

Visual Analogue Scale (VAS) in the Evaluation of Functional Outcomes After Three-dimensional Laparoscopic Prostatectomy

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OBJECTIVE	To assess suitability of visual analog scale (VAS) in the evaluation of functional outcomes after 3D laparoscopic prostatectomy (3D LRP)
METHODS	Two hundred men underwent 3D LRP for localised prostate cancer at Seinäjoki Central Hospital in Finland between December 2013 and September 2018. In October 2019, an EPIC-26 survey along with VAS scales enquiring urinary (VAS-incontinence) and sexual (VAS-sexual) symptoms was mailed to the patients, and the correlations between these 2 methods were evaluated. In the EPIC-26 survey, scores for incontinence-(EPIC-26 UI) and sexual (EPIC-26-sexual) domains were calculated using the University of Michigan scoring system. In the VAS questionnaires, patient put a mark on the 10 cm long horizontal line in place, which described his experience of continence and potency. The Spearman rank correlation coefficient was used to evaluate the correlation between methods.
RESULTS	The median scores were as follows: EPIC-26-UI, 79.25 (14.5-100); EPIC-26-sexual, 36.17 (0.0-100); VAS-incontinence, 8.8 cm (1.4-10.0); and VAS-sexual, 3.2 cm (0.0-10). The correlation coefficient between EPIC-26 UI and VAS-incontinence was 0.722 (95% confidence interval [CI], 0.63-0.79; $p < .0001$) and 0.883 (95% CI, 0.84-0.91; $p < .0001$) between EPIC-26-sexual and VAS-sexual.
CONCLUSION	Our study shows a strong correlation between VAS and EPIC-26 urinary incontinence and sexual domains. In daily clinical practice VAS-scale may serve as a simple tool to evaluate the key functional outcomes of radical prostatectomy. UROLOGY 00: 1–5, 2022. © 2022 Elsevier Inc.

Prostate cancer (PCa) is the second most common cancer in men worldwide.¹ Radical prostatectomy (RP) can be considered as the primary curative

treatment for clinically significant PCa in men with a life expectancy of >10 years.² The overall survival after RP is good, but treatment-related functional adverse effects, especially urinary incontinence (UI) and erectile dysfunction (ED), can be significant and reduce patients' health-related quality of life (HRQoL). As most men live with these functional problems for many years, follow-up for HRQoL and cancer control is crucial.^{3–6}

Functional results and HRQoL are evaluated using patient-reported outcome measures (PROMs).^{7–9} In the past several PROMs have been used to evaluate the HRQoL of patients after PCa treatment in research and clinical settings but at present the 26-item Expanded Prostate Cancer Index Composite (EPIC-26) is considered to be the most suitable cancer-specific questionnaire for these patients.⁶ It measures the HRQoL of patients with PCa across 5 disease-specific domains: UI, urinary obstruction and irritation, bowel-related symptoms, sexual dysfunction, and hormonal symptoms. Domain scores are calculated using an algorithm and points are transformed to linear 0-100 scale where higher scores indicate better

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Conflict of Interest:

H.Haapiainen no conflict of interest.

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Table 1. Summary of studies that used the VAS in urological indications among men

Authors	Study Design	Objective	Results
Ushijima S et. al.	A VAS questionnaire for the assessment of the quality of life specific to each symptom according to the International Prostate Symptom Score	VAS vs. IPSS	The VAS was significantly better in identifying patients' chief complaints
Okihara K et. al.	Quantitative evaluation of lower urinary tract symptoms using a VAS in men who had undergone permanent brachytherapy	VAS vs. IPSS and IPSS-QOL after permanent brachytherapy	The VAS reflected the change in the patients' QOL more precisely than the IPSS
Tiwari R et. Al.	Prospective validation of a novel visual analogue uroflowmetry score in 1000 men with lower urinary tract symptoms	VAS vs. flowmetry, voided volume and IPSS	The VAS score showed good correlation with Qmax, voided volume, and IPSS

IPSS, International Prostate Symptom Score; QOL, quality of life, Qmax, maximal urinary flow rate; VAS, visual analogue scale. Cohort of 200 Finnish men with localized prostate cancer managed with 3-dimensional laparoscopic prostatectomy.

outcome in each domain.¹⁰ EPIC-26 is at present the most frequently used brief self-report questionnaire and has been validated in many countries and languages.^{11,12} It has been recommended because of its good reliability and relative ease of use, requiring approximately 10 minutes to complete.^{11,13} However, even the shorter version of EPIC could be cumbersome and simpler and easier methods that can be interpreted at a glance could be helpful during daily clinical practice.¹⁴ The visual analogue scale (VAS) is mainly used in the evaluation of pain as it takes less than one minute to complete.^{15,16} It is also used for evaluating depression and preoperative/postoperative anxiety.¹⁷⁻²⁰ Few studies have used the VAS in urological indications among men, and the results are encouraging (Table 1).²¹⁻²³ However, no studies have evaluated functional outcomes after RP by using the VAS.

The hypothesis in our study was that VAS correlates strongly with EPIC-26 and could therefore be used instead of EPIC-26 in evaluation of UI and ED after RP. We evaluated UI and ED using the VAS and EPIC-26 and the correlation between these 2 tests. A strong observed correlation could make the estimation of functional outcomes easier and more comprehensive in daily clinical work.

METHODS

Study Population

The study included 200 men who underwent 3D LRP for localised PCa at Seinäjoki Central Hospital in Finland between December 2013 and September 2018. Their median age at surgery was 63 years (range, 45-75 years).

Collection of Data on Incontinence and Sexual Function

In October 2019, an EPIC-26 questionnaire with VAS-incontinence and VAS-sexual questionnaires were sent to the patients in the same envelope to evaluate the postoperative functional results. The VAS was exactly 10 cm long horizontal line, in which the patients were asked to put a mark according to their experienced degrees of continence and sexual function. The right end

of the line indicated normal urinary continence and sexual function, whereas the left end indicated total incontinence or sexual dysfunction. In other words, higher measured number indicating better result. The patients answered all questionnaires on the same date at home without the presence of medical staff.

In the VAS-incontinence and VAS-sexual questionnaires, the marks on the scale were measured using a ruler with an accuracy of 1 mm (min 0 cm-max 10 cm). The scores for the EPIC-26 UI and sexual domains were calculated using the University of Michigan scoring system, and the multi-item scores were transformed to a scale of 0-100.¹⁰ The time between the operation and the completion of the EPIC-26 and VAS questionnaires was recorded.

Statistical Analysis

The Spearman rank correlation coefficient was used to evaluate the correlation between VAS-incontinence and EPIC-26-UI domain and between VAS-sexual and EPIC-26-sexual domain. Scatterplots were formed to visualise the correlation. Statistical significance was considered when the p value was ≤ 0.05 . Statistical analyses were performed using the SPSS statistical software (IBM SPSS Statistics version 25, IBM Co., Armonk, NY).

RESULTS

The EPIC-26 questionnaire was completed by 76% (152/200) and the VAS-incontinence and VAS-sexual questionnaires were answered by 73% (146/200) of the patients. The median

Table 2. Functional results of the cohort of 200 Finnish men with localized prostate cancer managed with 3-dimensional laparoscopic prostatectomy

	n	Median	Q ₁ -Q ₃	Range
Urinary incontinence				
EPIC-26	149	79.25	62.63-96.88	14.5-100
VAS	146	8.8	7.5-9.6	1.4-10
Sexual function				
EPIC-26	150	36.17	18.0-58.35	0.0-100
VAS	146	3.2	0.48-6.53	0.0-10

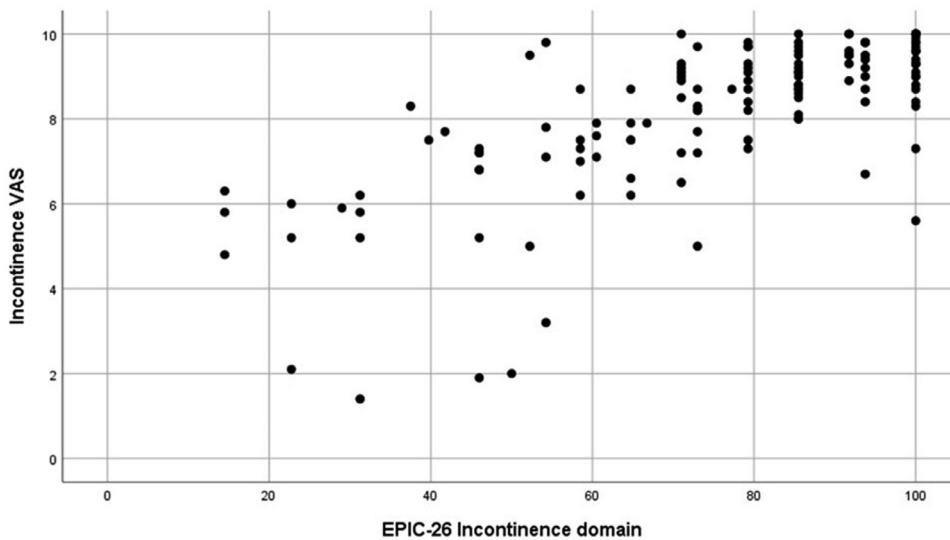


Figure 1. Scatterplot of the EPIC-26 and VAS incontinence domains for a cohort of 200 Finnish men with localized prostate cancer managed with 3-dimensional laparoscopic prostatectomy. Color version available online.

time between operation and the survey was 2.85 years (range, 1.07-5.81 years). The median score was 79.25 (14.5-100) for the EPIC-26-UI domain, 36.17 (0.0-100) for the EPIC-26-sexual domain, 8.8 (1.4-10.0) for the VAS incontinence, and 3.2 (0.0-10) for the VAS sexual domains (Table 2).

The correlation coefficient between EPIC-26-incontinence and VAS-incontinence and between EPIC-26-sexual and VAS-sexual was 0.722 (95% confidence interval [CI], 0.63-0.79; $p < .0001$) and 0.883 (95% CI, 0.84-0.91; $p < .0001$), respectively. These correlations are depicted in the scatterplots shown in Figures 1 and 2.

DISCUSSION

The purpose of this single-centre study was to evaluate if simple VAS-scale could be utilized as a method to

measure patients' functional outcomes after 3D LRP. For this purpose, 200 operated men were sent EPIC-26 questionnaire and VAS scales to measure urinary and sexual symptoms. We were able to demonstrate a strong correlation between the VAS and EPIC-26 scores for both incontinence and sexual function domains. To our knowledge, this is the first study to evaluate the degree of urinary incontinence or sexual dysfunction after RP using the VAS.

The introduction of anatomical nerve sparing RP in 1982²⁴ and the subsequent improvement of operative outcomes evoked interest among urologists in a systematic quality control of PCa treatments, and post-RP "trifecta" (undetectable PSA, urinary continence, and potency) has become the commonly accepted standard of successful

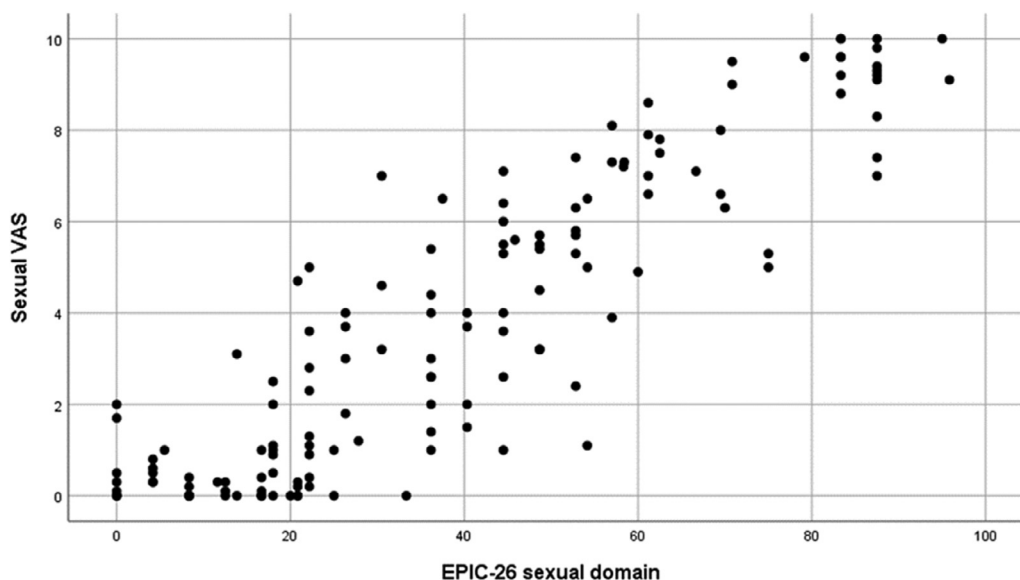


Figure 2. Scatterplot of the EPIC-26 and VAS sexual domains for a cohort of 200 Finnish men with localized prostate cancer managed with 3-dimensional laparoscopic prostatectomy. Color version available online.

operative treatment of localized PCa.²⁵ Although recently the indications for RP have narrowed, the caseload of early-stage cancers suitable for surgery has remained high due to active PSA and MRI -based screening which underlines the importance of the continuous quality monitoring of surgical PCa care.

The PROMs are used to measure the impact of the treatment to patients' quality of life, but it also reflects the quality of care. In the early 1990s, Litwin reported that PCa-related PROMs must cover both function and discomfort in independent domains, as discomfort can be highly subjective.²⁶ For example, a patient may have a relatively significant UI, but this does not affect the patient's HRQoL. On the other hand, another patient's life can be made miserable by mild objective incontinence.

The PROMs are focused mainly on the urinary function, sexual and bowel symptoms.⁸

Over the years several PROMs such as EPIC-50, UCLA-PCI, FACT-P-PCS, EORTC QLQ-PR25, PC-QOL and STAR have been presented and also different administration techniques have been tested.^{8,27} During the last decade the EPIC-26 has been used because of user-friendliness.⁶

The Visual analog scale is brief and simple method of evaluating patient experience. It is seen in the earlier literature that VAS is valid and reliable tool for measuring subjective experience.²⁸ The VAS can be considered a simple, easy-to-understood global assessment tool for a quick evaluation of not only difficulty but also discomfort and harm of functional problems.

The most common field where VAS is used is the pain evaluation. As presented in [Table 1](#) the VAS has been used earlier to evaluate urinary symptoms. However, no attempts to evaluate the HRQoL after PCa surgery with VAS have been done. After prostatectomy especially the incontinence and sexual adverse effects are pronounced.²⁹ The EPIC-26 covers 5 symptom domains to measure patients HRQoL. However, as the calculation and scaling the points in EPIC-26 takes time, the usability of the questionnaire in clinical work comes difficult. Still the importance of taking the patients symptoms to account is relevant. According to Litwin, it is fair to say that the VAS is quite rough evaluation method for HRQoL compared with EPIC-26. The idea of using the VAS to evaluate incontinence- and sexual HRQoL was motivated by vision to combine clinical usefulness to reliable measurement of patient's postoperative symptoms. Our results demonstrate a strong correlation between both EPIC-26 domains to its similar VAS scales. This indicates that VAS can be used as a simple alternative to EPIC in the evaluation of post prostatectomy HRQoL.

The strength of our study is that the EPIC-26 and VAS questionnaires were administered at the same time via mail, and the patients answered the questionnaires at home without the assistance or presence of medical staff. The median time from operation to questionnaire completion was almost 3 years (1.07-5.81 years). Therefore, it is unsure whether the reported strong correlation between

the EPIC-26 and VAS scores also exists shortly after the operation when incontinence and potency are worst. The correlation between EPIC-UI and EPIC-26 incontinence domain was weaker in patients with worse incontinence after surgery when observed from specific scatterplot. Although the number of these patients was small, this might reflect the patient's frustration or situation after possible pharmacological, surgical, or other treatments for long lasting incontinence. Nevertheless, as mentioned above the subject needs further investigation in different clinical situation to further assess the usability of VAS.

The limitation of the study is that the VAS has not been validated for this purpose and it is not optimal in research setting. Still the advantage of having the idea of the patients' symptoms with a glance is a clear benefit compared to EPIC-26. This also gives the patients a tool to visually monitor the development of their own symptoms over time.

Further research is needed to validate the use of the VAS in evaluating functional recovery immediately after RP. The correlation between the VAS and EPIC-26 scores for all domains such as urinary obstruction and irritation, bowel-related and hormonal symptoms must be evaluated. In addition, the usability of VAS on patients with treatments other than surgery is also unknown. The studies for latter as well as the correlation between the VAS and other urological questionnaires are underway. Although additional research is needed, the VAS appears to be an extremely simple and easy-to-use method and could provide a valuable new diagnostic tool for evaluating patients with voiding or sexual complaints.

CONCLUSIONS

The VAS is a promising tool for evaluating functional outcomes after RP. The clear benefits of this method are its ease of use and the applicability of the interpretations of its results to daily outpatient clinical practice.

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