Functional results after TME: J-pouch vs straight coloanal anastomosis and role of neoadjuvant radiochemotherapy

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Gaetano Luglio, Stefania Masone, Gennaro Quarto, Giacomo Benassai, Viviana Sollazzo, Rachele Tarquini, Valerio Celentano, Mariano Giglio, Luigi Bucci

Department of General, Oncological, Geriatric Surgery and Advanced Technologies, University of Naples "Federico II"

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AIM: *Purpouse of this study was to evaulate short and long term funtional outcomes after TME (total mesorectal excision) for rectal cancer. The role of straight anastomosis or colonic J-pouch reconstruction is investigated, as well as the impact of preoperative chemoradiotherapy is analyzed as a cause of the so called "anterior resection syndrome".*
METHODS: *We enrolled 40 patients (17 male and 23 female), in which a low anterior resection was performed: they were divided in four groups: A1 (Straight and no RCT), A2 (Straight and RCT), B1 (J-pouch and no RCT), B2 (J-pouch and RCT). Follow-up was performed six and twelve months after surgery, through a clinical questionnaire (to assess: stool frequency, incomplete emptying, the presence of fecal leakage, urgency and incontinence) and through anorectal manometry (to assess rest pressure, squeeze pressure, max tolerated volume and compliance). Results were evaluated through T-Student and Chi-Squared test.*
RESULTS: *Six months after surgery, colonic J-pouch offers the best clinical and functional results, in both radiated and not radiated patients (except for incomplete emptying); in the straight group, however, there is an improvement of results after twelve months. Chemoradiation therapy is always associated with worse functional results.*
DISCUSSION: *RCT seems to invalidate J-pouch function in particular, in fact twelve months after surgery the difference between J-Pouch and Straight groups is not statistically different for most of the parameters.*
CONCLUSION: *J-pouch gives a real functional advantage for only six months after surgery, especially in patients treated with neoajuvant chemoradiation therapy.*

KEY WORDS: Anterior resection syndrome, J-pouch, Rectal cancer, TME

Introduction

Total mesorectal excision (TME) has been demonstrated to be crucial to achieve the best oncological results in surgical treatment of rectal cancer, allowing to reduce local recurrences till 4% [1-3]. This technique, togheter with the acquisition of the safety of a two cm free disease margin [4-5] and together with the development of adjuvant and neoadjuvant chemoradiation therapy procedures, has led to a great improvement in overall survival in rectal cancer and to the reduction of abdominal-perineal resections. With regard to functional results, however, the main problem after a sphincter-saving proctectomy is the "anterior resection syndrome", characterized by high stool frequency, incontinence, urgency and soiling [6-12]. In order to reduce this syndrome, colonic J-Pouch reconstruction has been described by Lazorthes[13] and Parc [14] in 1986. More, functional results may also be impaired by adjuvant and neoadjuvant

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Correspondence to: Dr Gaetano Luglio, Department of General, Oncological, Geriatric Surgery and Advanced Technologies University of Naples "Federico II", Naples (E-mail: gaetano.luglio@gmail.com)

radiochemotherapy (RCT), which is currently recommended in stage II and III rectal cancer, as it is demonstrated to give survival benefits, particularly being able to reduce local recurrences [15-16]. RCT, however, leads to a further decline of functional results, caused by sphincter and pelvic nerves damage [17]. A small number of study from literature, moreover, analyze the role of preoperative RCT in affecting pouch function. Aim of this study is to compare functional results after J-pouch and Straight coloanal anastomosis and to evaluate functional consequences of neoadjuvant chemoradiation therapy, in order to assess if the use of neoadjuvant RCT can influence surgical choices.

Materials and Methods

Forty patients have been enrolled in this prospective study from 2009-2010. Twenty-three were female; mean age was 64 (range 47-75). All the patients were affected by middle and lower third rectal cancer. Inclusion criteria were: normal preoperative sphincter function (evaluated with clinical examination and manometry) and no postoperative complication who might have affected results (such as anastomotic leak). All the patients underwent a sphincter-saving procedure, with total mesorectal excision and coloanal anastomosis. Patients were divided into two groups: straight coloanal anastomosis group (Group A) and colonic j-pouch group (Group B). We use to fashion a 7 cm colonic J-pouch with a linear stapler, as a bigger reservoir might give problems as incomplete emptying.

Patients were preoperatively staged with endorectal ultrasound (1850 BK-Medical, 10 MHz). Twenty patients (50%) were staged as T1/T2 and twenty patients (50%) were staged as T3/T4. In Group A, ten patients which were staged as T3/T4 (Group A2), underwent preoperative RCT; the remaining patients which were staged as T1/T2 (Group A1) underwent surgery with no other preoperative therapy. In Group B, 10 patients were staged as T3/T4 (Group B2) and underwent preoperative RCT and 10 patients, staged as T1/T2 (Group B1) had no preoperative RCT.

Neoadjuvant radiochemotherapy regimen was characterized by a long term course radioterapy (45 Gy in 5 weeks plus a 5 Gy boost), associated with 5-FU continuous infusion. Surgery was performed 6 weeks after completion of neoadjuvant treatment.

All the patients were assessed six and twelve months after surgery with anal manometry and a clinical questionnaire, in order to assess: stool frequency/24 hrs, incomplete emptying, soiling, urgency, incontinence. Anal manometry (Menfis Biomedica, Bologna, Italy) allowed to identify the following parameters: rest pressure, squeeze pressure, max tolerated volume, compliance. Results were evaluated through T-Student and Chi-Squared test

Results

Six months after surgery, J-pouch offers the best functional results, both in radiated and not radiated patients. Stool frequency was significantly lower in J-pouch patients: A1 (5.3+/-2.4) vs B1 (2.6 +/-1.1); A2 (7.0 +/-3.9) vs B2 (3.1+/-1.9). Soiling was significantly lower in pouch patients (A1: 60%; B1: 10%; A2: 60%; B2: 30%); urgency was a more significant problem in straight anastomosis patients (A1:80%; B1: 20%; A2: 60%; B2: 20%), as well as the incontinence (A1: 40%; B1: 0%; A2: 50%; B2: 0%). J-pouch seems to offer worse results only with regard to incomplete emptying (A1:0%; B1: 40%; A2:0%; B2:50%).

Twelve months after surgery J-pouch still offers better function in patients not pre-treated with chemoradiotion (B1). Anyway straight anastomosis patients not pre-treated (A1) show a functional significant improvement, that appears to be similar to functional outcomes observed in the B1 group. More, results achieved in A1 twelve months after surgery are better than those obtained in both groups treated with neoadjuvant therapy (A2, B2). Stool frequency (A1: 2.5+/-1.4; B1: 1.2+/-0.6; A2: 3.2±1.8; B2: 3.4+/-2.2). Soiling (A1: 30%; B1:10%; A2:60%; B2:40%). Urgency (A1: 30%; B1:0%; A2: 90%; B2:70%). Incontinence (A1:20%; B1:0%; A2:40%; B2:20%). J-pouch still shows some incomplete emptying problems twelve-mothts after surgery (A1: 0%; B1:80%; A2:0%; B2:20%).

Anal manometry also confirms this clinical trend. Six months after surgery we found:

rest pressure (35.0 ± 12.0 mmHg in A1; 50.2 ± 14.6 mmHg in B1; 29.6 ± 9.3 mmHg in A2; 45.0 ± 10.6 mmHg in B2), ***squeeze pressure*** (75.4 ± 26.5 mmHg in A1; 82.8 ± 34.1 mmHg in B1; 69.3 ± 24.2 mmHg in A2; 75.9 ± 35.7 mmHg in B2), ***max tolerated volume*** (68.5 ± 23.8 ml in A1; 120.0 ± 41.6 ml in B1; 65.7 ± 24.2 ml in A2; 114.6 ± 37.4 ml in B2), ***compliance*** (3.2 ± 4.6 ml/mmHg in A1; 7.8 ± 19.4 ml/mmHg in B1; 3.0 ± 3.5 ml/mmHg in A2; 7.3 ± 12.6 ml/mmHg in B2), which emphasize a better sphincter function in j-pouch patients, no matter the neoadjuvant therapy.

Twelve months after surgery, we've got a different manometric profile: ***rest pressure*** (50.2 ± 14.7 mmHg in A1; 61.6 ± 10.1 mmHg in B1; 34.7 ± 12.8 mmHg in A2; 45.3 ± 15.6 mmHg in B2), ***squeeze pressure*** (106.5 ± 58.9 mmHg in A1; 122.0 ± 67.4 mmHg in B1; 76.2 ± 41.9 mmHg in A2; 86.6 ± 50.3 mmHg in B2), ***max tolerated volume*** (83.3 ± 27.6 ml in A1; 155.0 ± 53.4 ml in B1; 55.6 ± 18.2 ml in A2; 80.4 ± 24.9 ml in B2), ***compliance*** (6.4 ± 6.6 ml/mmHg in A1; 8.5 ± 5.3 ml/mmHg in B1; 4.2 ± 2.7 ml/mmHg in A2; 5.8 ± 3.1 ml/mmHg in B2). Data show a better overall performance and function in J-pouch patients not treated with preoperative RCT, together with a significant improvement in straight anastomosis patients not treat-

ed with RCT. On the other hand, all other patients treated with preoperative RCT do not show any further improvement and sometimes their function seems to get worse, particularly in j-pouch patients.

Discussion

Impaired sphincter function in patients operated on for rectal cancer depends on several parameters, such as anastomosis level, nerve injuries, preoperative function, "reservoir" function. After its first description, several studies have demonstrated the superiority of colonic j-pouch in terms of functional results [18-19,] with lower incidence of soiling, urgency and a decreased stool-frequency. On the other hand some studies demonstrate that after 1 or 2 year there is a functional adaptation of the pelvic colon and functional results tend to become similar to the j-pouch [20-22].

One more aspect that needs to be considered is the effect of radiotherapy on pouch function, due to the damage to both the sphincter and the muscolar colonic wall and rectal stump; Dehni et al. [23], describe a significant impairement of pouch function in patients treated with chemoradiation therapy, with high incidence of diarrhea and incontinence.

Our study shows how colonic j-pouch gives much better results in not radiated patients and particularly in the first 6 months. Straight anastomosis gives poor results after six months, but they signicantly improve after 12 months thanks to colonic adaptation. J-pouch patients who received preoperative radiotherapy show acceptable results after six months, but clinical and manometric profile get worse twelve months after surgery, with higer incidence of incontinence, soiling and urgency; complete emptying, on the other hand, shows a significant reduction, probably due to pelvic fibrosis which prevents further enlargement of the pouch.

Anyway J-pouch offers some advantages both in radiated and not radiated patients, but these advantages seem to be really modest after preoperative RCT and mostly limited to the first six months.

Conclusion

Colonic J-pouch in patients with rectal cancer suitable for conservative surgery gives better functional results a better quality of life compared with straight coloanal anastomosis. This advantages, however, are particularly significant in the first six months after surgery and in partients who did not underwent neoadjuvant chemoradiotherapy. Thus, in this latter group of patients, the choice of performing a J-pouch should carefully taken, in particular if anatomical conditions make the procedure technically challenging.

Riassunto

Il numero di amputazioni addominoperineali performate per cancro del retto si sta sempre più riducendo negli ultimi decenni, grazie a nuove acquisizioni di tipo oncologico, come la TME e soprattutto la consapevolezza di una adeguatezza oncologica di un margine distale di 1-2 cm. Questo ha incrementato il numero di procedure conservative con salvataggio degli sfinteri, ma ha allo stesso tempo sollevato l'attenzione sul tipo di ricostruzione da effettuare e la funzionalità defecatoria postoperatoria. Oltre all'anastomosi diretta, straight, coloanale, per migliorare la funzione postoperatoria è stata descritta la tecnica di J-pouch colica, che, duplicando l'ultima ansa colica a mezzo di una anastomosi latero-laterale realizzata con una suturatrice lineare, consente di creare un reservoir che migliora la funzione defecatoria postoperatoria. Altro fattore che inficia profondamente i risultati funzionali postoperatori è l'eventuale sovrapposizione con una terapia radiante pre o postoperatoria. In questo studio prospettico valutiamo il duplice effetto su una coorte di 40 pazienti sia della radioterapia preoperatoria, sia della j-pouch, raffrontata all'anastomosi diretta straight, valutando i risultati funzionali a mezzo di un questionario clinico e della manometria anorettale a 6 e 12 mesi dopo l'intervento.

I dati dimostrano che sebbene la j-pouch sia associata a migliori risultati rispetto all'anastomosi straight, questi sono particolarmente evidenti soprattutto nei primi sei mesi dopo l'intervento e soprattutto nei pazienti non irradiati. C'è da segnalare che la funzionalità dell'anastomosi diretta (straight) mostra un sensibile miglioramento tra i 6 e i 12 mesi, probabilmente grazie a meccanismi di adattamento del colon trasposto in pelvi, che tende ad aumentare la compliance. I pazienti irradiati mostrano complessivamente risultati funzionali alquanto scadenti e, soprattutto quelli trattati con pouch, spesso mostrano un peggioramento dei parametri (come incontinenza, soiling, urgenza) a dodici mesi, rispetto a sei mesi. In questi pazienti, quindi, già chemiotrattati preoperatoriamente, la scelta di performare una pouch colica dovrebbe probabilmente essere presa cautamente, soprattutto se le condizioni anatomiche (pelvi stretta, lunghezza del colon, presenza di diverticoli) rendono la procedura tecnicamente complessa o rischiosa.

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