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SHORT COMMUNICATION

The Italian version of the LARS score: cross-cultural adaptation and validation. An Italian Society of Surgical Oncology-Colorectal Cancer Network (SICO-CCN) collaborative study

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Abstract

Purpose The LARS score is an internationally well-accepted questionnaire to assess low anterior resection syndrome, but currently there is no formally validated Italian version. The purpose of this study was to test the reliability and validity of the Italian version among Italian patients submitted to sphincter-sparing surgery for rectal cancer.

Methods The English version of the LARS score was translated into Italian following the forward-and-back translation process. A total of 147 patients filled out our version. Among them, 40 patients answered the questionnaire twice for the test-retest reliability phase. The validity of the LARS score was tested using convergent and discriminant validity indicators by correlating the EORTC QLQ-C30 and QLQ-CR29 questionnaires. The LARS score capability to differentiate groups of patients with different demographic or clinical features was also assessed.

Results The test-retest reliability was excellent in 87.5% of patients, remained in the same LARS category in both tests. The convergent validity phase showed a relevant relationship of the LARS score with the EORTC domains, which was significant for 7 of 15 EORTC QLQ-C30 subscales, and for 14 of 29 EORTC QLQ-CR29 subscales. The LARS score was able to discriminate patients who received radiotherapy ($p = 0.0026$), TME vs. PME ($p = 0.0060$), tumour site at < 10 cm from the anal verge ($p = 0.0030$) and history of protective stoma ($p < 0.0001$).

Conclusion The Italian version of the LARS score is a valid and reliable tool for measuring LARS in Italian patients after SSS for rectal cancer.

Keywords Low anterior resection syndrome · LARS · LARS score · Rectal cancer · Bowel dysfunction

Introduction

Low anterior resection syndrome (LARS) frequently characterizes patients with variable levels of disrupted bowel function after sphincter-sparing surgery (SSS) for rectal cancer (RC). LARS includes frequent bowel movements, faecal and flatus incontinence, stool urgency and frequency, emptying difficulties, mucus discharge and even sexual and urinary dysfunction. These symptoms appear immediately after surgery, and despite a gradual improvement with time, a stable detrimental state after 1 year is often reported, impairing quality of life (QoL) [1].

In 2012 Emmertsen and Laurberg developed and validated a scoring system to assess LARS [2]. The questionnaire used to provide the score consists of five questions investigating overall bowel dysfunction. No, minor and major LARS patients are identified. Currently, despite LARS score is available in 24 languages, an Italian validated version is not available.

The purpose of this study was to test the translated Italian version assessing its reliability and validity among Italian patients who underwent SSS for RC.

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Methods

Translation and adaptation

The LARS score English version was translated into Italian language following WHO and EORTC current international recommendations [3, 4]. The forward-and-back translation was developed by two independent native Italian speakers, with expertise in healthcare terminology (RR) and in cultural/linguistic nuances (GM) so that two versions were generated. A third independent translator compared ambiguities and discrepancies between these two translations, creating a preliminary unique draft. This version was then backtranslated into English by a native English speaker. The translators and research team then discussed the final Italian version and did not find any conceptual discrepancies when compared with the English version (Fig. 1).

Validation phase

A total of 147 patients submitted to SSS for RC between December 2015 and August 2019 were recruited from 3 Italian referral centres. The study was approved by the central ethics committee (protocol number 13504, approval date 09/26/2019), and all patients gave a written informed consent. Patients with age less than 18, ostomy presence, tumour recurrence, concomitant gastrointestinal disease affecting bowel function and inability to understand the questionnaires were excluded.

Enrolled patients filled out the Italian version of the LARS score and the EORTC QLQ-C30 and QLQ-CR29 questionnaires during their follow-up [5, 6]. Furthermore, 40 of these patients participated in the test-retest reliability study.

Outcome measures

The LARS Score consists of five parameters investigating bowel dysfunction and QoL. Each parameter has 3–4 options, with different related scores. The total score is determined by summing all items' scores, with an overall range from 0 to 42 points. Patients are classified into three different categories: no (0–20 points), minor (21–29 points) and major LARS (30–42 points) [2].

The EORTC QLQ-C30 is used to assess cancer patients QoL and includes 5 functional scales, 3 symptom scales, a global health status-QoL scale and 6 individual items. All of the scales and individual items scores range from 0 to 100 points.

The EORTC QLQ-CR29 incorporates 6 scales and 11 single items assessing several symptoms and problems related to surgery for RC. The scoring approach is similar to that of EORTC QLQ-C30.

Validation process

To determine the consistency over different points across time, we assessed the *test-retest reliability*. Forty patients filled out the Italian LARS score version and repeated the procedure after 7–14 days. Concordance between the two tests was analysed.

LARS score validity was tested with *convergent and discriminant validity* assessment. *Convergent validity* was determined by estimating the correlation between global LARS score and EORTC QLQ-C30 and QLQ-CR29 questionnaires. *Discriminant validity* was established by assessing the capability of the LARS score to discriminate groups with different demographic or clinical features, consistent with previous validation studies.

Statistical analysis

The distribution of variables between LARS categories (no/minor and major LARS) was analysed with the Chi-square and the Wilcoxon tests for categorical and continuous variables, respectively.

Reliability was assessed by intra-class correlation coefficient (ICC) and was considered as poor, moderate, good or excellent when ICC was < 0.50, 0.50 to 0.75, 0.75 to 0.90 and > 0.90, respectively. The agreement between total score and each item of the first and second LARS score was explored by computing the percentages. Correlation extent and limits were also demonstrated on a Bland-Altman plot.

To establish *convergent validity,* Pearson's correlation was determined employing total LARS score and EORTC questionnaires' subscales scores. Finally, the Wilcoxon test was used to assess significant differences in each QLQ-C30/QLQ-CR29 subscale score and LARS categories (no/minor and major).

To test *discriminant validity*, numeric variables were converted into binary variables using median values as cut-off points. The differences between total LARS score and each subgroup were analysed with the Wilcoxon rank-sum test.

Statistical analyses were performed using R software and MedCalc® Statistical Software version 19.5.3. Results were considered as statistically significant when p value was < 0.05.

Results

Among the 147 participants, 85 (57%) were men; median age was 70 (IQR 55.5–77.0), and median time from surgery and ileostomy reversal were 31 (IQR 12–64) and 24 months, respectively. Eighty patients had a protective ileostomy with a median period of permanence of 7.1 months (1–30). The median tumour and anastomosis distance from the anal verge

Questionario sul funzionamento intestinale.

Lo scopo del questionario è di valutare come funziona il suo intestino

Per favore contrassegni solo una casella per ogni domanda. Potrebbe essere difficoltoso selezionare solo una risposta, com'è noto per alcuni pazienti i sintomi variano di giorno in giorno. In questo caso le chiediamo gentilmente di scegliere la risposta che meglio descrive la sua giornata tipica. Se lei ha avuto di recente un'infezione che ha modificato la sua funzione intestinale la preghiamo di non tenerne conto e di cercare di dare delle rispondere alle domande che riflettano il suo usuale funzionamento intestinale.

Le è mai capitato di non riuscire a controllare la flatulenza? (Emissione di aria)

□No, mai

□Si, meno di una volta a settimana

□Si, almeno una volta a settimana

Le è mai capitato di avere una perdita involontaria di feci liquide?

□No, mai

□Si, meno di una volta alla settimana

□Si, almeno una volta a settimana

Quante volte va di corpo?

□Più di 7 volte al giorno (su 24 ore)

□4-7 volte al giorno (su 24 ore)

□1-3 volte al giorno (su 24 ore)

□Meno di una volta al giorno (su 24 ore)

Le è mai capitato di dover andare di corpo dopo un 'ora dall'ultima scarica di feci?

□No, mai

□Si, meno di una volta a settimana

□Si, almeno una volta a settimana

Le capita mai di avere impellente urgenza di evacuare tanto da costringerla a correre alla toilette?

□No mai

□Si, meno di una volta a settimana

□Si, almeno una volta a settimana

Fig. 1 Italian version of the LARS score

were 10 (IQR 7–13.75) and 6 cm (IQR 4–8). Most patients (70%) underwent TME. Finally, 65 (44%) patients had no LARS, 38 (25.8 %) had minor LARS, and 44 (29.9 %) had major LARS.

Reliability

Forty patients participated in the test-retest reliability study. Among them 35 (87.5%) remained in the same LARS category in both tests (perfect agreement), 4 (10%) differed by one category (moderate agreement), and 1 (2.5%) changed across two categories (no agreement). The ICC was 0.9409 ($p \leq 0.0001$, 95% CI 0.8903 to 0.9685), indicating excellent reliability.

Convergent validity

Significant correlations were found when comparing the LARS-score and EORTC QLQ-C30 questionnaire with respect to fatigue scale ($p < 0.05$), cognitive function, pain, insomnia and financial difficulties scales ($p < 0.01$), global health status/QoL and diarrhoea scales (< 0.001).

Correlations between LARS score and EORTC QLQ-CR29 questionnaire were significant with respect to 14 of 22 subscales.

Each EORTC QLQ-C30/QLQ-CR29 subscales was then compared in no/minor and major LARS patients. Cognitive function, fatigue, insomnia, diarrhoea, urinary incontinence, dysuria, buttock pain, blood and mucus stool, hair loss,

LARS Score: istruzioni per l'applicazione del punteggio

Le è mai capitato di non riuscire a controllare la flatulenza? (Emissione di aria)	
◻No, mai.	0
◻Si, meno di una volta a settimana.	4
◻Si, almeno una volta a settimana.	7
Le è mai capitato di avere una perdita involontaria di feci liquide?	
◻No, mai.	0
◻Si, meno di una volta alla settimana.	3
◻Si, almeno una volta a settimana.	3
Quante volte va di corpo?	
◻Più di 7 volte al giorno (su 24 ore)	4
◻4-7 volte al giorno (su 24 ore)	2
◻1-3 volte al giorno (su 24 ore)	0
◻Meno di una volta al giorno (su 24 ore)	5
Le è mai capitato di dover andare di corpo dopo un 'ora dall'ultima scarica di feci?	
◻No, mai	0
◻Si, meno di una volta a settimana	9
◻Si, almeno una volta a settimana	11
Le capita mai di avere impellente urgenza di evacuare tanto da costringerla a correre alla toilette?	
◻No mai	0
◻Si, meno di una volta a settimana	11
◻Si, almeno una volta a settimana	16
punteggio totale:	
Interpretazione:	
0-20 No LARS.	
21-29 LARS minore.	
30-42 LARS Maggiore.	

Fig. 1 (continued)

flatulence, faecal incontinence, sore skin, stool frequency, embarrassment, anxiety and body image scores were significantly different between groups.

Discriminant validity

The Wilcoxon rank-sum test documented LARS scores significantly different when comparing patients with different characteristics. In particular, LARS score was higher after neoadjuvant radiotherapy (p = 0,0026) and TME (p =0,0060), in patients with tumour at < 10 cm from the anal verge (p = 0,0030) and with defunctioning stoma (p < 0,0001). No relevant differences were observed in patients categorized by age, sex or surgical approach.

Discussion

This study focused on the goal of translating the LARS score English version into Italian language and validating the Italian version.

The translation process was relatively easy to carry out, mostly due to the concise and clear structure of the

questionnaire, which was a contributing factor to its ease of administration and to a high level of patients' participation.

Test-retest reliability study demonstrated a perfect agreement between the first and second test in about 90% of cases, which was higher than in most validation studies [7–10].

Then the capability of LARS score to assess QoL was investigated by comparing it with the EORTC QLQ-C30 and QLQ-CR29 questionnaires. A significant correlation to 8 of 15 QLQ-C30 and 15 of 22 QLQ-CR29 subscales was found. Dyspareunia and sexual dysfunction subscales in women could not be assessed as most participants declared to be non-sexually active at the moment of the survey. Further studies focused on this topic are needed to reach a definitive conclusion. Notwithstanding, we did find a relevant correlation between EORTC QLQ-C30 global health/QoL scale and each LARS category.

The long-term consequences of radiation therapy which include functional anal and QoL related outcomes impairment are well documented. The Italian LARS score was able to distinguish this risk group from those who did not undergo neoadjuvant radiotherapy, consistent with the original LARS score findings.

The score was able to discriminate between TME and PME resection groups, finding higher LARS score in TME group, in line with most validation studies [7, 10, 11].

Additionally, the Italian score was able to demonstrate worse functional results in patients with tumours at < 10 cm from the anal verge and with history of protective stoma. The score showed also a tendency to bowel function impairment in younger patients.

This study has several limitations mostly related to its retrospective setting, and further dedicated trials are needed mostly to investigate LARS risk factors. Nonetheless, to date, this is the first Italian study focused on translation and validation of the original LARS score.

Conclusion

The Italian version of the LARS score has good psychometric properties and is at least comparable to previous versions published in other languages. It is a valid tool for evaluating postoperative bowel dysfunction and may be useful in clinical and research settings with the purpose of identifying and classifying LARS in Italian RC patients who underwent SSS.

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Author contribution MD, AR, GSi and GSp (1) made substantial contributions to the conception or design of the work, or the acquisition, analysis, or interpretation of data; (2) drafted the work or revised it critically for important intellectual content; (3) approved the version to be published; and (4) agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. GMart, BS, RR, CF, GMarc, MF and NI (1) made substantial contributions to the acquisition of data; (2) revised the work critically for important intellectual content; (3) approved the version to be published; and (4) agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Data Availability The data that support the findings of this study are available on request from the corresponding author [M.D.]. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

Code availability Not applicable

Declarations

Ethics approval The study was approved by the Ethical Committee of the Coordinating Centre (San Luigi University Hospital) on September 26, 2019 (Prot Nr 13504, tit 2, cat 06).

Consent to participate A consent to participate into the study was obtained by all enrolled patients.

Consent for publication A consent for publication was obtained by all enrolled patients.

Conflict of interest The authors declare no competing interest.

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