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Effectiveness of the EuraHS-QoL scale for evaluating quality of life among Chinese patients with abdominal wall hernias

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Abstract

BACKGROUND: Chronic pain following inguinal hernia repair is a non-negligible issue, yet accurately assessing patients' postoperative quality of life remains challenging. This study aims to evaluate the reliability, validity, and acceptability of the EuraHS-QoL scale within the Chinese patient population.

MATERIALS AND METHODS: Using the Chinese version of the EuraHS-QoL as a questionnaire, 80 patients with abdominal wall hernias (enrolled between September and November 2024) were tested preoperatively, on postoperative day 1, and at 3 months postoperatively. Additionally, the Visual Analog Scale and SF-36 Health Survey were completed on the first day after surgery. Through data analysis, the scale's reliability, validity, and acceptability were confirmed.

RESULTS: The internal consistency of the three dimensions of the Chinese version of the EuraHS-QoL scale was confirmed, with high correlations among similar dimensions of the three scales. Meanwhile, the EuraHS-QoL scale demonstrated advantages in hernia-specific areas and exhibited higher patient compliance. Notably, EuraHS-QoL scores across all three modules were significantly lower at 3 months postsurgery than at the preoperative and 1 day postoperative assessments ($p < 0.05$), suggesting that hernia repair surgery enhances patients' physical and psychological well-being and overall quality of life.

CONCLUSION: The Chinese version of the EuraHS-QoL scale has good reliability, validity, and acceptability, and it can serve as a reference tool for assessing quality of life in studies of abdominal wall hernia patients in China.

Keywords:

Abdominal wall hernia, EuraHS-QoL, quality of life

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Introduction

Abdominal wall hernia is a common surgical condition characterized by an organ or tissue leaving its normal anatomical position and protruding outside the abdominal wall.[1] Annually, over 20 million individuals worldwide undergo inguinal hernia repair.[2] Some patients experience pain or other discomfort after the operation. Although postoperative pain is usually mild, studies have shown that chronic pain may significantly interfere with patients' daily activities and reduce their quality of life.[3]

With advancements in hernia repair techniques, surgeons no longer focus solely on recurrence rates.[4] Patient-reported outcome measures are now considered equally important in evaluating the surgical quality. Accurately assessing the quality of life in patients with abdominal wall hernias

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has requires immediate attention. The Chinese version of the SF-36 Health Survey has been validated and is widely used in China to assess patients' quality of life in general surgery, otolaryngology, cardiology, and other medical fields.[5-8] However, it is not specific to patients with abdominal wall hernias. Similarly, the Visual Analog Scale (VAS) for pain, although widely used in China to assess postoperative pain,[9,10] is not specific to hernia patients either. In 2008, Heniford *et al*. introduced the Carolina Comfort Scale, a hernia-specific quality-of-life assessment tool, but it is limited to evaluating symptoms such as foreign body sensation, pain, and restricted movement after hernia repair.[11]

Compared to other scales, the EuraHS-QoL scale developed by the European Hernia Society in 2012 offers distinct advantages.[12] This tool comprises three modules and nine questions specifically designed for hernia patients. It is not only highly specific to hernia-related issues but also easy to use for assessing patients' quality of life. Its various language adaptations have been shown to be effective in numerous countries and regions.[13-19] In this study, we developed a Chinese version of the EuraHS-QoL scale, which encompasses three modules: pain, activity limitation, and cosmetic anxiety. By administering three different scales to 80 patients, we evaluated the reliability, validity, and acceptability of the Chinese version of the EuraHS-QoL scale.

Materials and Methods

Subjects

Patients with abdominal wall hernias who underwent surgical treatment between September 2024 and November 2024 and agreed to complete the questionnaire were enrolled as study subjects. Inclusion criteria: patients older than 18 years with abdominal wall hernias scheduled for laparoscopic hernia repair; no coagulation disorders or malignant tumors. Exclusion criteria: patients with incarcerated hernias; pregnant women. Sample size calculation: According to the requirements for questionnaire reliability and validity testing, the sample size should be 5 to 10 times the number of items on the questionnaire.[20] The Chinese version of the EuraHS-QoL scale consists of nine items. Considering an anticipated 10% loss to follow-up, a total of 80 patients were ultimately included. All surgeries were performed by experienced surgeons.

Assessment tools

Chinese version of the EuraHS-QoL scale

It comprises three modules and nine questions: the pain module (questions 1–3), the activity limitation module (questions 4–7), and the cosmetic anxiety module (questions 8–9). Each question is rated on a scale from 0 to 10. Lower scores indicate better outcomes. These questions were selected by unanimous agreement of 14 members of the EuraHS working group from nine countries, with the aim of capturing the issues most relevant to quality of life before and after hernia repair.[4]

SF-36 health survey (Chinese Version)

It consists of 36 questions covering eight dimensions of health-related quality of life (HRQoL), with higher scores indicating better health status.

Visual analog scale

The VAS is a tool for quantifying patients' pain.[21] Scores range from 0 to 10. Higher scores denote greater pain intensity.

Methods

Two doctors with relevant research experience were selected to serve as investigators. After training, they served as the investigators for the study. The investigators explained the study to each patient, obtained informed consent, and collected baseline information. Patients completed the EuraHS-QoL scale both prior to surgery and on the first postoperative day. At 3 months postsurgery, the EuraHS-QoL scale was administered again, either at an outpatient follow-up visit or via a telephone call. In addition, on the first postoperative day, patients completed the VAS and SF-36 questionnaires. Upon discharge, data on operation duration, length of hospital stay, and any complications were recorded. At 3 months postoperation, patients were followed-up to document any discomfort, complications, or recurrences.

Each SF-36 item was scored and then converted to a 0–100 scale using the standard scoring formula. Thus, each SF-36 domain score ranges from 0 (worst outcome) to 100 (best outcome). The coding of "missing" or "not applicable" values in the EuraHS-QoL was performed as follows[4]: if the number of missing values in a module was ≤ 50% of the total questions in that module, the missing values were replaced with the average of the other questions in the same module. If missing values exceeded 50% of a module's questions, that module was considered missing and was not scored. Within the EuraHS-QoL pain module, scores from 3 to 6 indicate moderate pain, and any score above 6 is defined as severe pain.[18]

Statistical analysis

Data processing was analyzed using SPSS 25.0. Categorical data were expressed as case counts (constituent ratio), and continuous data were described as $x \pm s$ or M(IQR) depending on their distribution (normality test results). Reliability was assessed using Cronbach's α, with $\alpha \geq 0.7$ considered acceptable. For the validity test, correlation analysis was conducted using either Pearson's or Spearman's correlation, depending on the normality test results, to evaluate the

EuraHS-QoL scale results (presurgery, 1 day postsurgery, and 3 months postsurgery) in relation to the SF-36 and VAS scores. A correlation coefficient $r \geq 0.4$ was interpreted as a strong correlation. Comparisons of the three modules across the three time points were performed using either one-way ANOVA (F-test) or the Kruskal–Wallis test, as appropriate, based on normality test results. Acceptability was assessed by examining the completion rate, the proportion of missing responses, and the average time required to complete the scale. A P value < 0.05 was considered statistically significant.

Results

Basic information

Among the 80 participants, 16 were female and 64 were male, yielding a male-to-female ratio of 4:1. Participant ages ranged from 19 to 87 years, with a median of 64 years. Patients aged 60 to 80 accounted for 57.5%. 93.7% were reducible hernias. Forty-two cases patients (52.5%) of the patients had hypertension or diabetes or COPD. All 80 patients underwent elective laparoscopic hernia repair, with a mesh placed in the preperitoneal space.

Of these patients, 20 (25%) underwent single-port TEP, while 60 (75%) underwent three-port TEP. In two patients, an additional 5-cm groin incision was made during the three-port TEP procedure due to other additional diseases. The intraoperative diagnoses were predominantly inguinal hernias (76 cases, 95%). Among these, 20 cases (20/76, 26.3%) were bilateral, 27 (27/76, 35.5%) were left-sided and 27 were right-sided, and two cases (2/76, 2.6%) involved a concurrent inguinal hernia and an umbilical hernia. Additionally, there was one case of incisional hernia (1/80, 1.3%) and three cases of umbilical hernia (3/80, 3.9%). Eleven patients (11/80, 13.8%) had a history of hernia repair surgery on the same side, the contralateral side, or at another location.

The median hospital stay was 4 (3,4) days, and no patients were readmitted after discharge. At 3 months post-operation, three people were lost to follow-up and 11.7% (9/77) reported of pain, and none reported of severe pain. See Table 1 for details.

Reliability analysis

In this study, Cronbach's α was used to assess internal consistency, and the correlation of each preoperative EuraHS-QoL item with its own module (and with other modules) was compared. The results indicated that Cronbach's α for the pain module was 0.599, whereas it was 0.922 for the activity limitation module and 0.956 for the cosmetic anxiety module. With the exception of the item "pain sensation at the hernia site during rest (lying flat)" ($r = 0.199$), every item had a correlation greater than 0.4 with its own module. Moreover, each item's correlation with its own module ($r = 0.886$–0.984) was higher than its correlations with other modules ($r = 0.065$–0.523). See Table 2 for further information.

Validity

Comparison of EuraHS-QoL scores at different time points

The collected data were subjected to statistical analysis. Statistical analysis showed significant differences across the three time points for each module ($p < 0.05$), prompting further pairwise comparisons using the Bonferroni method. The only comparison that was not statistically significant was between the preoperative and first postoperative day scores in the activity limitation module ($p = 0.923$). All other module scores differed significantly between time points ($p < 0.05$). The changes in total EuraHS-QoL scores over time are presented in Table 3.

Correlation between EuraHS-QoL and SF-36 scales

Spearman's correlation was used to examine the relationship between EuraHS-QoL scores (preoperative, 1 day postoperative, and 3 months postoperative) and SF-36 scores. Correlation coefficients were calculated for the EuraHS-QoL and SF-36 scores. Results indicated that the preoperative EuraHS-QoL pain module score was strongly correlated with the SF-36 BP (bodily pain) domain ($r = -0.753$). The activity limitation module showed strong correlations with the SF-36 domains of PF (physical functioning) ($r = -0.569$), RP (role physical) ($r = -0.566$), BP (bodily pain) ($r = -0.534$), and SF (social functioning) ($r = -0.413$). By contrast, EuraHS-QoL scores at 1 day and 3 months postsurgery showed relatively low correlations with SF-36 scores [see Figure 1]. Detailed data can be found in the Supplementary File.

Correlation between EuraHS-QoL and VAS

Spearman's correlation was used to analyze the relationship between EuraHS-QoL scores (presurgery, 1 day postsurgery, and 3 months postsurgery) and VAS scores. The analysis showed that at 1 day postsurgery, VAS scores were strongly correlated with the EuraHS-QoL pain module ($r = 0.770$) and activity limitation module ($r = 0.632$). However, VAS had low correlations with EuraHS-QoL scores before surgery and at 3 months postsurgery. See Figure 1 for further details.

Acceptability

The completion rate for the EuraHS-QoL scale was 89.5%. Notably, the questions "the limitation of hernia pain or discomfort on exercise" and "the limitation of hernia pain or discomfort on heavy physical labor" had relatively high nonresponse rates: 4.5% and 5.6%, respectively. We found that the non-response rates of these two questions on the first day after the operation were higher than at other time points. The filling time of the EuraHS-QoL scale was 3 (3, 3) min, whereas the SF-36 scale was 8 (7,9)

Table 1: Baseline characteristics of 80 patients with abdominal wall hernia

Variable	*N* (%)
Sex [n (%)]	
Male	64 (80.0)
Female	16 (20.0)
Age [years, n (%)]	
<40	13 (16.3)
40–60	17 (21.2)
60–80	46 (57.5)
>80	4 (5.0)
BMI [kg/m², n (%)]	
BMI < 20	4 (5.0)
20 ≤ BMI < 25	52 (65.0)
25 ≤ BMI < 30	22 (27.5)
BMI ≥ 30	2 (2.5)
Comorbidities [n (%)]	
Present	42 (52.5)
Absent	38 (47.5)
Hernia location [n (%)]	
Unilateral	54 (67.5)
Bilateral	20 (25.0)
Incisional hernia	1 (1.3)
Umbilical hernia	3 (3.7)
Unilateral + umbilical hernia	2 (2.5)
Hernia type [n (%)]	
Reducible hernia	75 (93.7)
Irreducible hernia	5 (6.3)
Surgical approach [n (%)]	
Three-port TEP	60 (75)
Single-port TEP	20 (25)
Interval from symptom onset to surgery [months, *M (IQR)*]	6 (1, 24)
Operative time [minutes, *M (IQR)*]	60 (50, 85)
Length of hospital stay [days, *M (IQR)*]	4 (3, 4)
History of abdominal surgery [*n* (%)]	34 (42.5)
History of prostatic disease [*n* (%)]	34 (42.5)

Table 2: Internal consistency and inter-domain correlations of the preoperative EuraHS-QoL scale

Module	Cronbach.s α	Correlation of each item with its own module (*r*)	Correlation of each item with other modules (*r*)
Pain	0.599	0.199–0.984	0.065–0.523
Activity	0.922	0.673–0.948	0.175–0.506
Cosmetic	0.956	0.974–0.977	0.068–0.240

min. This difference in completion time between the two questionnaires was statistically significant.

Discussion

The purpose of this study was to assess the effectiveness of the Chinese version of the EuraHS-QoL scale in evaluating the quality of life of Chinese patients with abdominal wall hernias. We used the Chinese version of the SF-36 Health Survey and the VAS as comparative standards.

Table 3: Changes in total scores of each EuraHS-QoL domain over time

EuraHS-QoL	Preoperative	Postoperative day 1	Postoperative month 3	*P*
Pain	0 (0, 4.75)	3 (0.8)*	0 (0, 0)*†	<0.05
Activity	1.34 (0, 11.2)	0 (0.4)	0 (0, 0)*†	<0.05
Cosmetic	10 (1, 19.5)	0 (0.2)*	0 (0, 0)*†	<0.05

Values are presented as *M(IQR)*
*$P < 0.05$ compared with the preoperative score for the same domain
†$P < 0.05$ compared with the postoperative day 1 score for the same domain.

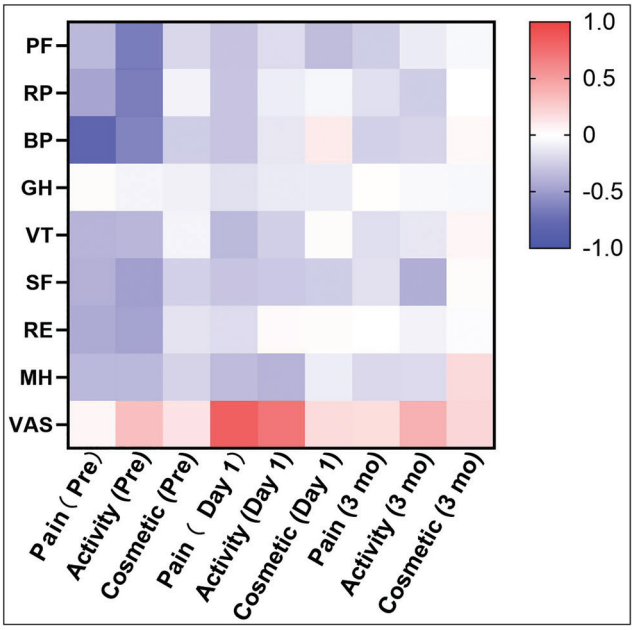

Figure 1: Correlations between EuraHS-QoL domains and the SF-36 and visual analog scale scales

Reliability of the EuraHS-QoL scale in Chinese abdominal wall hernia patients

Our results showed that the preoperative cosmetic anxiety and activity limitation modules of the EuraHS-QoL exhibited high internal consistency, whereas the pain module had a lower Cronbach's α that improved to 0.786 after the "pain at rest" item was excluded. This finding may be attributed to the scale's assessment of multiple distinct aspects of pain within the pain module. Patient pain levels often fluctuate with activity intensity, particularly when comparing those at a supine position to those at an upright position. When a patient is lying flat at rest, most hernia contents remain within the abdominal cavity, resulting in minimal pain. When standing or moving, increased intra-abdominal pressure can cause hernia contents to protrude through the defect, which in turn may compromise their blood supply and lead to pain of varying intensities.[22] In addition, the different timing of patients' clinical consultations and the degree of pain may influence the reliability coefficient for the pain module. Some patients undergo surgical intervention after an abdominal hernia is incidentally

found during a physical exam, whereas others seek treatment only when they experience significant discomfort. The discomfort experienced by patients with abdominal hernias is primarily influenced by their level of physical activity, and the EuraHS-QoL scale can assess the degree of discomfort under different activity levels, which indirectly demonstrates the scale's specificity and reliability.

Validity of the EuraHS-QoL scale in Chinese abdominal wall hernia patients

Our findings indicate that the EuraHS-QoL scale correlates strongly with the SF-36 in some domains but more weakly in others. Specifically, the preoperative EuraHS-QoL pain module score correlated strongly with the SF-36 BP domain, while the activity limitation module was highly correlated with the SF-36 PF and RP domains. However, the EuraHS-QoL scores at 1 day and 3 months postsurgery had low correlations with the SF-36. This might be because the EuraHS-QoL focuses on immediate quality-of-life changes, whereas the SF-36 captures quality of life over a longer retrospective period. The EuraHS-QoL scale offers more timely feedback on patient quality of life than the SF-36, making it useful for dynamically monitoring patient conditions and adjusting treatment plans promptly.

The VAS showed a high correlation with the EuraHS-QoL pain module at 1 day postsurgery, but low correlations with EuraHS-QoL scores presurgery and at 3 months postsurgery. The VAS provides only a snapshot of pain and cannot evaluate other aspects of patient status during the perioperative period. In contrast, as a hernia-specific instrument, the EuraHS-QoL scale provides a more comprehensive assessment of patient quality of life.[13]

From a clinical validity perspective, nearly all module scores differed significantly across the three time points. This may be because minimally invasive surgery not only repairs the hernia defect but also minimizes patient trauma, thereby allowing a faster return to an improved quality of life.

In contrast to the preoperative pain module total score, there was a slight increase in the total score 1 day postoperation, a phenomenon not reported in the studies by Antic, Mahfouz, Pielaciński *et al*.[13,14,16] This is likely due to the surgery itself as pain intensity typically peaks on the first postoperative day.[23] By 3 months after the operation, the total pain module score had decreased significantly from the preoperative level, suggesting that postoperative pain is transient and unlikely to cause long-term discomfort for most patients—consistent with previous research findings. Additionally, on postoperative day 1, the total activity limitation module score showed a slight decrease compared to the preoperative score, and this difference was not statistically significant ($p = 0.923$). This lack of early improvement may be due to patients' reluctance to move immediately after surgery, compounded by postoperative pain and other factors. By 3 months postoperation, the activity limitation score had decreased significantly from the preoperative value, indicating that the surgical intervention likely improves patients long-term quality of life.[13] In the module of cosmetic-related anxiety, scores declined over the three time points, and the reductions were statistically significant. This indicates that surgery not only mitigates physical discomfort but also alleviates patients' cosmetic-related concerns.

In our study, the preoperative mean scores for pain, activity limitation, and cosmetic anxiety were 3.0, 6.5, and 9.5, respectively. Notably, the mean cosmetic anxiety score in our cohort was similar to that reported by Mahfouz *et al*. but differed significantly from that reported by Antic *et al*. This discrepancy might be explained by the fact that Antic's patients had incisional hernias and were affected by preexisting surgical scars on their abdomens. Furthermore, the pain and activity limitation scores in our study differed significantly from those reported by Antic, Mahfouz, and Pielaciński. This variation may be attributed to the tendency of Chinese patients to prioritize physical health and seek prompt medical attention when experiencing discomfort.

Acceptability of the EuraHS-QoL scale in Chinese abdominal wall hernia patients

The Chinese version of the EuraHS-QoL scale demonstrated excellent patient compliance, a high completion rate, and a minimal time requirement for completion. Compared to the text-heavy SF-36, the EuraHS-QoL scale—with its combination of numeric ratings and brief descriptors—is more comprehensible and user-friendly. Follow-up assessments were conducted either in outpatient clinic visits or via telephone calls, enabling us to reach the majority of patients. Furthermore, the questionnaire was brief and easy to complete, which made the scale highly acceptable to patients. Our follow-up rate was 96.3%.

Conclusion

In treating abdominal wall hernias, addressing patient pain and discomfort is crucial. Accurately assessing quality of life—particularly pain and activity limitations—remains a pressing challenge. Therefore, effective tools are needed to evaluate pain and quality of life in patients with abdominal wall hernias. Such tools would help healthcare professionals better

understand hernia patients' quality of life and provide a foundation for evaluating the effectiveness of targeted interventions.

Our evaluation demonstrates that the Chinese version of the EuraHS-QoL scale exhibits high reliability and validity, supporting its use as an effective instrument for assessing quality of life in patients with abdominal wall hernias. It can be utilized in clinical studies on abdominal wall hernias to examine how various factors influence patient-reported outcomes, thereby providing valuable insights to inform clinical decision-making. The Chinese version of the EuraHS-QoL scale also demonstrates good internal consistency, and the distribution of questions in each module is well structured. However, our study's findings are limited by the small sample size and single-center design, which may affect the generalizability of the results. Therefore, further validation in larger, multicenter studies is warranted to ascertain the scale's practical applicability.

Author contributions

We certify that we have participated sufficiently in the intellectual content, conception, and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript, to take public responsibility for it and have agreed to have our name listed as a contributor.

Ethical policy and institutional review board statement

This report received IRB approval, after obtaining patient consent, from the Ethics Committee of the First Affiliated Hospital of Ningbo University (2024-R074A) on August 9th, 2024. The procedures followed were in accordance with the guidelines of Helsinki Declaration of 1975, as revised in 2013.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patients have given her consent for her images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Data availability statement

The data set used in the current study are available within the article.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Not applicable.

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Supplementary File

Table format: Grouped	Group A	Group B	Group C	Group D	Group E	Group F	Group G	Group H	Group I	Group J
	Pain (Pre)	Activity (Pre)	Cosmetic (Pre)	Pain (Day 1)	Activity (Day 1)	Cosmetic (Day 1)	Pain (3 mo)	Activity (3 mo)	Cosmetic (3 mo)	Title
1	PF	-0.294	-0.569	-0.164	-0.245	-0.142	-0.272	-0.202	-0.081	-0.036	
2	RP	-0.382	-0.566	-0.062	-0.237	-0.075	-0.046	-0.132	-0.201	-0.003	
3	BP	-0.753	-0.534	-0.198	-0.239	-0.102	0.085	-0.186	-0.176	0.033	
4	GH	0.018	-0.051	-0.068	-0.126	-0.083	-0.082	0.008	-0.032	-0.038	
5	VT	-0.310	-0.296	-0.051	-0.289	-0.189	0.012	-0.136	-0.103	0.044	
6	SF	-0.331	-0.413	-0.185	-0.235	-0.222	-0.199	-0.123	-0.334	0.016	
7	RE	-0.353	-0.390	-0.116	-0.143	0.026	0.012	-0.008	-0.061	-0.016	
8	MH	-0.293	-0.292	-0.178	-0.277	-0.310	-0.078	-0.154	-0.149	0.146	
9	VAS	0.043	0.266	0.106	0.770	0.632	0.141	0.132	0.324	0.164	
10	Title										