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Case report

Total colectomy with „J”-reservoir for synchronous neoplasia of the large bowel and rectum

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Abstract. Objective: we want to present two cases of multiple synchronous neoplasias of the colon and upper rectum admitted in our department, for which a limited excision was not enough. Case presentation: there were two cases for which we performed a total colectomy with ileo-rectostomy with „J”-reservoir, avoiding a straight ileo-rectoanastomosis. Results: the patients recovered without complications, with few bowel emissions per day. Post-surgery recovery was uneventful in both patients. One year after the surgery, the patients experienced two and three normal bowel motions daily and no episodes of incontinence. Conclusion: the method is good for patients with multiple primary neoplasias of large bowel and upper rectum and offers a good condition of life.

Key Words: colo-rectal neoplasms, synchronous lesions, total colectomy, „J”-reservoir.

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Introduction

In 2005, colon cancer in United States was the fourth most frequent cancer in men and women. Colon and rectal cancers combined were responsible for 10% of all cancer deaths (Jemal *et al* 2005) with an overall 5-year relative survival rate of 63% (Ries *et al* 2004). In 2008 colorectal cancer was the third most frequent cancer worldwide in men (663,000 cases, representing 10% of all) and the second in women (571,000 cases, representing 9.4% of all), 60% of the cases being diagnosed in the developed countries (Ferlay *et al* 2010). In 2011 it was estimated a number of 71,850 new cases of colorectal cancers in men, representing 9% of all cancer cases and 69,360 new female cases, representing also 9%; concerning the mortality, it was estimated for men a number of 25,250 (8%) and 24,130 (9%) for women (Jemal *et al* 2011).

The colorectal cancer is a public health problem in European countries because is among the first cancers. Annually in Europe almost 190,000 patients are diagnosed with cancer localized on the colorectum, 20% of them having already metastases when they are diagnosed. Yearly in USA about 56,000 patients die because of colorectal cancer and in Europe die more than 100,000 patients.

The incidence of colorectal cancer in Romania is 10.1/100,000 for men and 7.3/100,000 for women, this cancer being the third cancer for both men and women, after lung cancer and stomach cancer in men and after breast cancer and uterus cancer in women (Diculescu 2004). In 2008 Romania (Globocan 2008) was situated on a middle position for the incidence and mortality rates (in men the incidence rate was 27.6 (4554 cases) with a mortality rate of 16.7 (2884 deaths); in women the incidence rate was 19 (4142 cases), with a mortality rate of 9.7 (2294 deaths). Approximately one in eight cancers is of colorectal origin and the colorectal cancer is responsible for one in ten deaths because of cancer. Nowadays in Romania the large bowel cancer is the second leading cause of death by cancer after the lung cancer. The mortality after colorectal cancer continues to decrease, this reflecting a decrease of its incidence and an improvement of survival. Men/women ratio is almost one for the large bowel cancer and 1.5-2/1 for rectal cancer. There are angiogenic markers, like CD105, CD31 or vascular endothelial growth factor-A, which can predict the prognosis of patients with colorectal cancer and are well correlated with Dukes' stages (Jalba *et al* 2009, 2010). The SEER studies revealed the rate of lifetime risk of developing cancer (based on rates from 2007-2009), considering that one in twenty men and women will be diagnosed with colorectal cancer during their lifetime and 2.01% of men will develop cancer of the colon and rectum between their 50th and 70th birthdays compared to 1.47% for women. The overall 5-year relative survival for 2002-2008 from 18 SEER geographic areas was 64.3% (Howlader *et al* 2012).

It is well known that colorectal cancer is responsive for many deaths nowadays. The colorectal cancer has been studied intensively in the last years because of an increased incidence, mortality and morbidity. We know that there exist inherited conditions predisposing to colorectal cancer, such as FAP (Familial adenomatous polyposis), Lynch syndrome (HNPCC, hereditary non-polyposis colorectal cancer), MYH syndrome (MYH gene plays an active role in protecting genomic integrity during transcription and its mutations are autosomal recessive) and so on (Lynch *et al* 1966, 1990, 2009; Li & Fraumeni 1982) FAP is a hereditary colon cancer syndrome (Northover & Murday 1989) in which the affected family members develop large numbers of colon polyps; when the disease is not detected and

early treated, which implies the removal of the entire colon, it is most likely to appear a colon cancer, usually at the age of 40's, but also earlier. It has been described an increased risk for other cancers for the patients with FAP: thyroid, gastric, Vater's ampulla cancer. It was described also an attenuated adenomatous polyposis syndrome (AFAP), which is a milder version of FAP (Tao *et al* 2010; Aretz *et al* 2011), in which the affected patients develop less than 100 colon polyps, remaining with a high risk for developing large bowel cancers at a young age (but with a delay in onset of adenomatosis and colorectal cancer of 10–25 years compared with classical FAP) and a risk for appearance of stomach and duodenal polyps (Hernegger *et al* 2002; Sekine *et al* 2004; Ohtaka *et al* 2011). The APC gene is located on chromosome 5 (Bodmer *et al* 1987; Kinzler *et al* 1991; Nakamura *et al* 1992) and it is a tumor suppression gene that controls beta-catenin turnover in the Wnt pathway (Claes *et al* 2011); it suffers mutations and that results in an early and frequent development of colonic cancer. This genetic disease has an autosomal dominant inheritance. The p53 gene is mutated in 70% in patients with large bowel cancer, this gene being involved in the control of cell cycle and apoptosis, so the cells with a damaged DNA escape repair or destruction (Vogelstein *et al* 1988; Lane & Benchimol 1990). There are cancer treatments that use the upregulation of p53 gene in order to promote their effect (Gherman *et al* 2012).The mutations may be inherited or acquired. An inherited mutation means that every cell of the body has the mutation, as an acquired mutation is present only in the original cell and its descendants. Usually, acquired mutations tend to cause only one or a few colon polyps and these may be removed through colonoscopy, this way being prevented the progression of a polyp to bowel cancer; instead of inherited gene mutations which cause numerous colon polyps, impossible to be removed through a colonoscopy. That it why it is advisable the removal of the colon to prevent colon cancer in patients with inherited forms of colon cancer (Knudsen *et al* 2003;Half *et al* 2009; Knudsen *et al* 2010; Church, 1996; Natarajan *et al* 2010; Ardelean 2011; Aarnio 2012).

The patients with a primary colorectal carcinoma may have other malignant lesions within the colon and rectum, which are synchronous carcinomas. Also, they could have other carcinomas in other organs. The reported incidence of synchronous colorectal carcinomas range between 2.3 and 12.4% (Welch 1981; Cunliffe *et al* 1984; Arenas *et al* 1997; Chen *et al* 2000; Shin *et al* 2000); Oya *et al* 2003). Because of benign polyps, diverticular disease, ulcerative colitis, Crohn's colitis the incidence of non-malignant synchronous colorectal lesions is greater. In 1997 Arenas reported an incidence of 45.6% of non-malignant synchronous colorectal lesions and of 4.9% for synchronous colorectal cancer. It is important because the presence of synchronous colorectal lesions can force the surgical procedures to be more extensive than that dictated by the index cancer.

The surgical procedures for colorectal cancers vary from limited resections to extended ones. Total colectomy and proctorectocolectomy are used for familial adenomatous polyposis and ulcerative colitis. Also for multiple colorectal cancers these procedures may be used in order to obtain cure. After an extended colectomy we can use a straight anastomosis between the ileum and the rectum or the anus. Usually the functional results are not the best, even if the most important thing is that the patient is still alive. The patient's comfort became very important in the last decades, that is why there is a permanent desire to obtain good functional results. Like in other procedures for digestive tract surgery, in which the excision of a digestive segment may produce impairment of function, in colorectal surgery are utilized diverse techniques to restore at least in part some of the functions which were diminished. The creation of a J-pouch after a total colectomy would add benefits for the rectal reservoir function lost in part after rectal excision. In case of rectal cancers occurred also in the rectum it would be appropriate to perform a ileal J-pouch anal anastomosis. A J-pouch was made also for reconstruction after rectal resection in patients with distal rectal cancer, as an alternative to straight coloanal anastomosis, in order to prevent a definitive stoma and create a stool reservoir. If a straight coloanal anastomosis after a lower anterior resection is performed, in many cases appear imperative stool urge, stool fragmentation, prolonged stooling sessions, and minor problems of incontinence in the postoperative situation. All of these affect negatively the quality of life. Fürst concluded, after an analysis of a randomized prospective study on 74 patients operated for rectal cancer with restoration of the transit either by coloanal anastomosis or by a J-pouch, that the colonic J-pouch was superior with regard to continence for gas and liquids and stool frequency was significantly lower in the J-pouch group than in the coloanal reconstruction group; the authors explained the advantage of the colonic J-pouch not in the creation of a larger neorectal reservoir but rather related to decreased motility (Fürst *et al* 2002). Another study made by the same author (Fürst *et al* 2003) compared the results of 40 patients with distal rectal cancer for which was made either a J-pouch or a coloplasty, after a low rectal resection with coloanal anastomosis, founding no significant difference in resting and squeeze pressure and neorectal volume between both groups, but an increased neorectal sensitivity in the coloplasty group, preferring the coloplasty because of its feasibility, simplicity, and effectiveness. In terms of functional outcome, there is evidence of the superiority of the colonic J-pouch over a straight coloanal anastomosis (Ho 2006), even if the manometric data showed no difference of the volume of a short colonic J-pouch versus a straight coloanal anastomosis (Machado *et al* 2003). The urgency control favored the colonic J-pouch also in the study of Lin *et al* 2002. Comparing with the results of low colorectal anastomosis after surgery for rectal cancer, the colonic J-pouch-anal anastomosis offered superior long-term function (Dehni *et al* 1998; Brown *et al* 2008). The pouch procedure has an advantage especially in the early postoperative stage, but when this is technically impossible, is recommended instead of a straight anastomosis a side-to-end anastomosis (Huber *et al* 1999). Other authors consider that there are similar results after a colonic J-pouch with a side-to-end anastomosis made after a low rectal cancer resection (Jianq *et al* 2005).

Chrysos et al (2002) used total colectomy with removal of the upper rectum, followed by a 10 cm ileal J-pouch anastomosed to the distal rectum in four patients with obstructed carcinoma of the rectosigmoid junction and concluded after anorectal manometry that the procedure is a reasonable operative alternative in cases with obstructed tumors of the rectosigmoid junction which necessitate removal of the upper rectum. Subtotal colectomy with ileosigmoid or ileorectal anastomosis is one of the standard procedures for obstructed tumors of the left colon.

The lower the level of the anastomosis, the greater the number of bowel motions per day.

Case presentation

We made a retrospective study of the two patients admitted in our hospital with multiple tumors of the large bowel for which we performed a total colectomy, preserving the rectum and building a "J-pouch" for delaying intestinal e mpty.

The first patient, U.I., was a 52 years old male, admitted for rectal bleeding, anemia, diarrhea, weight loss, abdominal discomfort and diffuse pain, feeling of fullness after a bowel movement, asthenia and pyrosis. The laboratory revealed an augmentation of the ESR and a microcitary hypochromic anemia (Hb=8.49 g/dl; Ht=30.72%). The colonoscopy revealed colonic polyposis with malignant changes in 6 polyps on the ascendant, transverse, descendant and sigmoid colon. The rectum was free of polyps endoscopically. The ultrasonography revealed a 4 cm liver metastasis in the 6th segment. Also, the upper endoscopy diagnosed a chronic gastritis. We performed a xifopubian incision and we prepared the entire large bowel, ligating the right, middle and left colic arteries, along with sigmoidal arteries. The proximal section of the small intestine was made at 15 cm distance from ileo-cecal valve and the distal one was made on the sub-peritoneal rectum. We prepared a reservoir from the distal ileon of about 40 cm in length with a longitudinal continuous suture with absorbable material between the two loops (Fig. 1), anastomosed then at the bottom with the sub-peritoneal rectal stump in double layers with interrupted absorbable threads.

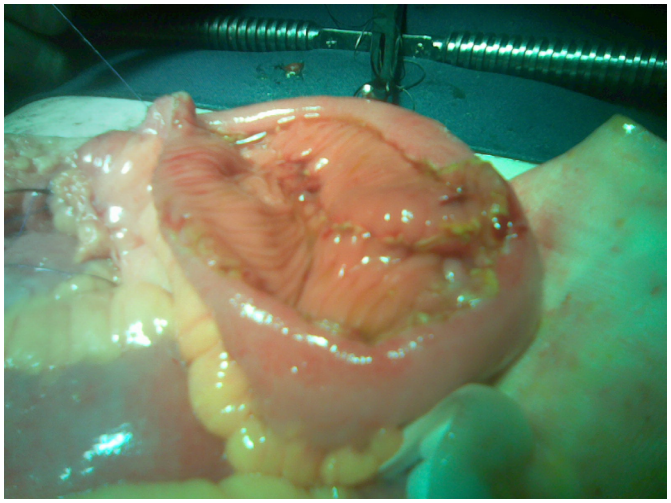

Figure. 1. Ileal pouch: side-to-side anastomosis between ileal segments

The evolution was without any complication and the patient was discharged 7 days later. The patient did not observe an increased stool frequency. The histopathology revealed many polyps, most of them pedunculated, measuring from 6 to 30 mm, and 4 malignant tumors after the macroscopically histopathology. The microscopy revealed six malignant tumors and other nine polyps (tubular and tubular-villous adenomas, one of them associated with high degree dysplasia). The first one was localized on the ascendant colon at 15 cm above ileo-caecal valve, it measured 40/35 mm and microscopically it was a colorectal tubular adenocarcinoma with medium differentiation, without extracellular mucinous component, infiltrating all the bowel layers, including the fat tissue. It had lymphatic invasion and a reduced lymphoid infiltrate, mild necrosis and peripherally there were aspects of adenoma with in situ adenocarcinoma. The second tumor was localized at 29 cm from the ileal stump, measured 7/4.5 cm and microscopically was described as a medium differentiate tubular-villous adenocarcinoma, without extracellular mucinous component, infiltrating all the bowel layers, including the serosa, with reduced lymphoidal infiltrate and necrosis, without angiolymphatic invasion. The third tumor was situated at 4 cm above the rectal section, measured 5/4.5 cm and 5.4 cm profound invasion; microscopically it was a tubular-villous adenocarcinoma cu mucous secretion, infiltrating all the layers but the serosa; it had lymphatic invasion and foreign body granulomas into the sub-serous layer. The fourth tumor was a tubular adenocarcinoma with mild differentiation, with a reduced lymphatic invasion and lymphoid infiltrate, infiltrating all the layers but the serosa; the tumor was localized at 20 cm above the rectal stump and measured 5/5 cm and 1.3 cm in depth. The other two malignant tumors found on microscopically examination were situated at a 14 cm distance from ileal limit of resection (a tubular malignant adenoma infiltrating inclusive the muscular inner layer, with no angiolymphatic invasion). The sixth tumor was situated at 34 cm above the ileal section, infiltrating the sub-mucosal layer and it was a malignized tubular adenoma. From the 42 lymph nodes resected 4 had metastases. The result was of a malignant colonic polyposis with 6 synchronous malignant neoplasms, TNM stage IIIB (pT3N2aMx) L1V0R0. After surgery, the patient followed a chemotherapy program. We have to say that we did not nor performed a biopsy from the liver metastasis.

At this moment, after almost 2 years the patient is well, has 2 bowel motions per day, a good degree of anal continence and the hepatic metastasis has not grown.

The second patient was M.G., 77 years old, male, admitted for anemia, and diagnosed two months earlier with a prostatic adenocarcinoma invasive into the urinary bladder under hormonal treatment. Also he was diagnosed with arterial hypertension, ischemic heart disease leucopenia, antral gastritis Helicobacter pylori positive, osteoporosis and thoracic scoliosis. The abdominal ultrasonography revealed splenomegaly (145/60 mm), aortic atherosclerosis, a small cortical cyst of the right kidney, prostatic tumor invasive into the bladder. The colonoscopy revealed polyps and tumors: next to the ileo-caecal valve an exophitic non-obstructive tumor; a 1 cm polyp on the ascendant colon; a 5 cm tumor on the transverse colon with polipoid aspect, partially pediculate, with a large implantation base; a 1.5 cm polyp on the descendent colon; a 2 cm polyp with a long pedicle, with irregular erythematous surface on the sigmoid colon; the rectum is without lesions; in the anal channel hemorrhoids. From the tumors and polyps were made biopsies, which revealed adenocarcinoma. Before surgery it was initiated martial therapy, transfusion, hypotensive therapy. The patient was submitted to surgery and it was found adherences after appendectomy, a 3 cm liver metastasis on the 6th segment (previous diagnosed by abdominal ultrasonography), multiple polyps palpated through the large bowel, the last one localized 30 cm above anal orifice, the obstructive, ulcerous-vegetant caecal tumor. We made

a total colectomy with restoration of bowel continuity by an ileal J-reservoir anastomosed to the rectum (Fig. 2).

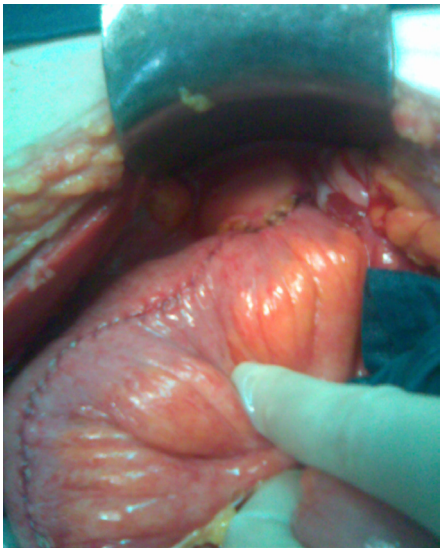

Fig. 2. The J-ileal pouch made with two ileal loops is anastomosed to the rectal stump

A schema for the surgical intervention may be seen in the following figure (Fig. 3), with the removal of the entire large bowel, remaining the ileum and the rectal stump; the continuity is restored by a J-pouch made from ileal loops.

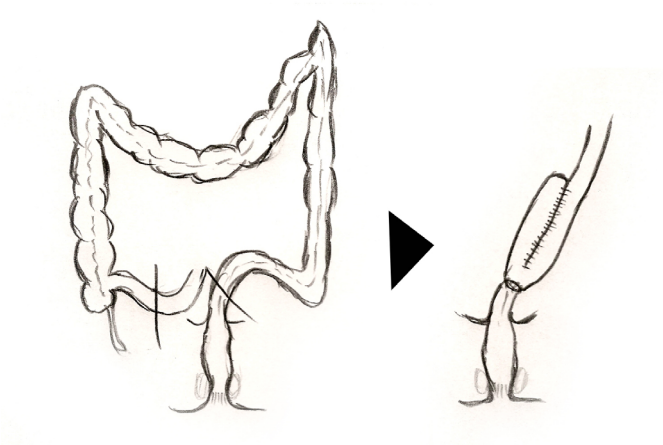

Fig. 3. The ileal J-pouch creating a reservoir in our patients; a similar type was made by Utsunomiya in 1980 (Heuschen *et al* 1999).

Postoperatively, the patient recovered well but appeared a complication: an acute laryngitis after the anesthetic oro-tracheal intubation and an acute toxic hepatitis due to medical drugs for which he followed a medical treatment with liver protective drugs. The histopathologic examination revealed a caecal infiltrating tumor of 5.0/3.5 cm and many polyps, most of them pedunculated. Microscopically the tumor is a medium differentiated tubular-villous adenocarcinoma, with a 5% extracellular mucinous compound; the polyps are tubular and tubular-villous adenomas with high degree dysplasia, one of them with an adenocarcinoma in situ. The metastasis was made exclusively of necrotic adenocarcinoma tissue. All the lymph nodes were free of metastases. The stage was TNM IVA (pT3N0M1a) L0V0R0, D (Dukes), D (MAC).

The patients are content with this type of restoration of the bowel continuity, they have a variable number of stool per day (usually 2 or 3, depending also of the food) frequency; in the first three months they faced minor incontinence problems with necessity to use pads, which disappeared later. They also observed moments of urgency and noticed rarely a sensation of incomplete evacuation. They did not need antidiarrheal drugs.

Discussions

Even if we present just two cases resolved by this operation, we consider that for malignant rectocolic polyposis (without polyps on the lower rectum), it is a procedure of choice, giving better results concerning bowel motions and discomfort of the patients. It is a safe procedure for selected patients. We say that because in another case in which it was diagnosed a splenic flexure cancer, multiple polyps and a superior rectal tumor biopsy-negative we could not perform this operation due to development of severe bowel obstruction with giant dilatation of the small bowel which could not be utilized for creating the J-pouch. In other cases we made straight ileo-rectal anastomosis.

Most of the studies compared the colonic pouch after low anterior rectal resections for rectal cancer. It is generally used either sigmoid bowel or descendent colon, with similar results, even if the descending colon has the advantage of being less muscular and more distensible than the sigmoid colon, which might improve the mid-term functional results, the follow-up suggesting that the descending colon adapts better (Ho 2006). After such an operation it is possible to perform a coloanal anastomosis or building a colonic pouch. Several studies demonstrated that a colonic J-pouch is functionally superior comparing to a straight coloanal anastomosis observing fecal incontinence and stool frequency, at least in the early postoperative period (Koh *et al* 2007). The patients with a pouch more than 10 cm may have evacuation difficulties, such as fragmentation of stool evacuation, and nowadays it is preferred a 5 cm colonic pouch, which is able to function adequately as a neo-rectum (Koh *et al* 2007). The incidence of anastomotic leaks is reduced by colonic J-pouch reconstruction made of the sigmoid colon; the pouch function is increased without compromising evacuation, providing better functional outcome comparing to a straight coloanal anastomosis, even 2 years or more after surgery, in patients whose anastomosis is less than 8 cm from the anal verge, observing that the patients with ultralow anastomoses, less than 4 cm from the verge, appear to benefit the most (Hida *et al* 2004; Hida & Okuno, 2010). Later, at 2 years postoperatively the patients seem to have similar results of bowel frecquency, either by coloanal anastomosis or with colonic J-pouch reconstruction.

Total colectomy or proctocolectomy is reccomended for ulcerative colitis, knowing that 30-40% of the patients need surgical treatment during the course of the disease, because of refractory symptoms to medical treatment, these procedures being made in order to prevent recurrence of systemic inflammatory disease, dysplasia and bowel cancer. Also, the ileal-pouch-anal anastomosis after a total proctocolectomy became the surgical therapy of choice also for familial adenomatous polyposis (Heuschen *et al* 2001). After a total proctocolectomy the creation of an ileal J-pouch has become the procedure of choice (Lichtenstein et al 2006). There are complications described after such procedures: anastomotic leaks, pelvic sepsis and abscess, fistulas,

strictures, pouchitis and pre-pouch ileitis, small bowel obstruction or haematomas diagnosed using fluoroscopic contrast examination, ultrasound, CT or MRI (Öresland *et al* 1989; Brown *et al* 1990; Bell *et al* 2006; Crema *et al* 2006, Nadgir *et al* 2006; Donatti *et al* 2010); also there are described urgency, leakage, nocturnal soiling and sexual dysfunction. The symptomatology of pouchitis include bloody diarrhea, urgency of defecation with abdominal cramps, malaise, occasionally fever and arthritis; this nonspecific inflammation of the ileal reservoir is a major long term complication occurring in 8-44% of patients and the explananation could be because of bacterial overgrowth inside the pouch or a novel manifestation of the inflammatory bowel disease (Salemans *et al* 1992). Chronic pouchitis implies the risk of malignant transformation of the pouch mucosa (Heuschen *et al* 2001). In case of failure of ileal pouch the patients could need a permanent ileostomy. In time there were used different types of ileal pouches, described very well by Heuschen *et al* (1999), from Parks in 1978, Utsunomiya in 1980 and Fonkalsrud in 1982 to W-type for Nicholls in 1985, Thou in 1985, Harms in 1987, Nasmith in 1986, Brummelkamp in 1987 and Martin in 1986. The pouches have few functional differences (Hewett *et al* 1995), even if the W-pouch seemed to have advantages. Better results favoring the W-shape pouch were obtained by other authors (Selvaggi *et al* 2000) who compared the frequency of defecation and other functional data collected at 4, 8, and 12 months after ileostomy closure in patients after a total proctocolectomy with ileal J- or W-pouch-anal anastomosis made for ulcerative colitis; they measured also the maximum tolerated volume by a latex balloon inflated with water, the maximum resting anal pressure, maximum voluntary contraction, and the rectoanal inhibitory reflex in the same period. The W-shape ileal-pouch was favored also by Hatakeyama et al (1989), observing that the defaecatory function is better when is constructed a large and wide reservoir. In literature are described four shapes of ileal-pouch-anal anastomosis: the S-shape (more than 50% of patients with this type of reconstruction need to use a catheter for evacuation), the J-shape (there is a higher frecquency of defaecation and night evacuations), the H-shape and the W-shape (Hatakeyama *et al* 1989).

The morphologic changes (inflammatory infiltration and alterations in mucosal architecture) were studied in the ileal pouch after a total colectomy with an ileal J-pouch-anal anastomosis up to 3 years after surgery and it was found a marked flattening of the villi and an augmentation in crypt number and length. Also, in time, it was noted an improved neorectal function of the pouch (stool frequency, pouch volume, and intestinal transit), and the ileum which acquires progressive colonic capacities in accordance with its morphologic transformation to a colonic type mucosa (Nicholls *et al* 1981; Lerch *et al* 1989; Garcia-Armengol *et al* 1998; Ettorre *et al* 2000; Fruin *et al* 2003). The chemical studies have shown a change of pouch mucin from small bowel-type sialomucin to colorectal sulfomucin (Shepherd *et al* 1987; de Silva *et al* 1991). As a result of the post-operative adaptation of the ileum to its function as neorectum (Donatti *et al* 2010), deep clefts in the ileal pouch mucosa resembling rectal valves, so-called "pseudovalves of Houston" (Alfischer *et al* 1997) could be observed during a pouchography (fluoroscopic contrast examination). Among the complications developed after the creation of a J-pouch it was reported the development of cancer (even 12 years after surgery) from the rectal mucosal remnants in patients treated with restorative proctocolectomy for ulcerative colitis, suggesting that it is better to perform the anastomosis either at the level of the dentate line or above to the anal transitional zone; when exists high-grade dysplasia at the rectum it is advisable to perform either an ileal pouch-anal anastomosis with mucosectomy or completion proctectomy with an end Brooke ileostomy should be offered (Rotholtz *et al* 2001; Candioli *et al* 2007).

For the treatment of familial adenomatous polyposis surgery is followed by an ileal pouch-anal anastomosis or an ileo-rectal anastomosis, many studies promoting good results with the first technique; also the procedure can be made laparoscopically which can offer other advantages (lower adhesion formation resulting in less small bowel occlusion; prevention of sexuality, fertility and childbirth functional issues threatened by the pelvic maneuvers of the pouch technique, prevented by close rectal wall dissection and a laparoscopic approach (Leonard *et al* 2011).

Conclusions

The J-pouch procedure after a total colectomy is safe and it gives good condition of life, the patients are content and they do not have very many bowel motions per day. We consider that it is better to perform an ileal J-pouch-rectal anastomosis than an ileo-rectal anastomosis or ileo-anal anastomosis after a total rectocolectomy for rectocolic cancer.

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