6.7%)
L-TERPT (n=42)	8 (19.0%)	1 (2.3%)	2 (4.8%)
p-value	0.05	0.354	0.354

Values are presented as a number (percentage of the total group). Comparisons were performed using Fisher's exact test. A p-value < 0.05 was considered statistically significant.

Discussion. In this retrospective cohort study, laparoscopic-assisted transanal endorectal pull-through was associated with a longer operative time compared with transanal endorectal pull-through. This finding likely reflects the additional steps involved in laparoscopic mobilization of the colon and intraoperative histopathological assessment. Despite the longer operative duration, postoperative analgesic requirements were lower in the L-TERPT group, suggesting reduced postoperative discomfort and surgical trauma associated with the laparoscopic approach.

Although postoperative complications were numerically more frequent in the TERPT group, no statistically significant differences were observed between the two techniques. Early complications, including pelvic abscess and anastomotic leakage, occurred in both groups and were successfully managed with either surgical or conservative treatment. Late complications were rare and were observed only in the TERPT group. Overall, these findings suggest that both approaches are safe and effective when applied to appropriately selected patients.

Preoperative HAEC was more common in the TERPT group, which may be attributable to the younger age of patients and their increased susceptibility to inflammatory complications. Postoperative HAEC-both recurrent and de novo-also occurred more frequently following TERPT, although these differences did not reach statistical significance. These observations underscore the importance of meticulous perioperative management, particularly in younger children undergoing transanal procedures.

The limitations of this study include its retrospective design, single-center setting, and relatively small sample size, which may limit statistical power and generalizability. Nevertheless, the findings provide valuable comparative data on two widely used minimally invasive techniques for HD.

Surgical approach selection should therefore be individualized, taking into account patient age, disease extent, and preoperative clinical status. L-TERPT may offer particular advantages in older children or in cases requiring precise intraoperative identification of the transition zone, whereas TERPT remains an effective minimally invasive option for younger patients with short-segment disease. Standardized diagnostic and perioperative protocols, especially those aimed at preventing HAEC, are essential for optimizing outcomes. Future prospective multicenter studies are warranted to refine patient selection criteria and further improve surgical management strategies for Hirschsprung's disease.

LITERATURE:

1. Munnangi, P., Sayed Mushir Ali, A., Deva, S., Kushwaha, V., Srivastava, S., Boini, A., Agarwal, R. S., Dinkar, P. K., & Chaudhary, E. (2023). Post-surgical Outcomes of Different Surgical Techniques in Hirschsprung's Disease: A Literature Review. *Cureus*, *15*(10), e47012.https://doi.org/10.7759/cureus.47012.

2. Ghavami Adel, M., Ashjaei, B., Sinafar, S., Maghbouli, L., Parizad, J., Gharib, B., & Khosravi, R. (2018). Evaluation of the effect of one-stage transanal endorectal pull-through (TERPT) technique on defecation in patients with Hirschsprung's Disease over the last 10 years in Tehran Pediatrics Medical Center. *Iranian Journal of Pediatric Surgery*, *3*(2), 87–93.https://doi.org/10.22037/irjps.v3i2.19381.

3. Puri P. (1997). Variant Hirschsprung's disease. *Journal of Pediatric Surgery*, *32*(2), 149–157. https://doi.org/10.1016/s0022-3468(97)90170-6.

4. Oshiba, Ahmed, Ayub, I. Safiyo, Khairi, A. Gabr, & Abouheba, M. Abdelazim. (2024). Management of Hirschsprung's Associated Enterocolitis as a Post-Operative Complication: Single-Center Experience: Management of Hirschsprung's Associated Enterocolitis as a Post-Operative Complication: Single-Center Experience. *Iranian Journal of Pediatric Surgery*, *10*(2), 179–192. https://doi.org/10.22037/ irjps. v10i2. 45743.

5. Cantone, N., Catania, V. D., Zulli, A., Thomas, E., Severi, E., Francesca, T., Nicola, C., Enrico, C., Bruno, N., Michele, L., Tommaso, G., & Mario, L. (2023). Comparison between two minimally invasive techniques for Hirschsprung disease: transanal endorectal pull-through (TERPT) versus laparoscopic-TERPT. *Pediatric Surgery International*, *39*(1), 198.https://doi.org/10.1007/s00383-023-05473-3.

6. Gosemann, J. H., Friedmacher, F., Ure, B., & Lacher, M. (2013). Open versus transanal pull-through for Hirschsprung disease: a systematic review of long-term outcome. *European journal of pediatric surgery: official journal of Austrian Association of Pediatric Surgery.[et al] = Zeitschrift fur Kinderchirurgie*, *23*(2), 94–102.https://doi.org/10.1055/s-0033-1343085.

7. Langer, J. C., Seifert, M., & Minkes, R. K. (2000). One-stage Soave pull-through for Hirschsprung's disease: a comparison of the transanal and open approaches. *Journal of Pediatric Surgery*, *35*(6), 820–822. https://doi.org/10.1053/jpsu.2000.6849.

8. Karlsen, R. A., Hoel, A. T., Fosby, M. V., Ertresvåg, K., Austrheim, A. I., Stensrud, K. J., & Bjørnland, K. (2022). Comparison of clinical outcomes after total transanal and laparoscopic-assisted endorectal pull-through in patients with rectosigmoid Hirschsprung disease. *Journal of Pediatric Surgery*, *57*(9), 69–74. https://doi.org/10.1016/jpedsurg.2022.01.011.

9. Sholadoye, T. T., Ogunsua, O. O., Alfa, Y., Mshelbwala, P. M., & Ameh, E. A. (2024). Outcome of Transanal Endorectal Pull-Through in Patients with Hirschsprung's Disease. African journal of paediatric surgery: AJPS, 21(1), 1–5. https://doi.org/10.4103/ajps.ajps_93_22.

10. Almadhoun, M. K. I. K., Morcos, R. K. A., Alsadoun, L., Bokhari, S. F. H., Ahmed, Z., Khilji, F., Hasan, A. H., Bakht, D., Abuelgasim, O., & Altayb Ismail, M. A. (2024). Minimally Invasive Surgery for Hirschsprung Disease: Current Practices and Future Directions. *Cureus*, *16*(8), e66444. https://doi.org/10.7759/cureus.66444.