

# #566 Electromyography evaluation of the pelvic floor muscles and functional outcomes in patients who underwent rectal cancer treatment EFFORT trial

## Introduction

Earlier diagnosis, improved accuracy of preoperative imaging, preoperative (chemo)radiotherapy and total mesorectal excision (TME) has strongly improved prognosis of rectal cancer last decade. However, poor functional outcome after rectal cancer treatment is a major problem and an enormous impact on quality of life.

A unique cooperating central, somatic, autonomic and enteric nervous system maintains faecal and urinary continence. Surgical procedures and radiotherapy have impact on this continence mechanism leading to bowel dysfunction (Low Anterior Resection Syndrome: LARS 41%) urinary incontinence (38%), difficulty in bladder emptying (30%) (1) and sexual dysfunction (33%) (2). Studies showed sphincter weakness with anorectal manometry.

However, the specific function of all layers of the pelvic floor musculature remain unclear.

The aim was to clarify correlation between EMG values of individual muscles of the pelvic floor during contractions/ relaxation and functional outcomes (LARS) after rectal cancer treatment.

## Methods

This is a cross-sectional study. Patients treated in our hospital for rectal cancer between 01-2014 and 12-2018 with Low Anterior Resection (LAR), LAR preceded by Short Course Radiotherapy (SCRT), LAR preceded by Chemoradiotherapy (CRT) or CRT alone were eligible for selection. Exclusion: abdomino- perineal resection (APR), Hartman resection, diverting colostomy, neurological comorbidity, local relapse and distant metastasis.

76 of 228 patients were eligible to participate.

All participants completed questionnaires, LARS score, Vaizey score, International Prostate Symptom Score (IPSS), International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form (ICIQ-UISF), the International Index of Erectile Function (IIEF-5) questionnaire or Item 34 in the EORTC-QLQ-CR 29 questionnaires about sexual functioning.

The MAPLe<sup>®</sup>, a probe for EMG registration of the pelvic floor musculature (PFM) with a matrix of 24 electrodes enabling measurement of EMG activity from different sides and layers of PFM, was used (3) (fig 1).

Standardized registration: 1 min rest, 10 maximum voluntary contractions (MVC's), and 3 endurance contractions. Mean raw EMG values per electrode (24 in total) were calculated.

Correlations between LARS score and EMG values were consecutively calculated per specific layer of the PFM, the m. puborectalis and m. sphincter ani externus, and per specific nerves, n. pudendus, n. levator ani (fig 2). From these correlations p-values were obtained.

A sample size of 46 achieves 80% power, using a two-sided hypothesis test with a significance level of 0.05.

In order to correct for multiple testing, correlation between EMG values of PFM and IPSS score, Vaizey score, ICIQ, IIEFF a significance level of 0.005 was used.



Fig 1. Multi array probe

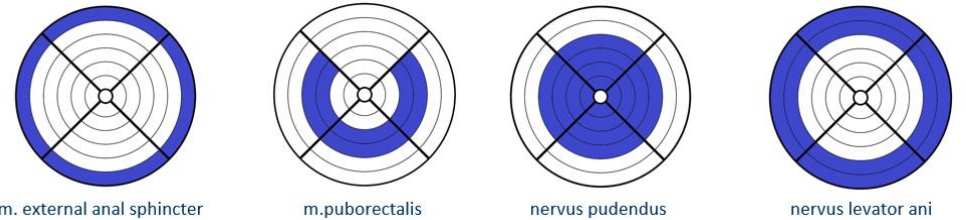


Fig 2. Graphical representation pelvic floor muscles and nerves to MAPLe electrodes in a visualization Grid. Anterior, left, posterior, right (12,3,6,9 o'clock) Outer rings superficial, inner rings deeper parts of the PFM

## Results

In this study 27 participants, 7 women and 20 men, were included. Time from treatment up to EMG assessment was 46,74 (SD 15,91) months.

Questionnaires of all participants were completed. Mean LARS score (0-42) was 24,11 (sd 10,78), mean Vaizey score (0-24) 4,11 (sd 3,33), mean IPSS (0-35) 7,96 (sd 5,7), mean ICIQ\_UISF (0-24) 2 (sd 2,5), mean IIEF5 (0-30) 12,95 (sd 7,8).

We calculated EMG rest values of all electrodes. Update of software caused miscounted raw EMG values of some electrodes. Finally, we calculated EMG values of 23 MVC's and 24 endurance contractions

There was no (significant) correlation between the LARS score and the EMG values of pelvic floor musculature. This was the case for EMG values of individual muscles, m. puborectalis and m. sphincter ani externus, as well for the EMG values of individual nerves, n. pudendus and n. levator ani. This applied to EMG values of rest, MVC's and endurance contractions.

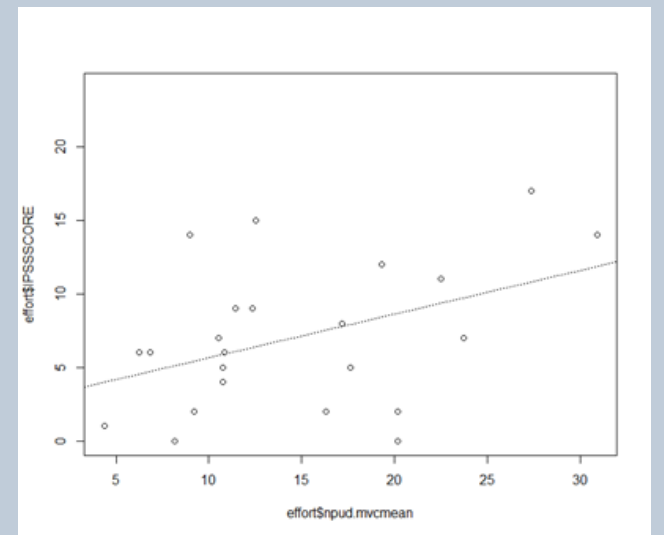


Fig 3. Correlation between IPSS score and increasing EMG values of superficial layers of pelvic floor musculature, n. pudendus, in MVC's contractions was significant (p-value 0.0045) fig3.

## Interpretation of results

This is the first research evaluating EMG activity in rest and during contractions of the different muscle layers of the pelvic floor and how these were associated with functional outcomes in patients treated for rectal cancer.

There are relevant limitations, such as a small heterogenous cohort. Although the LARS score in this cohort is representative and similar to the population treated for LAR, the urinary and fecal incontinence rate in this study is low.

It is of note that the significant correlation between the IPSS score and superficial layers of the pelvic floor muscles represents an increasing muscle activity. The absence of incontinence, the presence of LUTS and the increasing pelvic floor muscle activity, might well be explained by damage to the hypogastric plexus.

## Concluding message

We conclude that in our study functional outcomes, like bowel and bladder dysfunction, appear not to be related to loss of pelvic floor muscle activity.

## References

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