Rectal advancement flaps for the treatment of transphincteric perianal fistulas: a three-dimensional endoanal ultrasound and quality of life assessment

Marina Garcés-Albir[1], Stephanie Anne García-Botello[1,2], Vicente Pla-Martí[1,2], Jose Martín-Arévalo[1,2], David Moro-Valdezate[1,2], Alejandro Espi[1,2] and Joaquín Ortega[1]

[1]Department of General Surgery. Hospital Clínico. Universidad de Valencia. Biomedical Research Institute INCLIVA. Valencia, Spain. [2]Colorectal Unit. Department of General and Digestive Surgery. Hospital Clínico Universitario. Valencia, Spain

Received: 29/04/2020 · **Accepted:** 02/05/2020

Correspondence: Stephanie Anne García-Botello. Department of General Surgery. Hospital Clínico Universitario. Av. Blasco Ibáñez, 17. 46010 Valencia, Spain. **e-mail:** stephaniegarciabotello@gmail.com

ABSTRACT

This study quantifies the damage to the internal anal sphincter (IAS) after a rectal mucosal advancement flap for a high transphincteric fistula in 16 patients using 3D-endoanal ultrasound. This was correlated with postoperative incontinence and quality of life scores. The median length of involved IAS preoperatively was 50 % (20-100) and 93.72 % for EAS (47.4-100 %). IAS division did not influence continence ($p > 0.05$). Continence deteriorated between the pre-, postoperative ($p = 0.014$) and six-month follow-up ($p = 0.005$), with no significant differences after one year ($p > 0.05$). The FIQOL score and SF-36 deteriorated initially, with recovery in all domains except for mental health after one year. Three fistulas recurred (18.75 %).

Keywords: Rectal mucosal advancement flap. Endoanal ultrasound. Quality of life. Anal continence. Anal sphincter.

INTRODUCTION

Surgical management of perianal fistulas is associated with a considerable morbidity caused by damage to the anal sphincters. Incontinence rates after fistula treatment vary from 18 % to 82 % (1,2). The main objective of treatment is to obtain the highest cure rate whilst preserving continence. The extent of sphincter involvement by the fistula preoperatively or of the sphincter division post-operatively was subjectively evaluated via clinical and intraoperative examinations and 2D-endoanal ultrasound (EAUS) and magnetic resonance imaging. However, these techniques do not reliably and quantitatively correlate the amount of divided sphincter with postoperative morbidity. 3D-EAUS opens up new possibilities for diagnosis, allowing quantitative measurements of damage to the sphincters.

The objective of this study was to quantify the extent of the division of the internal anal sphincter (IAS) after rectal mucosal advancement flap (RMAF) using 3D-EAUS, and these results were correlated with quality of life (QOL) and incontinence scores.

METHODS

A prospective, observational, consecutive study was performed of patients over a two-year period. All patients were evaluated pre and post-operatively with a physical examination, 3D-EAUS, Jorge and Wexner incontinence score (JWS) and SF-36 and fecal incontinence (FI) QOL questionnaires (3). All examinations were repeated 6- and 12-months postoperatively, except 3D-EAUS.

Patients diagnosed with a high cryptoglandular perianal fistula, or with risk factors for postoperative FI such as females with an anterior fistulae, were scheduled for a RMAF. Patients undergoing other techniques such as fibrin

Preliminary results were presented as a podium meeting presentation in the ASCRS Annual Meeting in Hollywood, Florida (Ref.: P225 and P181).

Financial support: The manuscript has not received support in the form of grants, equipment, drugs, or any of these. The authors have no relevant financial relationships to disclose.

Author´s contribution: Author Garcés-Albir M and García-Botello SA contributed equally to this paper. All the authors have made substantial contributions to the conception and design, acquisition of data, analysis and interpretation of data, drafting of the article or critical revision for important intellectual content and final approval of the version for publication.

Garcés-Albir M, García-Botello SA, Pla-Martí V, Martín-Arévalo J, Moro-Valdezate D, Espi A, Ortega J. Rectal advancement flaps for the treatment of transphincteric perianal fistulas: a three-dimensional endoanal ultrasound and quality of life assessment. Rev Esp Enferm Dig 2020;112(11):860-863

DOI: 10.17235/reed.2020.7187/2020

glue, collagen plugs or stem cells etc. were excluded.

RMAF includes fistulectomy and curettage of the remaining tract up to the internal opening, followed by partial thickness mucosal flap. IAS is sutured and a trapeze shaped rectal flap is created with the mucosa, submucosa and circular muscle plane of the rectum.

Definitions were as follows:

- FI was evaluated using the adapted JWS (4). All degrees of FI were considered.
- Minor incontinence: involuntary loss of gas or liquid stool (4).
- Mayor incontinence: involuntary loss of solid stools (4).
- Soiling: involuntary seepage of small amounts of stool after defecation in patients who are otherwise continent (5).
- Recurrence: persistence or reappearance of symptoms.

All scans were performed by the same surgeon using a B&K Medical Systems ProFocus 2202® and B-K2050 transducer as previously reported (6). Quantitative measurements of the sphincters were taken as described in figure 1A.

Data was analyzed with non-parametric tests. The Wilcoxon test was used to compare anal continence and QOL in different periods. Likelihood ratio was used to contrast the independence hypothesis between sphincter division and the deterioration of anal continence. A value of $p < 0.05$ was considered as statistically significant. The Clinical Research Ethics Committee approval was obtained.

RESULTS

Seventeen patients with preoperative 3D-EAUS treated with a RMAF were included in the study. Two patients were lost to follow-up (Fig. 1B). Sixteen patients (nine male, seven female) with a median age of 44 years (25-70) were finally included and 15 patients completed QOL scores.

Preoperative 3D-EAUS measurements are shown in Table 1. The median length of involved IAS preoperatively was 50 % (range 20-100) and 93.72 % for EAS (range 47.4-100 %). Division of the total length of IAS was found via postoperative 3D-EAUS in 12 patients and below 66 % in four. There were no significant differences between the level of division of IAS and anal continence (Table 2). The EAS was not divided during surgery.

One patient had mild incontinence (1/20 JWS) and three patients had some extent of soiling preoperatively. Nine patients suffered postoperative deterioration in anal con-

Table 1. *Preoperative 3D EAUS measurements of involved IAS and EAS in patients with a rectal mucosal advancement flap*

	Preoperative measurements	
	%	mm
IAS	50 (20-100)	12.6 (6-29)
EAS	93.72 (47.4-100)	14 (5-22.8)

*Median (range).

Table 2. *Level of the defect in the IAS and deterioration in anal continence*

		Worsening anal continence		Total
		No	Yes	
Postoperative IAS division	Low	0	0	0
	Medium	3	1	4
	High	4	8	12
Total		7	9	16

Low: lower third of IAS; Medium: middle third of IAS; High: upper third of IAS. $p > 0.05$.

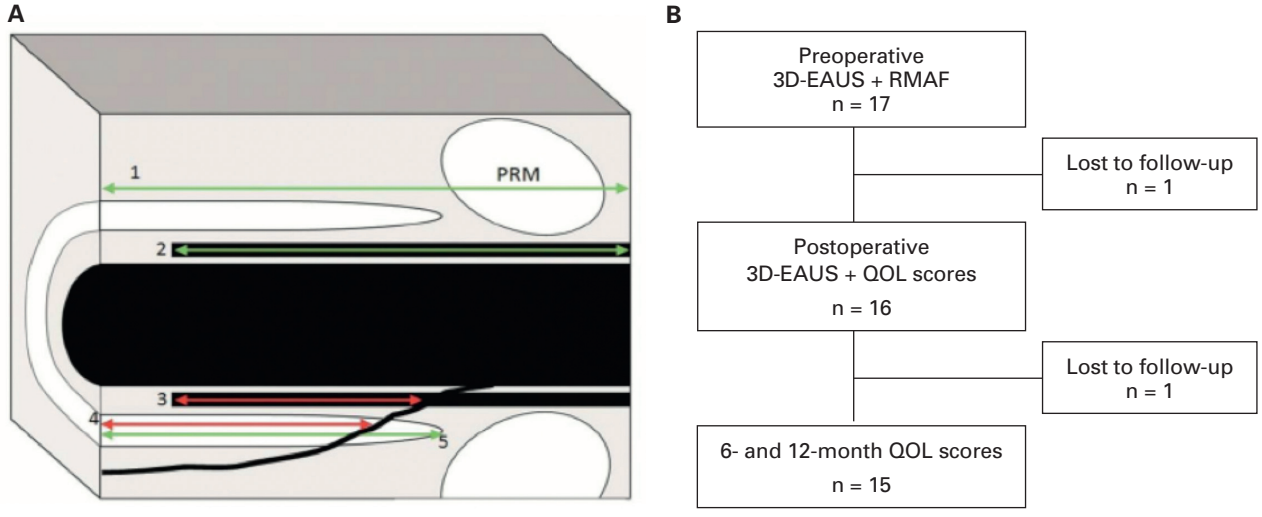


Fig. 1. *A. High posterior transsphincteric fistula. 3DEAUS diagram. Left sagittal section: 1 = anal canal length; 2 = internal anal sphincter (IAS) length; 3 = IAS length involved by the fistula; 4 = external anal sphincter (EAS) length involved by the fistula; 5 = EAS length; PMR = puborectalis muscle. B. Patient distribution (RMAF: rectal mucosal advancement flap; QOL: quality of life).*

tinence according to JWS and seven patients showed a deterioration in soiling. Six of the seven patients with deterioration in soiling also showed deterioration in FI. This incontinence was mild in the majority of cases, five patients improved, one did not change and only three patients remained incontinent at the one-year follow-up.

Follow-up and recurrence

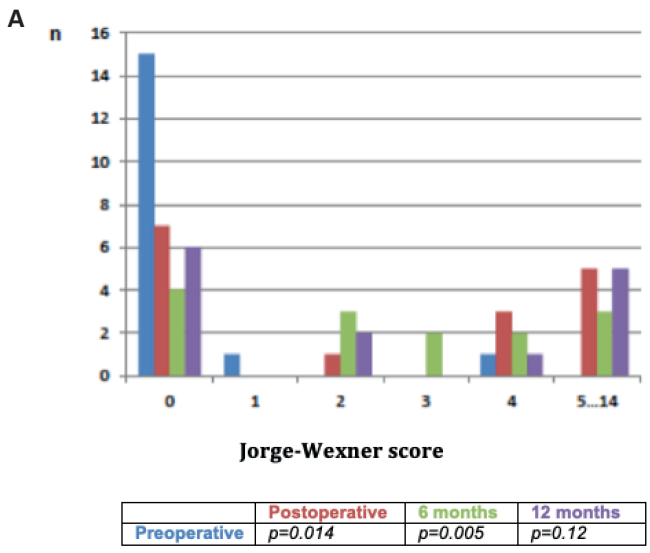
There are significant differences in soiling ($p < 0.05$) and anal continence between preoperative, eight-weeks ($p = 0.014$) and six-month ($p = 0.005$) postoperative values (Fig. 2). Three cases developed a recurrence after 12 months (18.75 %).

FIQOL

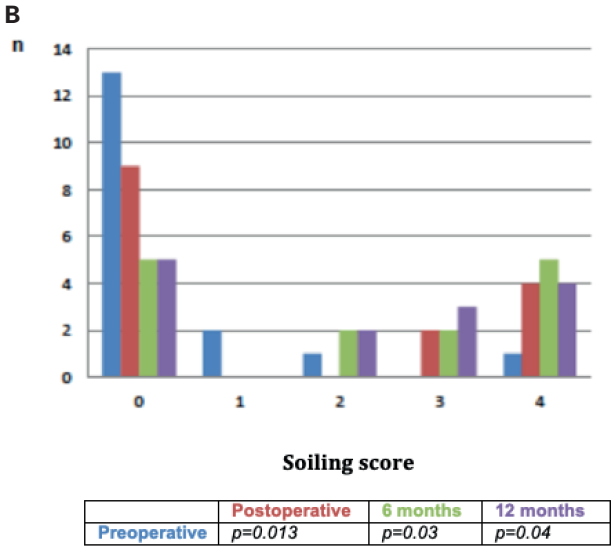
There was an overall postoperative deterioration in all domains, which slowly improved but did not fully recover to preoperative values after 12 months (Fig. 3A).

SF-36 QOL score

There is a postoperative deterioration in all domains except mental health score. These scores all improve and are fully restored to preoperative values after one-year follow-up with no significant differences at any of the given time points (Fig. 3B).

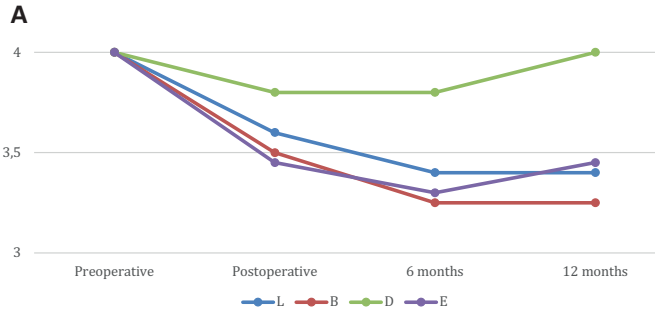


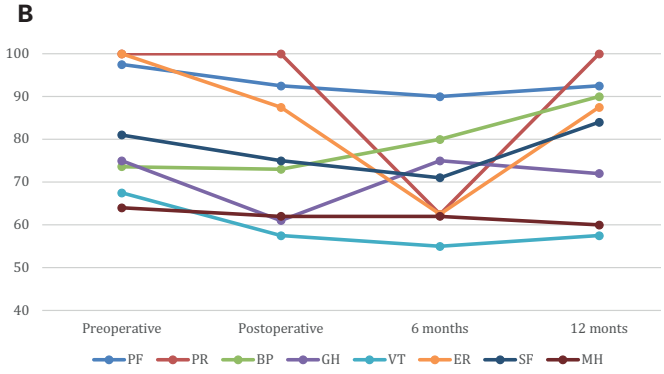
	Postoperative	6 months	12 months
Preoperative	p=0.014	p=0.005	p=0.12



	Postoperative	6 months	12 months
Preoperative	p=0.013	p=0.03	p=0.04

Fig. 2. *A. Anal continence pre- and post-rectal flap surgery, measured by the Jorge and Wexner score (0 = no incontinence, 20 = total incontinence). B. Soiling before and after rectal flap surgery (0 = never, 4 = always).*





	L	B	D	E
Preoperative	4	4	4	4
Postoperarive	3.6*	3.5*	3.8	3.45*
6 months	3.4*	3.25	3.8*	3.30*
12 months	3.4*	3.25	4	3.45

	PF	PR	BP	GH	VT	ER	SF	MH
Preoperative	97.5	100	73.6	75	67.5	100	81	64
Postoperative	92.5	100	73	61	57.5	87.5	75	62
6 months	90	62.5	80	75	55	62.5	71	62
12 months	92.5	100	90	72	57.5	87.5	84	60

Fig. 3. *A. FIQOL continence score preoperatively, eight weeks, six months and 12 months postoperatively in patients with rectal flap surgery. L: lifestyle; B: behavior; D: depression; E: embarrassment. Values are the average. *p < 0.05 vs preoperative values. B. SF-36 QOL score preoperatively, eight weeks, six months and 12 months postoperatively in patients with rectal flap surgery. PF: physical function; PR: physical role; BP: body pain; GH: general health; VT: vitality; ER: emotional role; SF: social function; MH: mental health. Values are the average. *p < 0.05 vs preoperative values.*

DISCUSSION

For most clinicians, RMAF is the most secure option for treating complex perianal fistulas. Fistulotomies generally seem to be associated with a lower recurrence rate but report a higher incontinence rate when compared to RMAF (7). Both techniques have a similar long-term healing rate, recurrence, continence and QOL when compared with LIFT, whereas ligation of the intersphincteric tract has the advantage of less postoperative pain (8). RMAF involves changes in anal continence in up to 35 % of patients, whilst recurrence rates are reportedly high (9). Other less invasive techniques used to treat high transphincteric fistulas have been described. De la Portilla et al. performed a phase II trial using platelet-derived growth factors (PDGF) with closure of the internal opening. A complete healing rate was reported in 33.3 % of 36 patients with improvement in pain and incontinence (10). Van del Hogen reported a 90 % healing rate in ten patients when injection of PDGF was associated with RMAF (11). Stem cells have also been used for treatment of all types of fistulae, with a 60 % healing rate in ten patients one year after surgery (12) and a 50 % healing rate two years later when associated with intralesional fibrin-glue (13). A comparison between different studies is difficult as there are major differences in the follow-up period, inclusion criteria and the definition of anal continence.

In our study, the fistulas involved over 50 % and 90 % of IAS and EAS, respectively. Division over 66 % of the IAS was associated with higher incontinence than division of the lower two thirds, with no correlation between the lengths of IAS division and deterioration in continence. Quantitative measurements of sphincters by 3D-EAUS allow us to obtain an objective measure of their injury. This type of measurement has enabled us to analyze the results of fistulotomies in a previous study (6).

During follow-up, two patients were lost and the recurrence rate at one year was 20 %. In total, ten patients suffered a worsening in continence according to JWS and/or in soiling (one soiling, six incontinence plus soiling and three only incontinence). Patients with previous incontinence were not excluded.

QOL scores are the best way to evaluate anal continence. Even though there are many authors who do not quantify changes in fecal continence in such detail, we believe this is necessary to standardize follow-up and compare results. Joy et al. already suggested this as they found difference between a normal clinical follow-up and that studied via QOLS (14).

During follow-up, we did not find that soiling significantly worsened after surgery. Anal continence deteriorates initially but fully recovers after one year. These changes in anal function may be multifactorial. Some studies have described a decrease in maximum resting and squeeze pressures, which they attribute to the prolonged use of anal retractors, full thickness rectal flaps or inadvertent damage to the EAS during fistulectomy (15).

The FIQOL score shows a mild postoperative deterioration, possibly due to that fact these patients have higher rates of fistulas, incontinence and recurrence. Most differences in the SF-36 score involve the "emotional role" domain, as this is the major limitation for most patients who have FI. When QOL domains were analyzed, patients did not present significant improvement at six months postoperatively. However, the sample size is low and it is difficult to make firm conclusions.

In summary, the majority of patients presented a division of IAS of over 66 % of the total length of IAS, as measured by 3D-EAUS. These patients showed a mild deterioration in anal continence but a significant deterioration in QOL parameters studied with the FIQOL score. At present there is no ideal treatment for complex perianal fistulas, which guarantees cure and preserves anal continence. Further studies are required to address this difficult problem.

REFERENCES

1. García-Aguilar J, Belmonte G, Wong WD, et al. Anal fistula surgery. Factors associated with recurrence and incontinence. Dis Colon Rectum 1996;39:723-9. DOI: 10.1007/BF02054434
2. Roig JV, Jordán J, García-Armengol J, et al. Changes in anorrectal morphologic and functional parameters after fistula-in-ano surgery. Dis Colon Rectum 2009;52:1462-9. DOI: 10.1007/DCR.0b013e3181a80e24
3. Mínguez M, Garrigués V, Soria MJ, et al. Adaptation to Spanish language and validation of the Fecal Incontinence Quality of Life Scale. Dis Colon Rectum 2006;49:490-9. DOI: 10.1007/s10350-006-0514-5
4. Jorge JM, Wexner SD. Etiology and management of fecal incontinence. Dis Colon Rectum 1993;36:77-97. DOI: 10.1007/BF02050307
5. Keighley MRB, Williams NS. Fecal incontinence. In: Surgery of the anus, rectum and colon. 3rd ed. Philadelphia: Elsevier; 2008. p. 593. ISBN: 9780702027239
6. Garcés-Albir M, García-Botello SA, Esclapez-Valero P, et al. Quantifying the extent of fistulotomy. How much sphincter can we safely divide? A three-dimensional endosonographic study. Int J Colorectal Dis 2012;27:1109-16. DOI: 10.1007/s00384-012-1437-3
7. Mizrahi N, Wexner SD, Zmora O, et al. Endorectal advancement flap: are there predictors of failure? Dis Colon Rectum 2002;45:1616-21. DOI: 10.1007/s10350-004-7248-z
8. Madbouly KM, El Shazly W, Abbas KS, et al. Ligation of intersphincteric fistula tract verus mucosal advancement flap in patients with high transsphincteric fistula-in-ano: a prospective randomized trial. Dis Colon Rectum 2014;57:1202-8. DOI: 10.1097/DCR.0000000000000194
9. Dubsky PC, Stift A, Friedl J, et al. Endorectal advancement flaps in the treatment of high anal fistula of cryptogladular origin: full-thickness vs. mucosal rectum flaps. Dis Colon Rectum 2008;51:852-7. DOI: 10.1007/s10350-008-9242-3
10. De la Portilla F, Segura-Sampedro JJ, Reyes-Díaz ML, et al. Treatment of transphincteric fistula-in-ano with growth factors from autologous platelets: results of a phase II clinical trial. Int J Cororectal Dis 2017;32:1545-50. DOI: 10.1007/s00384-017-2866-9
11. Van del Hagen SJ, Baeten CG, Soeters PB, et al. Autologous platelet-derived growth factors (platelet-rich plasma) as an adjunct to mucosal advancement flap in high crytptoglandular perianal fistulae: a pilot study. Colorectal Dis 2011;13:215-8. DOI: 10.1111/j.1463-1318.2009.01991.x
12. García-Olmo D, Guadalajara H, Rubio-Prez I, et al. Recurrent anal fistulae: limited surgery supported by stem cells. World J Gastroenterol 2015;21:3330-6. DOI: 10.3748/wjg.v21.i11.3330
13. García-Arranz M, García-Olmo D, Herreros MD, et al.; FISPAC Collaborative Group. Autologous adipose-derived stem cells for the treatment of complex cryptoglandular perianal fistula: a randomized clinical trial with long-term follow-up. Stem Cells Transl Med 2020;9:295-301. DOI: 10.1002/sctm.19-0271
14. Joy H, Williams JG. The outcome of surgery for complex anal fistulas. Colorectal Dis 2002;4:254-61. DOI: 10.1046/j.1463-1318.2002.00357.x
15. Balciscueta Z, Uribe N, Balciscueta I, et al. Rectal advancement flap for the treatment of complex cryptoglandular anal fistulas: a systematic review and meta-analysis. Int J Colorectal Dis 2017;32:599-609. DOI: 10.1007/s00384-017-2779-7