

The Use of Mechanical Suture in the Treatment of Hirschsprung's Disease: Experience of 17 Cases

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Rezumat

Folosirea suturii mecanice în tratamentul bolii Hirschsprung - o experiență de 17 cazuri

Introducere: Boala Hirschsprung sau megacolonul congenital este o malformație caracterizată prin absența celulelor ganglionare la nivelul intestinului distal. Zona de aganglioneză cuprinde cel mai frecvent rectul și o parte din sigmoid, dar ea se poate întinde pe lungimi variabile. În ultimii ani tratamentul chirurgical al acestei afecțiuni s-a îmbunătățit semnificativ, atât prin introducerea procedurii de coborare a colonului pe cale perineală transanală, asistat sau nu laparoscopic, cât și prin dezvoltarea tehnicilor de sutura mecanică.

Scop: Lucrarea își propune să analizeze rezultatele noastre cu procedeul Duhamel modificat, folosind sutura mecanică pentru realizarea anastomozelor colo-rectale latero-laterale.

Materiale și metode: Au fost analizate 17 cazuri de megacolon congenital operate în departamentul nostru între anii 2007 și 2011 de către aceeași echipă de chirurgi pediatri, utilizând tehnica Duhamel modificată prin folosirea suturii mecanice. Este prima serie operată în țara noastră prin acest procedeu. 2 pacienți au avut forma întinsă de aganglioneză colonică, 2 au prezentat segment aganglionotic scurt, iar 13 pacienți au avut forma comună a bolii. Am urmărit detaliile tehnice, perioada de spitalizare, precum și complicațiile imediate și cele la distanță.

Rezultate: Perioada medie de spitalizare a fost de 9 zile. Mortalitatea în seria analizată a fost 0. Complicațiile post-

operatorii au constat în: rectoragie minoră (5 cazuri), ocluzie prin bride (1 caz) și sindrom subocluziv determinat de prezența unui sept restant cu dezvoltarea consecutivă de fecalom în ampula rectală (4 cazuri). Toate cazurile operate din această serie au avut în final o continență de materii fecale foarte bună. **Concluzii:** În opinia noastră folosirea dispozitivelor de sutură mecanică în cadrul unui procedeu Duhamel într-o singură etapă este deosebit de benefică, atât în ceea ce privește rata complicațiilor, cât și durata de spitalizare. Această tehnică este sigură, simplă și eficientă.

Cuvinte cheie: boala Hirschsprung, procedeul Duhamel, dispozitive de sutura mecanică

Abstract

Introduction: Hirschsprung's disease, or congenital megacolon, is a malformation characterised by the absence of ganglion cells in the distal bowel. Most often, the aganglionic segment includes the rectosigmoid, but it may extend proximally to variable length. In late years, significant improvements regarding the surgical treatment of Hirschsprung's disease were made, by the introduction of both one-stage transanal endorectal pull-through – laparoscopically assisted or not - and mechanical suture devices

Aim: The purpose of this paper is to analyse our results with modified Duhamel procedure by using mechanical sutures for construction of a side-to-side colo-rectal anastomosis

Materials and Method: We analysed 17 congenital megacolon cases operated in our department between 2007 – 2011 by the same pediatric surgical team, using the modified Duhamel technique performed with mechanical suture. It is the first series operated in our country using this procedure. 2 patients had a long colonic aganglionosis, 2 patients had a short aganglionic segment and 13 patients had the common form

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of the disease. Mainly, we focused on technical details, hospitalization period, and immediate and late complications. **Results:** The mean hospitalization period was of 9 days. Mortality in our series was 0. Postoperative complications consisted in minor bleeding (5 cases), adhesions and mechanical occlusion (1 case), and subocclusive symptoms due to remnant septum with subsequent fecaloma formation in the rectal ampulla (4 cases). All of our operated cases had consequently a very good fecal continence.

Conclusions: We think that usage of mechanical suture devices in a single stage Duhamel procedure is extremely beneficial regarding both complication rate and hospitalisation time. This technique is safe, simple and efficient.

Key words: Hirschsprung's disease, Duhamel procedure, mechanical suture devices

Introduction

Hirschsprung's disease, or colonic aganglionosis, is a malformation characterized by the absence of neural ganglion cells from a portion of the intestinal tract. In the majority of cases (80%), aganglionosis is limited to the rectosigmoid. In 15% of cases, the aganglionic segment extends proximal to the sigmoid colon. In about 5% of patients the entire colon is involved. Extremely rare, aganglionosis also affects the small bowel. Rectal biopsy is the gold standard for the diagnosis of this anomaly (1).

The most commonly used procedures in the treatment of Hirschsprung's disease are retrorectal transanal pull-through (Duhamel) and endorectal pull-through (Soave) (1). Recently, surgical treatment has been considerably improved, mainly because of 2 reasons: the development of single-stage transanal pull-through techniques – laparoscopically assisted or not (2,3) - and also thanks to implementing the usage of both circular and linear mechanical suture instruments (4-7,9-12).

Aim

The purpose of this paper is to evaluate the results obtained with a modified Duhamel procedure, using mechanical suture devices.

Materials and Methods

Between 2007 and 2011, 17 congenital megacolon patients were treated by our surgical team with the modified Duhamel technique, using mechanical suture devices. The procedure was done through an abdomino-perineal approach. The rectum was divided at the level of the peritoneal reflection, and its distal part was closed with interrupted sutures. The aganglionic segment was removed. The retro-rectal space was created from above, as much as

possible. Afterwards, in the perineal stage, a posterior full-thickness incision was made 0.5-1 cm proximal to the dentate line. The retrorectal space creation was completed and then the healthy colon was pulled through a retrorectal transanal way. Its posterolateral wall was sutured to the anocutaneous junction. Then, a gastrointestinal mechanical stapling device was used. In all cases we used an Endo-GIA linear stapler. We preferred 80 mm long cartridges, with 4.8 mm staples. One arm of the stapler was passed into the lumen of the native rectum and the other one into the lumen of the healthy colon and the side-to-side colorectal stapled anastomosis was completed (Fig. 1 A-C).

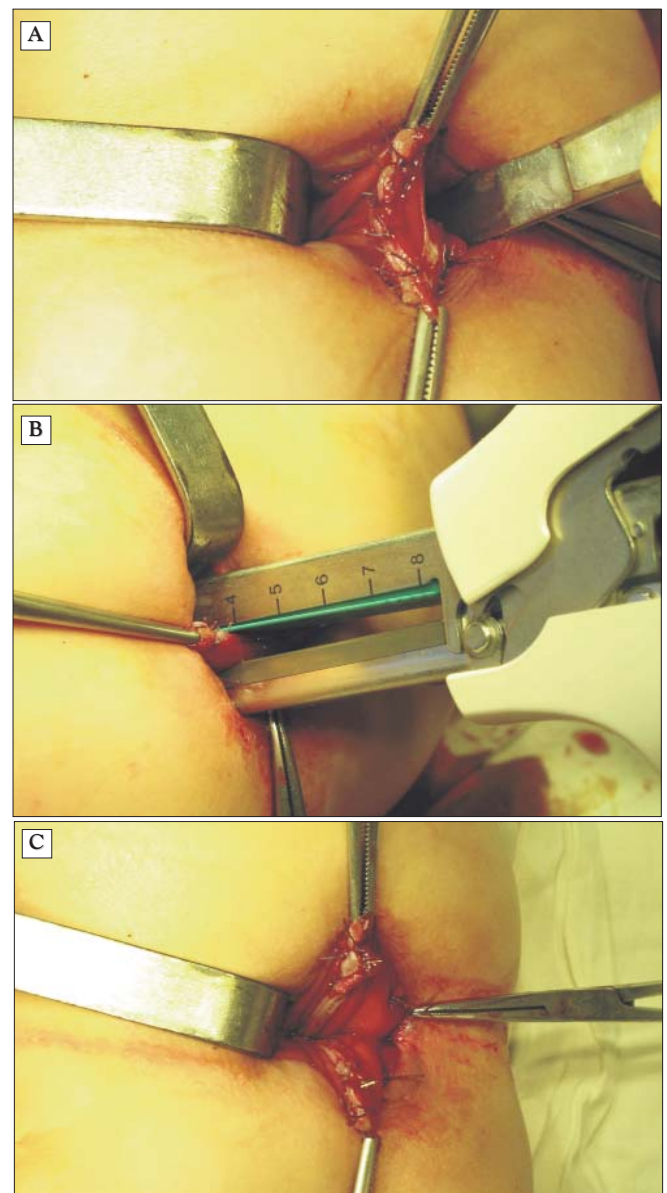


Figure 1. (A) the common wall, represented by the posterior wall of the remnant rectum and the anterior wall of the pulled-through healthy colon, is exposed; (B) One arm of the stapler was passed into the lumen of the native rectum and the other one into the lumen of the healthy colon; (C) the side-to-side colorectal stapled anastomosis was completed

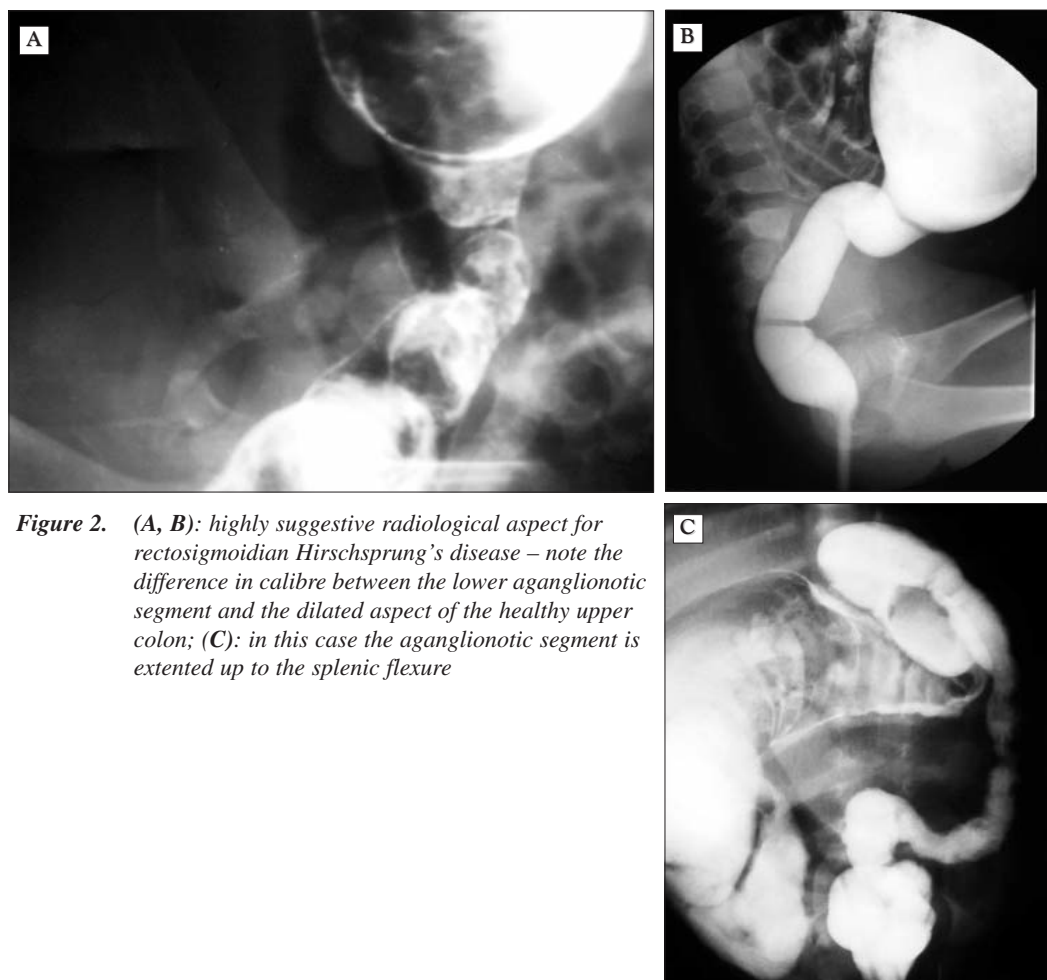


Figure 2. (A, B): highly suggestive radiological aspect for rectosigmoidian Hirschsprung's disease – note the difference in calibre between the lower aganglionic segment and the dilated aspect of the healthy upper colon; (C): in this case the aganglionic segment is extended up to the splenic flexure

It is the first series operated in our country using this procedure. We paid special attention to the diagnosis means, the technical surgical aspects, the evaluation of the period of hospitalization, and also to immediate and late complications.

Results

17 patients were operated using the modified one stage Duhamel pull-through technique using a linear stapler device in order to suppress the septum represented by the posterior rectal wall and the anterior wall of the pulled-through colon.

There were 13 male (76.5%) and 4 female (23.5%) patients. In 8 cases (47%) the patients' status imposed an initial diverting colostomy, performed at the mean age of 4 months (between 19 days - 9 months). Four of these patients suffered an initial colostomy in other medical units. In our series, 13 patients (76.5%) have had the common type of the disease, 2 patients (11.75%) have had a long colonic aganglionic segment and 2 patients (11.75%) have had a short aganglionic segment.

In the majority of cases (12 cases – 70.6%) the diagnosis was highly suggestive by a barium enema (Fig. 2).

In 5 cases, we noted an equivocal radiologic aspect, which imposed a rectal suction biopsy. The rectal suction

biopsy led to the preoperative diagnosis (Fig. 3).

The diagnosis was confirmed postoperatively by the full-thickness histopathological examination in all cases (Fig. 4).

The mean age at the time of the pull-through intervention was 37.6 months (between 3 months - 8 years). 7 patients were less than 1 year old at the time of the procedure.

We didn't encounter any notable intraoperative complications. We experienced a relative difficulty in using the stapler in the case of a 3 month old patient, because of the small diameter of his anal canal.

The mean period of hospitalization was of 9 days. Regarding the immediate postoperative complications we noticed minor rectal bleeding in 5 cases (29.5%), spontaneously stopped on average in 7 days postoperatively. Among the late postoperative complications we encountered 1 case (5.9%) with mechanical occlusion, produced by adhesions (17 months postoperatively), which was successfully operated. Also, in 4 cases (23.5%) we noted the persistency of a remnant septum, which led to fecaloma accumulation in the rectal ampulla, with subsequent subocclusive picture. It is to be mentioned that all those 4 cases appeared in the first 2 years of the analysed period of time. This situation led to a supplementary intervention, represented by applying the classic "duck beak" clamp on the remnant septum, with very

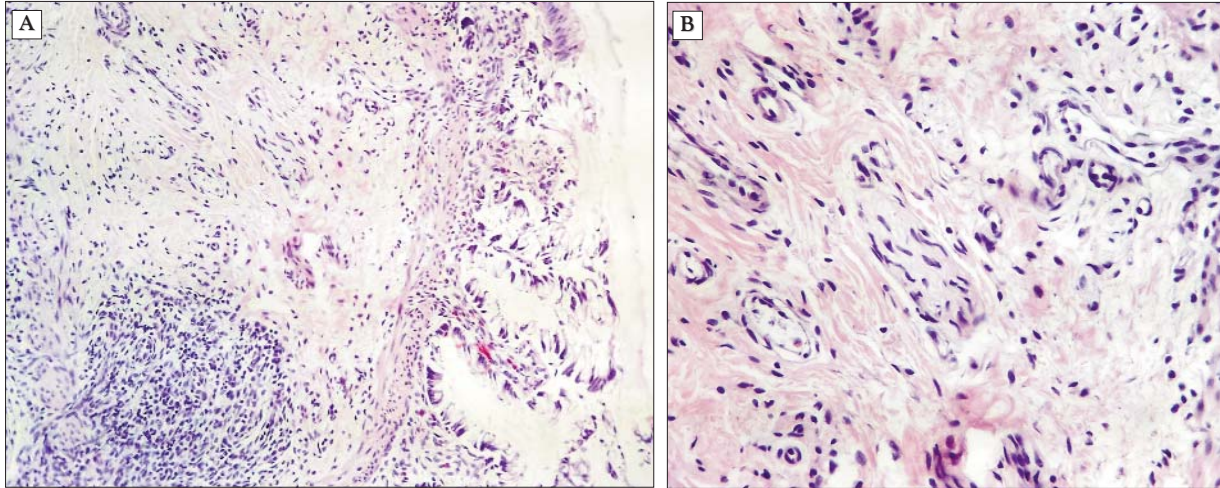


Figure 3. (A): fragment of colonic mucosa and submucosa – note the absence of ganglionic cells from Meissner plexus (hematoxylin and eosin stain, Ob.20X); (B): detail: the absence of ganglionic cells from the submucosal plexus together with nervous fibre hyperplasia (hematoxylin and eosin stain, Ob.40X)

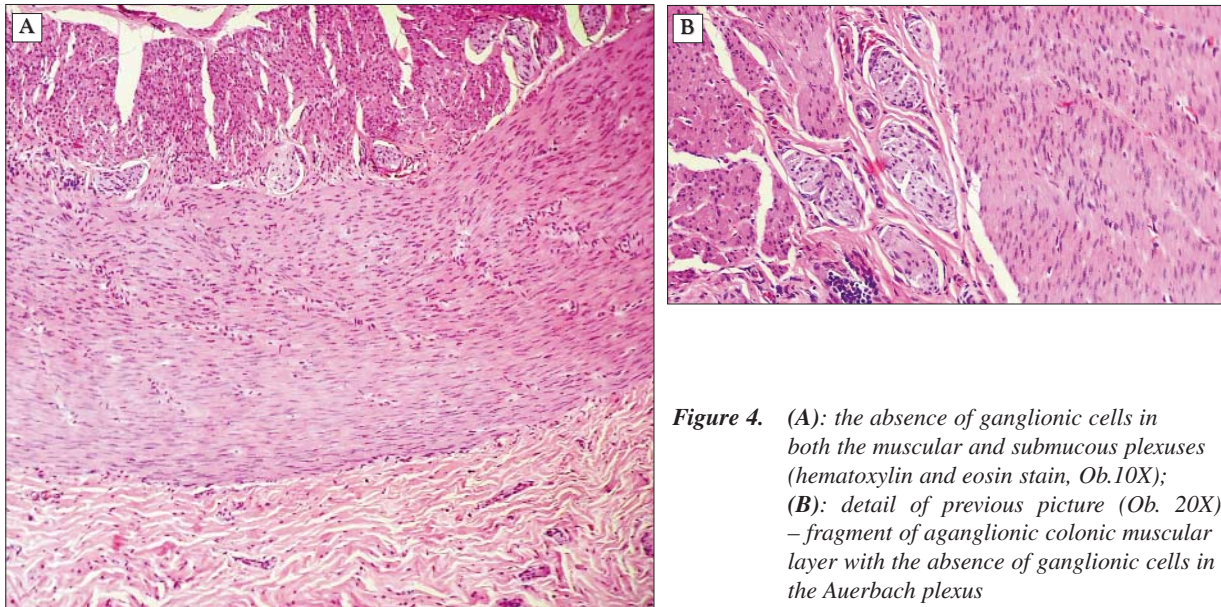


Figure 4. (A): the absence of ganglionic cells in both the muscular and submucous plexuses (hematoxylin and eosin stain, Ob.10X); (B): detail of previous picture (Ob. 20X) – fragment of aganglionic colonic muscular layer with the absence of ganglionic cells in the Auerbach plexus

good final results (Fig. 5).

Among the last 8 consecutive cases in this series we haven't noticed this complication anymore, as a result of the accurate checking of the position of the tip device, by intraabdominal exploration. The continence was excellent in all operated cases.

Discussions. Conclusions

Remarkable improvements were noted in the past years, regarding the precocity of the diagnosis, and also the surgical treatment of Hirschsprung's disease. The common use of rectal suction biopsy technique in newborns experiencing a delay in passage of fecal matter within the first 48 hours of life led to a significant increase of the percentage of cases diagnosed in the

neonatal period. On the other hand, the usage of intra-operative frozen biopsies allowed having a correct evaluation of the aganglionic segment, and performing an earlier surgical intervention (1). In 1960 Duhamel presented his technique designed to cure Hirschsprung's disease, as an improvement to the Swenson procedure. He aimed "to exclude and not to resect the malformed rectum and, also, to avoid all dissection of the pelvis". The healthy proximal colon is brought down through a retrorectal route. The anastomosis between the normal colon and the excluded rectum is performed by applying two Kocher's forceps in a "V" position, and after a few days a longitudinal enterostomy opening between the colon and the rectum is produced (15). Despite the fact that more than 50 years have passed since, this pull-through procedure remains a very good surgical option because of its good standardization, the



Figure 5. (A): the “duck beak” clamp; (B): the clamp applied on the remnant recto-colic septum; (C): necrotized remnant septum spontaneously removed, together with the clamp

possibility of a direct evaluation of the aganglionic segment and the very good long term functional results (1,13). Nevertheless, many modification of this procedure have been made. The majority of them have centered around the elimination of the common wall of the rectum and healthy pulled-through colon (1).

The introduction of mechanical suture devices to the colorectal anastomosis (4-7,14) led to a significant facilitation in division of the common wall, represented by a lower percentage of postoperative complications, shorter hospitalization period, and also the maintaining of the entire healthy colon (8).

From 2007, we started to use mechanical suture devices in single-stage modified Duhamel operation. This technique is well standardised. The complications related to use of a mechanical stapler were represented by rectal bleeding and remnant septum. In all cases rectal bleeding was minor, spontaneously stopping in less than 7 days. We noted the presence of a remnant septum in 23.5% of our cases. Looking in the literature we found that Minford et al (16) reported an incidence of this complication in 6 cases out of 34 patients operated with the same procedure (17.6%), while Fortuna (17) encountered 2 cases of remnant septum from 27 patients (7%). We believe that this relatively high percentage of this complication in our series is the expression of a learning curve. During the last 8 consecutive cases in this series we haven't noticed this complication anymore, as a result of the accurate checking of the position of the tip device. The size of the stapler, compared to the diameter of the anal canal allowed us to easily perform this technique on patients older than 3 months.

We conclude that usage of mechanical suture devices in a single stage Duhamel procedure is safe, simple and economically efficient.

References

- Teitelbaum DH, Coran AG, Weitzman JJ, et al. Hirschsprung's Disease and Related Neuromuscular Disorders of the Intestine. *Pediatric Surgery*, edited by O'Neill et al, fifth ed, Mosby, 1381 – 1420.
- De la Torre-Mondragón L, Ortega-Salgado JA. Transanal endorectal pull-through for Hirschsprung's disease. *J Pediatr Surg.* 1998;33(8):1283-6.
- Georgeson KE, Fuenfer MM, Hardin WD. Primary laparoscopic pull-through for Hirschsprung's disease in infants and children. *J Pediatr Surg.* 1995;30(7):1017-21; discussion 1021-2.
- Steichen FM, Spigland NA, Nunez D. The modified Duhamel operation for Hirschsprung's disease performed entirely with mechanical sutures. *J Pediatr Surg.* 1987;22(5):436-8.
- Samuel M, Freeman NV. Primary modified Duhamel operation for Hirschsprung's disease in infants. *Ped Surg Int.* 1994;9(1-2):61-3.
- Balén EM, Hernández-Lizoáin JL, et al. The Endo-GIA stapler for the side-to-side colorectal anastomosis in the Duhamel operation. *Ped Surg Int.* 1994;9(4):305-6.
- Zee DC, Bax NMA, Pull ter Gunne AJ, Rövekamp MH. Use of EndoGIA stapling device in Duhamel-Martin procedure for Hirschsprung's disease. *Ped Surg Int.* 1993;8(5):447-8.
- Wrighton L, Curtis JL, Gollin G. Stapled intestinal anastomoses in infants. *J Ped Surg.* 2008;43(12):2231-4.
- Mattioli G, Castagnetti M, Martucciello G, Jasonni V. Results of a mechanical Duhamel pull-through for the treatment of Hirschsprung's disease and intestinal neuronal dysplasia. *J Ped Surg.* 2004;39(9):1349-55.
- Wester T, Hoehner J, Olsen L. Rehbein's anterior resection in Hirschsprung's disease, using a circular stapler. *Eur J Pediatr Surg.* 1995;5(6):358-62.
- Hedlund H. Colorectal resection and anal anastomosis with an intraluminal stapler in Hirschsprung's disease. *Pediatr Surg Int.* 1997;12(2-3):142-4.
- Rappert P, Losert U. Preanal stapler anastomosis in minimally invasive surgery of Hirschsprung's disease. *J Laparoendosc Surg.* 1996;6 Suppl 1:S75-82.
- Balanescu R, Topor L, Nedelea S. Diagnosis and Treatment of Hirschsprung's Disease in Children. *Therapeutics, Pharmacology and Clinical Toxicology.* 2012;XVI(1):45-50.
- Coroş MF, Sorlea S, Crăciun C, Rareş G, Pascarenco G, Corhan T, et al. Benefits of mechanical suture in our experience *Chirurgia (Bucur).* 2012;107(3):325-31.
- Duhamel B. A new operation for the treatment of Hirschsprung's disease. *Arch Dis Child.* 1960;35:38-9.
- Minford JL, Ram A, Turnock RR, Lamont GL, Kenny SE, Rintala RJ, et al. Comparison of functional outcomes of Duhamel and transanal endorectal coloanal anastomosis for Hirschsprung's disease. *J Pediatr Surg.* 2004;39(2):161-5; discussion 161-5.
- Fortuna RS, Weber TR, Tracy TF Jr, Silen ML, Cradock TV. Critical analysis of the operative treatment of Hirschsprung's disease. *Arch Surg.* 1996;131(5):520-4; discussion 524-5.