

Surgical procedures for evacuatory disorders



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This review addresses the range of treatments suggested to be of contemporary value in the treatment of constipation with critical evaluation of efficacy data, complications, patient selection, controversies and areas for future research. Resection-rectopexy, stapled prolapsectomy, mesh procedures, rectocele repair, stapled rectal resection and anterograde enema are among the reported procedures, but none of them showed a clear superiority over the others due to the lack of prospective randomised trials. Both open and laparoscopic interventions have been used. The outcome is usually positive in the short-term, but long term follow up showed that most procedure carry a high recurrent rate, possibly because the target of surgery is represented by the evident organic lesions, whereas the occult functional causes tend to be underestimated. In conclusion, the authors recommend a strict and selective surgical policy when dealing with patents suffering from evacuation disorders.

KEY WORDS: Coloproctology, Constipation, Evacuatory disorders, Obstructed defecation

Introduction

Patients with chronic constipation suffer from delayed colonic transit, evacuation disorders (ED) or both. First line treatment consists of non-surgical measures, including all medical and behavioural therapies, while patients are proposed for surgery commonly after failure of conservative treatments, and demonstration of potential benefit by clinical examination and / or physiological testing, taking into consideration the multiple anorectal pathophysiologies that singly or in combination underlie symptoms of ED. These consist of difficult and often painful evacuation, a sense of incomplete evacuation, perineal support or finger insertion into the vagina or anus to defecate, which push patients to frequent enemas, and laxative abuse.

By far the most common surgically addressed abnormalities are rectocele and intussusception. Association with anterior compartment and vaginal vault urogenital prolapse, enterocele, and sigmoidocele are also common. The pathophysiology and cause of this syndrome is poorly understood. One of the theories is that, at least in a subset of patients, intussusception develops because of multiple and/or difficult deliveries and is the cause of obstruction; as a consequence rectocele develops, causing an inability to generate adequate rectal pressures for defecation. Chronic straining is likely to be another cause of rectocele, due to a weakness of the rectovaginal septum.

This review aims to focus on the multiple options that surgery offers to correct ED symptoms, analysing their principles, real effectiveness and potential complications. Differently from the potential medical treatments, there is in fact no clear evidence for the benefit of any surgical procedure for constipation. As insufficient data exist to make safe recommendations, no stepwise algorithm is proposed.

Several problems beset in general surgical decision making. The first and most discussed is that anatomical abnormalities, such as rectocele and intussusception, are

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commonly detectable in at least 40% of asymptomatic subjects^{1,2}, and frequently co-exist^{3,4}. This is evidently a significant proportion that often raises doubts about the real opportunity of a surgical treatment, which evidently requires a combination with potentially related symptoms, of obstructed defecation who fail conservative treatment, such as dietary modifications and biofeedback training. Secondly, in most of the cases such abnormalities often belie a complex multifactorial problem with several contributing aetiologies that cannot be corrected by surgery alone^{5,6}. This is the so called 'iceberg' phenomenon^{7,8}, where the metaphor refers to seeing only the apparently treatable 'tip' of the iceberg while other submerged occult functional or organic disturbances may "sink the surgical ship". This is the case of a prospective study of 100 patients with severe ED, among whom occult lesions were frequent, with two-thirds of patients suffering from anxiety or depression, and these being negative predictors of outcome for certain procedures⁷. Other 'submerged' deleterious pathophysiological disturbances demonstrated by appropriate testing included enterocele (17 cases), dyssynergic defecation (44 cases), rectal hyposensation (33 cases) and delayed colonic transit (28 cases).

It is also a fact that correction of anatomical abnormalities does not necessarily equate well with functional outcome⁸⁻¹¹, and even then, success rate decrease to an approximately 50% of cases in the long term^{5, 8, 11-13}. Finally, all of the surgical procedures which can be proposed to treat ED are not without the risk of serious complications, at least in a minority of patients. Correction of both intussusception and rectocele may restore normal anatomy and reverse symptoms, but this is a matter of debate¹⁴. Simultaneous correction of intussusception and rectocele has been achieved by combined abdominovaginal approach, as proposed by Zacharin and Hamilton¹⁵, or by combined transanal and transvaginal approach, which provides good results but a high incidence of complications. The Delorme operation may correct both defects but is difficult to perform and has a discrete complication rate¹⁶, whereas abdominal rectopexy for intussusception is frequently ineffective at relieving constipation¹⁷.

On the basis of these considerations it should not be surprising that wide disparities exist in the application of surgical techniques for management of ED with some surgeons advocating operations for up to 60% of their patients, and others nearly always avoiding surgery^{1,5,18,19}. Although various evident pathophysiological variants of ED e.g. enterocele, solitary rectal ulcer may warrant some variations in surgical strategy, we would like to focus on those predominantly addressing rectocele, intussusception or both. As studies to define selection criteria for any operative intervention in rectal evacuation disorders are still missing, the only informations available derive from published case series. While some procedures target one of these pathophysiologicals more

than the other, the vast majority of reports describe operations that transgress both disorders to some extent. These are most logically considered by presumed broad mechanism of action.

Hitching procedures

Several 'rectal prolapse' procedures have been used to address intussusception including various types of rectopexy performed by open or laparoscopic technique. These have generally disappointing long-term results^{8,12,13}, even when the proctographic abnormality is corrected⁸. A variation on this theme, which has been recently proposed, is the External Pelvic Rectal SuSpension (EXPRESS) procedure in which an anterior perineal approach is used to perform rectopexy to the pubis using porcine collagen strips, and eventually allowing synchronous mesh rectocele repair. Short-term results of this procedure have been published on 15 patients at one year but, like other procedures, they were not free of some failures and complications²⁰.

Reinforcing procedures

Reinforcing procedures are predominantly proposed for large rectocele, considered as a defect larger than 3 cm, requiring self-digitation, visible at defecography on straining for barium entrapment. Different approaches are described, i.e. transanal, perineal or abdominal. Reinforcement of the rectovaginal septum has been attempted using anterior levatorplasty²¹, or a posterior vaginal wall plasty²², which both may cause dyspareunia, transperineal mesh transposition which may cause local sepsis, or transanal anterior plication of the rectal wall, which may cause new onset anal incontinence due to a stretch of the anal sphincters²³. The success rate for most procedures is approximately 90% at one year. Nevertheless long term follow-up show a decrease of success rate down to approximately 50% of patients treated^{9,11}. In other words correction of the anatomical defect does not correspond to that of the functional disorder in nearly half of the patients¹⁴. The use of synthetic implants to improve results is still matter of debate. Previous studies using synthetic biomaterials in rectocele repair are few and generally report favorable anatomic outcomes with limited implant complications. Unfortunately, these studies are highly heterogenous. The number of included patients is usually small, time to follow-up limited, methods of rectocele quantification variable, and the surgical techniques used differ between different studies²⁴⁻²⁶. In a case series of 4 patients, polypropylene was successfully used in rectocele repair without any serious complications²⁴. In a prospective evaluation ranging over 29 months, 8 of 9 women with rectocele demonstrated at defecography and manually

TABLE I - Results of surgery for ED by broad type of surgery

Author, year (ref)	N.	Technique	F. up (months)	% success
<i>Procedures that predominantly 'hitch' up the rectum</i>				
Schultz et al., 2000 ²⁸	76	sacral rectopexy	60	78
Brown et al., 2004 ²⁹	74	resection rectopexy	48	50
Williams et al., 2005 ³²	17*	EXPRESS procedure	12	88
<i>Procedures that predominantly reinforce the rectovaginal septum</i>				
Boccasanta et al., 2001 ²⁵	317	transanal & perineal repair	12	94
Roman & Michot, 2005 ²⁷	71	rectocele repair	74	50
D'Hoore et al., 2008 ³⁵	17	laparoscopic mesh & perineal repair‡	24	83
Pescatori et al., 2009 ²³	13	open abdominal mesh & perineal repair ⁺	42	90
<i>Procedures that predominantly excise redundant rectal tissue</i>				
Boccasanta et al., 2004 ⁴³	90	STARR	12	90
Pescatori et al., 2006 ²¹	40	manual & stapled mucosectomy	36	48 [†]
Gagliardi et al., 2008 ³⁶	85	STARR	18	65
<i>Anterograde colonic irrigation procedures (see text)</i>				

*n = 13 also had reinforcement of rectovaginal septum

+ = plus psychotherapy and pelvic floor rehabilitation when indicated

† = 80% success in patients without 'anismus' and 'psychoneurosis'

‡ = also includes 'hitching' of rectum

STARR = stapled transanal rectal resection, EXPRESS = external pelvic rectal suspension

assisted defecation were significantly improved following transperineal rectocele repair using a polypropylene mesh. The small numbers of patients included in these studies do not permit any valid conclusions but serve as interesting pilot studies on the plausibility of rectocele repair using synthetic mesh.

Twenty-two consecutive female patients with rectocele determined at defecography underwent transperineal rectocele repair using polypropylene (14 cases) or polyglactin-polypropylene (8 cases) in a retrospective case series ²⁷. Subjective improvement was reported by 77% of the patients with a less favorable outcome in patients with abnormal colonic transit and the need for vaginal dilatation ²⁷.

To date the most used absorbable, synthetic mesh is the one made of polyglactin, as reported. Laparoscopic rectocele repair with polyglactin mesh reinforcement was performed in 20 patients followed for one year ²⁶. Symptom resolution was reported by 16 of 20 patients. In a randomized trial evaluating the efficacy of polyglactin 910 in preventing recurrence of cystoceles and rectoceles, this mesh was found to be useful in the prevention of recurrent cystoceles compared with standard suture techniques ²⁸. There was, however, no difference between the two groups in regard to rectocele recurrence one year postoperatively, suggesting that absorbable mesh does not improve rectovaginal support. By adding a mesh reinforcement of the rectovaginal septum through a combined perineal and laparoscopic approach, D'Hoore ²⁹ has recently reported a low recurrence rate at two years in patients with rectocele associ-

ated with either enterocele or intussusception. Moreover, he did not report any case of new onset constipation, incontinence and dyspareunia ²⁹.

Recently Reid ³⁰ reported on an interesting theory, the so-called "flag-pole", according to which theory the connective tissues of the postero-superior axis ("flag-pole") form a continuous strong band that runs from the sacral periosteum, through the uterosacral ligaments, into the pericervical ring, and down through the rectovaginal septum, to insert into the perineal body. When this is intact, bowel motions are guided smoothly through the pelvis and easily out the anus. However, when it is torn, as for obstetric reasons for instance, pelvic dragging discomfort and obstructive defecation become a problem. In other words, he believes that prolapse repair is associated with stretch dilatation of the anterior rectal wall, but only as a consequence of a combination of pelvic muscle avulsive and denervation injury, together with various 'site-specific' lacerations of the suspensory hammocks. Therefore, to be curative, his suggestion is to repair the sites of fascial tearing (rather than just plicating the non-specific dilatation of the rectal muscularis). For this reason his suggestion is to use tissue augmentation materials, both as a static strut and a dynamic bridging graft. Results of a small series of 49 patient, 46 of them at a one year follow-up had outright or qualified anatomic success. There were statistically significant reductions in all pre-operative symptoms, including bulge, drag and defaecatory difficulties. Intraoperative complications were minimal, and no graft-related morbidity or dyspareunia has been seen.

Excisional procedures

With the advent of suitable staple devices and introduction of stapled haemorrhoidopexy³¹, which later became widespread, the most currently popularised intervention is that of stapled transanal rectal resection (STARR) in which the internally prolapsed rectum is excised with the aim of improving anatomy and function^{32,33}. The rationale of the operation is to restore normal anatomy and function by excising redundant tissue. Although applicable for both intussusception and rectocele, a recent review by Gagliardi et al shows that STARR does not correct large rectoceles, possibly because it does not reinforce the rectovaginal septum³². Controversial results are reported after STARR, ranging between 90% success in the short term to 52% persistence of symptoms after 18 months³⁴. Furthermore, reported complications of STARR include bleeding, faecal incontinence, excruciating anal pain, rectal diverticulum, recto-vaginal fistulae and even fatal pelvic sepsis³⁵⁻⁴⁰. Painful defecation, possibly due to retained staples in the puborectalis muscle, affects 20% of patients one year post surgery, and chronic proctalgia requires re-intervention in approximately one third of patients³². Both severely affect quality of life⁴¹. Thus, although many are only case reports, a quick search on Pubmed reveals that there are almost as many publications describing complications of STARR (15 cases) as there are published trials of the procedure (18 cases). Whilst STARR is promoted, particularly in its country of origin, as 'soft, sutureless' and free from complications⁴²⁻⁴⁴, it has been described by others as "an operation introduced in the clinical routine prior to an adequate evaluation"¹⁸. In fact, only three series, two of which were from the same institution, have been fully published, reporting improvement in 90 percent of patients and a very low complication rate⁴⁵⁻⁴⁷. After these results, several surgeons had enthusiastically adopted this procedure, but preliminary reports indicated a high complication rate and poor patient satisfaction^{18,35,48,49}.

Despite an increasing number of multicentre prospective trials, no RCT has been carried out aimed at comparing STARR with other surgeries although 2 different approaches have been compared⁵⁰.

Variations on the STARR include a combined laparoscopic and transanal approach to minimize the risk in patients with concomitant enterocele⁵⁰, and the transSTARR procedure which is carried out using a more sophisticated Contour® stapler, which is less likely to cause bleeding but may still be followed by significant complications⁵¹.

Anterograde enema procedures

Anterograde enema can be considered an alternative to stoma in patients with severe ED when conservative

methods +/- anorectal procedures have failed or are contra-indicated⁵². In patients with previous appendectomy or in whom the appendix cannot be satisfactorily employed, caecostomy may be effected using a percutaneously-placed Chait tube⁵³ or surgically by more complex techniques such as stapled tubularised caecal neopendicostomy⁵⁴ or continent colonic conduit⁵⁵. In general, success rates have been lower in adults^{52,54} than in children: approx. 60 vs. 80%. In the long-term, complications such as stomal stenosis and leakage, or failure to effectively treat symptoms commonly (> 50% at 3 years) lead to revision, reversal or conversion to stoma⁵⁴.

Conclusions

At the current time, it is almost impossible to make any evidence-based recommendations for selection of either patient or particular operation, with no surgical procedure showing clear superiority over others. Nevertheless, if 'iceberg lesions' can be excluded or treated concurrently, some interventions may achieve reasonable medium-term outcomes. It is suggested that surgery should be reserved for a minority of cases not responding to all non-surgical interventions, and that it should only be carried out by properly trained surgeons in pelvic floor and colorectal surgery.

Although scientific and technological research has been very active in the recent years, still there is a great demand for well-designed randomised placebo-controlled or treatment comparison trials with adequate run in and follow up and using validated outcome measures expressed on an 'intention to treat' basis. At the same time better studies to define selection criteria for any operative intervention in rectal evacuation disorders are also awaited. Hopefully the amalgamation of such data will provide an evidence-based surgical treatment algorithm for an no doubt complex disease.

Riassunto

Questa review analizza i diversi trattamenti oggi disponibili per il trattamento della stipsi, con una analisi critica della loro efficacia, delle loro complicanze, della corretta indicazione, della selezione dei pazienti, delle controversie tuttora esistenti e delle aree di ricerca futura. La resezione/rettopessi, la prolassectomia con stapler, le procedure con mesh, la riparazione del rettocele, la resezione di retto con stapler e l'idrocolonterapia sono fra i trattamenti riportati, ma nessuno di essi ha dimostrato una chiara superiorità sugli altri per la mancanza di studi prospettici randomizzati. Sia tecniche di chirurgia tradizionale sia tecniche mininvasive sono state impiegate nel corso degli anni. Il risultato è generalmente positivo nel breve periodo, ma il follow-up a distanza dimostra

che la maggior parte delle tecniche è affetta da un alto tasso di recidiva, verosimilmente perché l'obiettivo della chirurgia consiste nella correzione di una lesione organica evidente, mentre le cause funzionali occulte tendono a essere sottostimate. In conclusione, gli autori raccomandano una strategia chirurgica stretta e selettiva dinanzi al paziente affetto da disturbi della evacuazione.

References

- 1) Bartolo DC, Bartram CI, Ekberg O, et al.: *Symposium. Proctography*. Int J Colorectal Dis, 1988; 3:67-89.
- 2) Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW: *Defecography in normal volunteers: Results and implications*. Gut, 1989; 30:1737-49.
- 3) Thompson JR, Chen AH, Pettit PD, Bridges MD: *Incidence of occult rectal prolapse in patients with clinical rectoceles and defecatory dysfunction*. Am J Obstet Gynecol, 2002; 187:1494-499.
- 4) Hausammann R, Steffen T, Weishaupt D, Beutner U, Hetzer FH: *Rectocele and intussusception: Is there any coherence in symptoms or additional pelvic floor disorders?* Tech Coloproctol, 2009 ;13:17-26.
- 5) Pescatori M, Boffi F, Russo A, Zbar AP: *Complications and recurrence after excision of rectal internal mucosal prolapse for obstructed defaecation*. Int J Colorectal Dis, 2006; 21:160-65.
- 6) Pescatori M, Spyrou M, Pulvirenti d'Urso A: *A prospective evaluation of occult disorders in obstructed defecation using the 'iceberg diagram'*. Colorectal Dis, 2007; 9:452-56.
- 7) Pescatori M, Zbar AP: *Reinterventions after complicated or failed STARR procedure*. Int J Colorectal Dis, 2009; 24:87-95.
- 8) Christiansen J, Zhu BW, Rasmussen OO, Sørensen M: *Internal rectal intussusception: Results of surgical repair*. Dis Colon Rectum, 1992; 35:1026-28.
- 9) Boccasanta P, Venturi M, Calabrò G et al.: *Which surgical approach for rectocele? A multicentric report from Italian coloproctologists*. Tech Coloproctol, 2001; 5:149-56.
- 10) Vermeulen J, Lange JF, Sikkenk AC, van der Harst E: *Anterolateral rectopexy for correction of rectoceles leads to good anatomical but poor functional results*. Tech Coloproctol, 2005; 9:35-41.
- 11) Roman H, Michot F: *Long-term outcomes of transanal rectocele repair*. Dis Colon Rectum, 2005; 48:510-17.
- 12) Schultz I, Mellgren A, Dolk A, Johansson C, Holmström B: *Long-term results and functional outcome after Ripstein rectopexy*. Dis Colon Rectum, 2000; 43:35-43.
- 13) Brown AJ, Anderson JH, McKee RF, Finlay IG: *Surgery for occult rectal prolapse*. Colorectal Dis, 2004; 6:176-79.
- 14) Vermeulen J, Lange JF, Sikkenk AC, van der Harst E: *Anterolateral rectopexy for correction of rectoceles leads to good anatomical but poor functional results*. Tech Coloproctol, 2005; 9:35-41.
- 15) Zacharin FR, Hamilton NT: *Pulsion enterocele: long-term results of an abdominoperineal technique*. Obstet Gynecol, 1980; 2:141-48.
- 16) Lieberman H, Hughes C, Dippolito A: *Evaluation and outcome of the Delorme procedure in the treatment of rectal outlet obstruction*. Dis Colon Rectum, 2000; 43:188-92.
- 17) Brown AJ, Anderson JH, McKee RF, Finlay IG: *Surgery for occult rectal prolapse*. Colorectal Dis, 2004; 6:176-79.
- 18) Jayne DG, Finan PJ: *Stapled transanal rectal resection for obstructed defaecation and evidence-based practice*. Br J Surg, 2005; 92: 793-94.
- 19) Arroyo A, González-Argenté FX, García-Domingo M, et al. : *Prospective multicentre clinical trial of stapled transanal rectal resection for obstructive defaecation syndrome*. Br J Surg, 2008; 95:1521-527.
- 20) Williams NS, Dvorkin LS, Giordano P, et al.: *EXTERNAL Pelvic RECTal SuSPension (EXPRESS procedure) for rectal intussusception, with and without rectocele repair*. Br J Surg, 2005; 92:598-604.
- 21) Lamah M, Ho J, Leicester RJ: *Results of anterior levatorplasty for rectocele*. Colorectal Dis, 2001; 3:412-16.
- 22) ano M, Ferronato M, Solej M, D'Amico S: *A novel technique for rectocele repair in elderly women*. Tech Coloproctol, 2007; 11:149-51.
- 23) Zbar AP, Lienemann A, Fritsch H, Beer-Gabel M, Pescatori M: *Rectocele: Pathogenesis and surgical management*. Int J Colorectal Dis, 2003; 18:369-84.
- 24) Parker MC, Phillips RK: *Repair of rectocele using Marlex mesh*. Ann Roy Coll Surg Eng, 1993; 75:193-94. *Transperineal repair of symptomatic rectocele with Marlex mesh: A clinical, physiological and radiologic assessment of treatment*. J Am Coll Surg, 1996; 183:257-61.
- 26) Lyons TL, Winer WK: *Laparoscopic rectocele repair using polyglactin mesh*. J Am Assoc Gynecol Laparosc, 1997; 4:381-84.
- 27) Mercer-Jones M, Sprowson A, Varma J: *Outcome after transperineal mesh repair of rectocele: A case series*. Dis Colon Rectum, 2004; 47:864-68.
- 28) Sand PK, Koduri S, Lobel RW, et al.: *Prospective randomized trial of polyglactin 910 mesh to prevent recurrence of cystoceles and rectoceles*. Am J Obstet Gynecol, 2001; 184:1357-362.
- 29) D'Hoore A, Vanbeckvoort D, Penninckx F.: *Clinical, physiological and radiological assessment of rectovaginal septum reinforcement with mesh for complex rectocele*. Br J Surg, 2008; 95:1264-272.
- 30) Reid R: *Recto-enterocele repair: Past problems and new horizons*. Pelviperineology 2007; 26:9-16.
- 31) Pescatori M, Aigner F: *Stapled transanal rectal mucosectomy ten years after*. Tech Coloproctol, 2007; 11:1-6.
- 32) Gagliardi G, Pescatori M, Altomare DF, et al.: *Italian Society of Colo-Rectal Surgery (SICCR). Results, outcome predictors, and complications after stapled transanal rectal resection for obstructed defecation*. Dis Colon Rectum, 2008; 51:186-89.
- 33) Pescatori M, Gagliardi G: *Postoperative complications after procedure for prolapsed hemorrhoids (PPH) and stapled transanal rectal resection (STARR) procedures*. Tech Coloproctol, 2008; 12: 7-19.
- 34) Boccasanta P, Venturi M, Calabro G, Maciocco M, Roviario GC: *Stapled transanal rectal resection in solitary rectal ulcer associated with prolapse of the rectum: A prospective study*. Dis Colon Rectum, 2008; 51:348-54.
- 35) Dodi G, Pietroletti R, Milito G, Binda G, Pescatori M: *Bleeding, incontinence, pain and constipation after STARR transanal double stapling rectotomy for obstructed defecation*. Tech Coloproctol, 2003; 7:148-53.

- 36) Sciaudone G, Di Stazio C, Guadagni I, Selvaggi F: *Rectal diverticulum: A new complication of STARR procedure for obstructed defecation*. Tech Coloproctol, 2008; 12:61-63.
- 37) De Nardi P, Bottini C, Faticanti Scucchi L, Palazzi A, Pescatori M: *Proctalgia in a patient with staples retained in the puborectalis muscle after STARR operation*. Tech Coloproctol, 2007; 11:353-56.
- 38) Stolfi VM, Micossi C, Sileri P, Venza M, Gaspari A: *Retroperitoneal sepsis with mediastinal and subcutaneous emphysema complicating stapled transanal rectal resection (STARR)*. Tech Coloproctol, 2009; 13:69-71.
- 39) Zbar AP: *Postoperative complications after procedure for prolapsing haemorrhoids (PPH) and stapled transanal rectal resection (STARR)*. Tech Coloproctol, 2008; 12:136-7; author reply 137-8.
- 40) Boffi F: *Retained staples causing rectal bleeding and severe proctalgia after the STARR procedure*. Tech Coloproctol, 2008; 12:7-19.
- 41) Oom DM, van Dijnl VR, Gosselink MP, van Wijk JJ, Schouten WR: *Enterocoele repair by abdominal obliteration of the pelvic inlet: long-term outcome on obstructed defaecation and symptoms of pelvic discomfort*. Colorectal Dis, 2007; 9:845-50.
- 42) Pappagallo M: *And I operate them in Austria: interview with A. Longo*. Il Corriere della Sera, Milan, September 2008, reported by F. Boffi, correspondence, Tech Coloproctol, 2008; 12:352.
- 43) <http://www.emorroidopessiestipsi.com>.
- 44) Boffi F: *Sutureless PPH and STARR*. Tech Coloproctol, 2008; 12:352.
- 45) Boccasanta P, Venturi M, Stuto A, et al.: *Stapled transanal rectal resection for outlet obstruction: a prospective, multicenter trial*. Dis Colon Rectum, 2004; 47:1285-96.
- 46) Boccasanta P, Venturi M, Salamina G, Cesana BM, Bernasconi F, Roviario G: *New trends in the surgical treatment of outlet obstruction: clinical and functional results of two novel transanal stapled techniques from a randomised controlled trial*. Int J Colorectal Dis, 2004; 19:359-69.
- 47) Renzi A, Izzo D, Di Sarno G, Izzo D, Di Martino N: *Stapled transanal rectal resection to treat obstructed defecation caused by rectal intussusception and rectocele*. Int J Colorectal Dis, 2006; 13:1-7.
- 48) Pescatori M, Dodi G, Salafia C, Zbar AP: *Rectovaginal fistula after double-stapled transanal rectotomy (STARR) for obstructed defecation*. Int J Colorectal Dis, 2005; 20:83-85.
- 49) Binda GA, Pescatori M, Romano G: *The dark side of double-stapled transanal rectal resection*. Dis Colon Rectum, 2004; 47:1285-286.
- 50) Petersen S, Hellmich G, Schuster A, Lehmann D, Albert W, Ludwig K.: *Stapled transanal rectal resection under laparoscopic surveillance for rectocele and concomitant enterocele*. Dis Colon Rectum, 2006; 49:685-89.
- 51) Schulte T, Bokelmann F, Jongen J, Peleikis HG, Fandrich F, Kahlke V: *Mediastinal and retro-intra-peritoneal emphysema after STARR using the Contour Transtar stapler in obstructive defecation syndrome*. Int J Colorect Dis, 2008; 23:1019-20.
- 52) Hirst GR, Arumugan PJ, Watkins AJ, et al.: *Anterograde continence enema in the treatment of obstructed defecation with or without fecal incontinence*. Tech Coloproctol, 2005; 9:217-22.
- 53) Chait PG, Shandling B, Richards HF: *The cecostomy button*. J Pediatr Surg, 1997; 32:849-51.
- 54) Lees NP, Hodson P, Hill J, et al.: *Long-term results of the antegrade continent enema procedure for constipation in adults*. Colorectal Dis, 2004; 6:362-68.
- 55) Williams NS, Hughes SF, Stuchfield J: *Continent colonic conduit for rectal evacuation in severe constipation*. Lancet, 1994; 343:1321-324.