

Functional outcome of total anorectal reconstruction: incontinence or constipation?

Vincenzo Violi, Adamo Stefano Boselli, Massimo De Bernardinis, Renato Costi, Leopoldo Sarli, Domenico Iusco, Luigi Roncoroni

Clinica Chirurgica Generale e Terapia Chirurgica, Dipartimento di Scienze Chirurgiche, Università di Parma

Abstract. *Background and aims:* Besides incontinence, constipation is important after TAR. We aimed at evaluating their correlation and role in functional outcome. *Materials and methods:* 81 diaries in 16 patients (up to 8 years) were assessed, by a specific scoring system, regarding incontinence and evacuation. In the overall series and in three postoperative time groups, the correlation between the two items, their mean scores and relative score rates (% of the maximum possible scoring) were calculated. *Results:* The Spearman correlation coefficient in all assessments was -0.128. According to timing, it was: 0.468 (short term), -0.036 (mean term) and -0.69 (long term). Incontinence was more disabling than evacuation; constipation occurred more frequently. Incontinence improved over time; constipation did not substantially change. *Conclusions:* Current criteria for functional assessment do not describe the true conditions after TAR and their variations over time. Profound consideration is necessary before announcing ultimate judgements on TAR.

Key words: Anorectal reconstruction, graciloplasty, abdominoperineal resection

Introduction

Irrespective of evaluation or application criteria utilised, the rate of results considered as being favourable after abdominoperineal resection (APR) and total anorectal reconstruction (TAR) by gracilis muscle transposition ranges from 53% to 87% (Table 1) (1-10). However, the evaluation of functional outcome as reported in the literature is difficult because of the great variety and heterogeneity of factors affecting surgical and electrodynamic procedures, assessment conditions and time and, above all, methods of evaluation, which usually consider continence as the sole indicator of success.

In previous reports (8, 11) we expressed the opinion that continence is the most important but not the exclusive issue after TAR, since constipation is also very frequent and may affect the quality of life.

In a recent article, the authors most experienced in anal sphincter replacement (The Working Party on Anal Sphincter Replacement - WPASR) (12) acknowledged the importance of this issue and proposed a combined incontinence and evacuation scoring system, based on the consensus that "because ease of evacuation has proven to be an important issue, particularly after electrically stimulated skeletal muscle neosphincter for congenital incontinence and total anal reconstruction, an assessment of this function be incorporated into the scoring system". Thus, the WPASR worked out two independent I-to-IV scales for incontinence and evacuation items (Table 2).

After a short account of the pathophysiological mechanisms which, after TAR, may lead to continence and evacuation, this lecture will explain how much incontinence and constipation did affect functional outcome in our patients.

Table 1. Functional results after Total Anorectal Reconstruction (only series with ≥ 8 cases have been included)

Authors	Pt. no.	Type of EMS	Follow-up (months)	Good result (%)	Evaluation methods
Simonsen et al. (1)	22	None	12-108	77	4-stage continence class.
Santoro et al. (2)	11	IEMS	2-32	73	3-stage continence class.
Seccia et al. (3)	42*	IEMS	16-100	71	Modified Corman scale
Mander et al. (4)	8	CEMS	≥ 18	75	Not specified (Williams?)
Geerdes et al. (5)	20	CEMS	1-60	53	Williams scale
Cavina et al. (6)	26	CEMS	4-68	85	Williams scale
Rosen et al. (7)	16	CEMS	3-53	68	Williams scale
Violi et al. (8)	8	I+CEMS	1-48	87	Jorge & Wexner scale
Rouanet et al. (9)	9	CEMS	14-50	66-75	Adverse events number
Rullier et al. (10)	12	CEMS	3-48	58	Williams scale

IEMS: Intermittent, temporary, external-source EMS

CEMS: Continuous EMS (Implantable Pulse Generator)

*: Ten patients with CEMS are included in the series of Cavina, '98

Table 2. Original WPASR incontinence and evacuation scoring system for sphincter replacement patients

Frequency	<i>Incontinence Scoring System</i>		
	Incontinence for gas or minor staining		Incontinence for liquid or solid stool
Never	I		I
<1/week	II		II
$\geq 1/\text{week}$ to <1/day	II		III
$\geq 1/\text{day}$	II		IV
Frequency	<i>Evacuation Scoring System</i>		
	Incomplete or failed evacuation	Strain >30 minutes	Enemas, irrigation or digital evacuation
Never	I	I	I
<1/week	II	II	II
$\geq 1/\text{week}$ to <1/day	III	III	III
$\geq 1/\text{day}$	IV	IV	IV

Pathophysiology of continence and evacuation after TAR

Apart from stool consistency, which does not depend on APR, decreased rectal capacity and compliance, which might be improved by colonic pouch, and anorectal angle, which is somehow restored by graciloplasty, all physiological mechanisms which maintain continence – related to both sensation and motility – are lost after anorectal excision. The reconstruction of a dynamic neosphincter apparatus by single or double gracilis muscle transposition guarantees in most patients a valid and effective basal tone. If adequately trained, patients can also acquire, over ti-

me, voluntary contraction so that, in most cases, this mechanism may contribute to continence, especially when some rectal sensation is present.

The perception of rectal distension is a debated question. While Abercrombie and Williams maintain the complete sensory loss after total anorectal reconstruction (13), the presence of another form of sensitivity is reported by most authors: the distension of the bowel might be felt as a feeling of fullness, and the pressure on the gracilis muscle might be interpreted as a call to stool (14). In any case, both rectoanal inhibitory reflex and sampling mechanism are irreparably lost after TAR. All this conditions a defective call to stool. In addition, although sitting (or squatting) and

Table 3. Patient-rated and surgeon-corrected scoring and grading scale for functional result evaluation after TAR (modified WPA-SR scoring system)

	Never	Seldom <1/week	Often ≥1/w.-<1/d.	Always ≥1/day
INCONTINENCE ITEMS				
<i>Incontinence for liquid or solid stool</i>				
Incontinence for solid stool	0	3	4	5
Incontinence for liquid stool	0	2	3	4
<i>Incontinence for gas or minor staining</i>				
Incontinence for gas	0	1	2	3
Minor staining	0	0	1	2
EVACUATION ITEMS				
Strain >30 min	0	0	1	2
Incomplete or failed evacuation	0	0	1	2
Enemas, irrigation, digital evacuation	0	0	1	2

The total score is determined by adding points from the above items.

Final grading into five categories:

Very good (1-4); Good (5-8); Fair (9-12); Poor (13-16); Very Poor (17-20)

straining give rise to a normally increased intra-abdominal pressure, neosphinter relaxation after switching off the stimulator may be inadequate. As an overall result, while some patients may also achieve an optimal evacuation ability, most complain of constipation, and evacuation has to be managed through enemas, albeit with differences as regards quantity and frequency.

Methods

Although we first evaluated our patients by the continence grading scale of Jorge and Wexner (15), we wondered right from the start of our experience whether a different system, more specific for TAR, might allow for a better description of the functional outcome after this type of graciloplasty. Thus, in recent years, we set up and used a different method for functional assessment, which resulted from an adaptation of the WPASR scoring system and which also took into account, besides continence, other more specific items regarding evacuation (16). In particular:

1. All incontinence+evacuation items of the WPASR system were included in a single form.
2. The form was submitted to 12 patients who had undergone TAR.

3. Each patient assigned a rating to each item↔frequency cell so as to obtain 100 as the maximum value.
4. The mean values of each cell were divided by 5 and rounded off so as to obtain a 0-20 scoring scale (patient rated scoring).
5. The patient rating was corrected by the authors using previously defined criteria (patient-rated surgeon-corrected scale), which preserved an objective severity rating of incontinence items but did not change the overall patient rating and, in particular, the partition between incontinence and evacuation overall scores (14 and 6 points respectively).

Eighty-one diary-based evaluations of functional results in 16 patients who underwent APR+TAR from 1994 to 2001 (prominent post-surgical steps and yearly controls up to 8 years) have been thereby assessed (or re-assessed) by the new scale (Table 3). The correlation between incontinence and evacuation scores was calculated (Spearman rank correlation coefficient), as well as the relative weight of the scores within each item groups, in the overall series and according to different postoperative times: soon after stoma closure (short-term assessments), at 1-3 years (mean-term assessments), at 4-8 years (long-term assessments).

Results

The distribution of the 81 assessments according to incontinence and evacuation scores is reported in Figure 1. The Spearman rank correlation coefficient in the overall series was -0.128 . In the three different postoperative time assessments it was: 0.468 (short term), -0.036 (mean term) and -0.69 (long term).

The mean incontinence score was 4.32 ; the mean evacuation score was 2.98 . The absolute incontinence rate (% of the maximum overall scoring) was 21.6 ; the absolute evacuation rate (% of the maximum overall scoring) was 14.9 . The relative incontinence rate (% of the maximum incontinence scoring) was 30.8 ; the relative evacuation rate (% of the maximum evacuation scoring) was 49.6 .

According to postoperative time, in the short-term assessments the relative incontinence rate was 44.3 (absolute rate: 31) and the relative evacuation rate was 53.3 (absolute rate: 16). In the mean-term assessments the relative incontinence rate was 30.2 (absolute rate: 21.1) and the relative evacuation rate was 52.3 (absolute rate: 15.7). In the long-term assess-

ments the relative incontinence rate was 21.7 (absolute rate: 15.2); the relative evacuation rate was 43.8 (absolute rate: 13.1)

Discussion and Conclusions

Although some correlation occurred at the early assessments, recorded soon after stoma closure, incontinence and constipation proved, on the whole, to be independent variables. Incontinence was considered, by our patients, as more disabling than evacuation. However, constipation occurred more frequently than incontinence.

Incontinence was more frequent in the early phases and improved in the long-term assessments. In effect, some of the pathophysiological factors which can condition incontinence after TAR (in particular, rectal capacity and compliance, and sphincter apparatus tone) may improve or be improved over time (halved incontinence scores in our series). In contrast, constipation did not substantially change and, in effect, apart from possible neosphincter stenosis – not considered in this study – which can be corrected by surgery, none of the pathophysiological factors which can condition constipation after TAR (in particular, rectoanal inhibitory reflex and sampling mechanism loss) may improve or be improved over time (unchanged evacuation scores in our series). The perception of rectal distension might improve over time, thereby improving both continence and evacuation, although the items used in our system do not include evaluation of rectal sensation.

Reluctance to adopt TAR and the critical attitude towards this procedure originate from criteria for functional outcome assessment which do not describe the true pathophysiological conditions and their variations over time. Profound consideration and revision of these criteria are therefore necessary before final judgement on total anorectal reconstruction can be made.

References

1. Simonsen OS, Stolf NA, Aun F, Raia A, Habr-Gama A. Rectal sphincter reconstruction in perineal colostomies after abdomino-perineal resection for cancer. *Br J Surg* 1976; 63: 389-91.

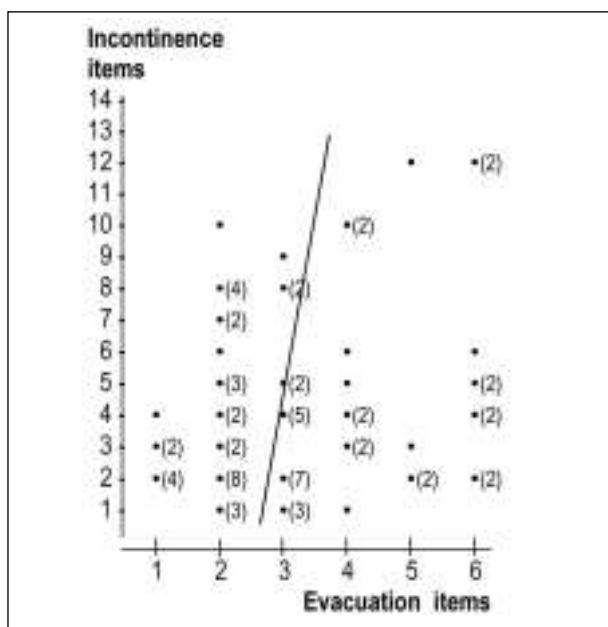


Figure 1. Distribution of 81 assessments of functional result (0-to-20 personal scoring system) according to scores given to incontinence and evacuation items. In parentheses the number of observations when $\neq 1$.

2. Santoro E, Tirelli C, Scutari F, et al. Continent perineal colostomy by transposition of gracilis muscles. Technical remarks and results in 14 cases. *Dis. Colon Rectum* 1994; 37 (Suppl.): 73-9.
3. Seccia M, Menconi C, Balestri R, Cavina E. Study protocols and functional results in 86 electrostimulated graciloplasties. *Dis Colon Rectum* 1994; 37: 897-904.
4. Mander BJ, Abercrombie JF, George BD, Williams NS. The electrically stimulated gracilis neosphincter incorporated as part of total anorectal reconstruction after abdominoperineal excision of the rectum. *Ann Surg* 1996; 224: 702-11.
5. Geerdes BP, Zoetmulder FAN, Heinemann E, Vos EJ, Rongen MJ, Baeten CGMI. Total anorectal reconstruction with a double dynamic graciloplasty after abdominoperineal reconstruction for low rectal cancer. *Dis Colon Rectum* 1997; 40: 698-705.
6. Cavina E. Outcome of restorative perineal graciloplasty with simultaneous excision of the anus and rectum for cancer. A ten-year experience with 81 patients. *Dis Colon Rectum* 1996; 39: 182-90.
7. Rosen HR, Novi G, Zoch G, Feil W, Urbarz C, Schiessel R. Restoration of anal sphincter function by single-stage dynamic graciloplasty with a modified (split sling) technique. *Am J Surg* 1998; 175: 187-93.
8. Violi V, Roncoroni L, Boselli AS, De Cesare C, Livrini M, Peracchia A. Total anorectal reconstruction by double graciloplasty. Experience with delayed, selective use of implantable pulse generators. *Int J Colorectal Dis* 1999; 14: 164-71.
9. Rouanet Ph, Senesse P, Bouamirrene D, et al. Anal sphincter reconstruction by dynamic graciloplasty after abdominoperineal resection for cancer. *Dis Colon Rectum* 1999; 42: 451-6.
10. Rullier E, Zerbib F, Laurent C, Caudry M, Saric J. Morbidity and functional outcome after double dynamic graciloplasty for anorectal reconstruction. *Br J Surg* 2000; 87: 909-13.
11. Violi V, Roncoroni L, Boselli AS, De Cesare C, Trivelli M, Peracchia A. Anorectal reconstruction after abdominoperineal excision: a state-of-the-art alternative to a conventional colostomy. *It J Gastroenterol Hepatol* 1999; 31: 267-8.
12. Madoff RD, Baeten CG, Christiansen J, et al. Standards for anal sphincter replacement. *Dis Colon Rectum* 2000; 43: 135-41.
13. Abercrombie JF, Rogers J, Williams NS. Total anorectal reconstruction results in complete anorectal sensory loss. *Br J Surg* 1996; 83: 57-9.
14. Baeten CGMI, Rongen MJ. Total anorectal reconstruction. Fact or fiction. *Swiss Surg* 1997; 3: 262-5.
15. Jorge JMN, Wexner SD. Etiology and management of fecal incontinence. *Dis Colon Rectum* 1993; 36: 77-97.
16. Violi V, Boselli AS, De Bernardinis M, Costi R, Trivelli M, Roncoroni L. A patient-rated, surgeon-corrected scale for functional assessment after total anorectal reconstruction. An adaptation of the Working Party on Anal Sphincter Replacement scoring system. *Int J Colorectal Dis* 2002; 17: 327-37.

Correspondence: Dr. Vincenzo Violi
Dipartimento di Scienze Chirurgiche
Sezione di Clinica Chirurgica Generale e Terapia Chirurgica
Università degli Studi di Parma
Via Gramsci, 14
43100 Parma
Tel: +39-0521-991158
Fax: +39-0521-940125
E-mail: vincenzo.violi@unipr.it