

Frail Frailty Scale and Fried Frailty Phenotype and Tilburg Frailty Scale in Frailty Screening of PKRP Patients

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Abstract: To compare the application ability of three screening scales in preoperative frailty risk screening in patients with PKRP, and to provide reference for medical staff in the operating room, a total of 134 inpatients with benign prostatic hyperplasia and PKRP hospitalized in the urology department of a tertiary hospital in Panzhihua from June 2022 to June 2023 were selected by convenience sampling, and three screening scales and ADL scales were used for screening, and kappa consistency analysis, ROC subject working curve analysis and Bayes discriminant analysis were performed. The screening results of the three scales were 41.8%, 48.5% and 73.9%, respectively. The kappa consistency analysis results were 0.595, 0.405 and 0.441 ($P < 0.001$), respectively; the AUC of ROC curve analysis showed that the AUC was 0.819, 0.861 and 0.901 ($P < 0.001$), respectively, and the Bayes discriminant analysis showed that the cross-validation accuracy rate of Tilburg scale for the risk prediction of daily life ability of experimental subjects reached 80.6%. The Tilburg Frailty Assessment Scale has a stronger ability to apply to preoperative frailty risk screening in PKRP patients, and the Tilburg Frailty Assessment Scale should be preferred.

1. Introduction

With the aging of the population, the incidence of benign prostatic hyperplasia (BPH) in the elderly is increasing year by year, BHP is a common urinary system disease in elderly men, with frequent urination, urgency, progressive dysuria, urinary retention, etc. as the main manifestations, seriously affecting the physical health and quality of life of elderly patients^[1], the treatment of BPH is mainly surgery, transurethral plasma resection of the prostate (Plasma Kinetic Resection Of Prostate (PKRP) is one of the surgical methods that has been gradually accepted by patients due to its safety, rapidity, and few complications^[2].

Surveys have shown that the elderly who are hospitalized due to sudden illness are more likely to develop frailty^[3], and the frailty rate of elderly patients is 18~87.1%^[4-5]. The evaluation of patients with benign prostate is mainly based on urodynamics^[6], risk assessment, and FTS^[7], and the specific evaluation of preoperative frailty has not been covered. Driven by the concept of high-quality nursing, preoperative visits, assessments, and screening have become an important part of operating room nursing, and patients can receive personalized perioperative care through scientific

and standardized preoperative visits^[8]. In this study, we compared the application ability of the FRAIL Frailty Screening Scale, the Fried Frailty Phenotype (FP) and the Tilburg Frailty Assessment Scale (TFI) in the preoperative frailty risk screening of PKRP patients, and provided a reference for operating room medical staff to select evaluation tools for preoperative frailty screening in PKRP patients.

2. Research objects and methods

2.1 Research Subjects

A total of 134 patients with benign prostate who were hospitalized in the urology department of a tertiary hospital in Panzhihua from June 2022 to June 2023 were selected as subjects by convenience sampling method. Inclusion Criteria: (1) age 60 years and above, (2) inpatients undergoing PKRP, (3) strong communication skills, able to complete the survey independently, (4) autonomous walking and assisted walking, (5) informed consent and voluntary participation in the study. Exclusion criteria: (1) patients with severe disease, (2) patients with benign prostatic hyperplasia undergoing other surgical methods, and (3) patients with insufficient communication skills.

2.1.1 General Data

The general demographic data of patients were collected using the hospital medical record system, including age, residence, marriage, education, economic status and health status.

2.1.2 FRAIL Frailty Screening Scale

In 2008, the International Geriatric Nutrition Association proposed this scale^[9], which includes 5 clinical indicators, if 3 are \geq , the diagnosis of frailty syndrome can be confirmed, < 3 are pre-frailty, and 0 are no frailty. The Cronbach's α coefficient of the scale is 0.826, which can be applied to the frailty screening of elderly patients in hospitals.

2.1.3 Fried frailty phenotype (FP)

In 2001, Fried^[10] et al. proposed this scale, which includes 5 clinical indicators, if 3 are \geq , the diagnosis of frailty syndrome can be made, < 3 are pre-frailty, and 0 are no frailty.

2.1.4 Tilburg Assessment of Frailty (TFI)

The table, developed by Dutch nurse scientist Gobbens^[11] et al. on the basis of the frailty integration model, includes 15 items and three dimensions: physical frailty (8 items), psychological frailty (4 items), and social frailty (3 items), with an assessment score ranging from 0 to 15 points, with ≥ 5 points being frailty, and the higher the score, the higher the degree of frailty^[12]. The Cronbach's α coefficient of the scale is 0.686, which can be used as an effective tool to screen the frailty state of elderly patients.

2.1.5 Activities of Daily Living Scale (ADL)

In 1969, Lawton and Brody^[13] in the United States proposed this scale, with a total of 14 items, and the higher the score, the worse the self-care ability and the greater the degree of disability. The ADL's Cronbach's α coefficient is 0.966 and is used to rate a person's ability to perform in everyday life^[14].

2.2 Data Survey Methodology

General data is collected from the hospital's medical record system, and preoperative visits are conducted by trained operating room nursing staff on a case-by-case basis.

2.3 Statistical Methods

EXCEL sheet was used for data entry, SPSS26.0 was used to process and analyze the data, the measurement data were expressed as ($\bar{X} \pm S$), the count data were expressed as frequency and composition ratio (%), and the χ^2 test was used between groups. The consistency of the scale was analyzed by the Kappa test, and the validity of the three frailty assessment tools was detected by the ADL test standard, and the validity of the three frailty assessment tools was detected by the ADL test standard, the receiver operating characteristic (ROC) curve and Bayes discriminant analysis were detected, and the difference was statistically significant with $P < 0.05$.

3. Results

3.1 General Information Results

Table 1: General information of respondents (n=134 cases)

Group	Number	Composition Ratio (%)
	39	29.1
	58	43.3
	37	27.6
Age (years)		
60~	128	95.5
71~	6	4.5
≥81		
Married or not	60	44.8
married		
unmarried	58	43.3
Education		
Elementary school and below	16	11.9
Junior high school, high school and technical secondary school	81	60.4
College degree or above	53	39.6
Economic Income (Month)		
≤4000		
>4000	118	88.1
smoking	16	11.9
Yes		
not	120	89.6
Drinking	14	10.4
Yes		
not		
Type of medication	97	72.4
≤2	37	27.6
>2		
Hospitalization in the past 1 year	77	57.5
Yes	57	42.5
not		
Health self-assessment	34	25.4
Good	83	61.9
Normal	17	12.7
Difference		

A total of 134 respondents, aged 60-94 (75.89 ± 7.75) years, were included in this study, as shown

in Table 1.

3.2 Comparison of screening scores on three scales

The screening results (Table 2) showed that there were significant differences in the scores of the three scales in the preoperative frailty risk screening of patients with PKRP ($P < 0.001$), Table 3.

Table 2: Screening results of three scales (n=134 cases)

	FP		Total
	frailty	No-frailty	
FRAIL			
frailty	60	18	78
No-frailty	9	47	56
TFI			
frailty	33	2	35
No-frailty	36	63	99
Total	69	65	134

Table 3: Comparison of scores on the three scales [Cases (%)]

	FRAIL	FP	TFI	
frailty	56(41.8)	65(48.5)	99(73.9)	
No-frailty	78(58.2)	69(51.5)	35(26.1)	
χ^2				30.983
P				0.001

3.3 KAPPA consistency analysis of the three scales

According to the screening results of the number of people on the three scales, the kappa consistency test showed that the kappa values of FRAIL scale and FP scale, FRAIL scale and TFI scale, FP scale and TFI scale were 0.595, 0.405 and 0.441 respectively ($P < 0.001$), and when the value was $0.4 < \text{kappa} < 0.75$, it represents the principle of medium consistency, indicating that the results of the three scales are judged to be moderately consistent.

3.4 ROC curve analysis of three scales

The ADL score was used as the outcome variable, the receiver operating characteristic (ROC) curve was used for test analysis, and the AUC value of 0.7-0.9 and the AUC value of ≥ 0.9 were used to determine the accuracy^[15]. The results showed that the risk prediction ability of FRAIL scale and FP scale for daily living ability was at a medium level, and the risk prediction ability of TFI scale was at a high level, and the optimal cut-off value of the corresponding scale was obtained by calculating the Youden index (sensitivity + specificity-1), and the corresponding sensitivity and specificity were given as shown in Table 4.

Table 4: ROC curve analysis of the risk prediction of daily living ability of PKRP patients on three scales

Scales	AUC	95%CI	sensitivity	specificity	Youden Index	P	Optimal Cut-off Value (min)
FRAIL	0.819	(0.731,0.908)	0.683	0.909	0.592	<0.001	1.5
FP	0.861	(0.771,0.951)	0.878	0.727	0.605	<0.001	0.5
TFI	0.901	(0.816,0.986)	0.797	0.909	0.706	<0.001	4.5

Note: AUC is the area under the operating characteristic curve of ROC subjects

3.5 Bayes discriminant analysis of three scales

Using the ADL score as the dependent variable and the three-screening scale score as the independent variable, the results showed that compared with the cross-validation accuracy of the FRAIL scale and the FP scale, the TFI scale had the highest cross-validation accuracy in the risk prediction of daily living ability, as shown in Table 5.

Table 5: Bayes discriminant analysis of three scales

Scales		Discriminant formula		Correctness
FRAIL		$Y=0.093X-0.706$		70.1%
FP		$Y=0.218X-0.752$		77.6%
TFL		$Y=0.513X-1.415$		80.6%

4. Discussion

According to kappa consistency analysis, ROC receiver operating curve and bayes discriminant analysis, the TFI frailty screening scale is more applicable in the application of preoperative frailty risk screening tools for PKRP patients. Reasons for analysis: Although both the TFI scale and the FP scale contain objective physical measurement indicators and can better evaluate the physiological frailty of the elderly, the FP scale and the FRAIL scale are unidimensional frailty assessment tools^[16], while the TFI scale can comprehensively evaluate the elderly from physical, psychological, and social aspects, which can better predict the degree of preoperative frailty in PKRP patients and guide patients to prepare for surgery; Intraoperative operating room nursing staff actively take measures to prevent the occurrence of intraoperative hypothermia, pressure ulcers, falls and beds, and unplanned extubation, because PKRP surgery needs to be placed in lithotomy position, weak patients must pay attention to prevent the damage of their nerve function and the occurrence of deep vein thrombosis, to ensure the safety of the patient's operation; After the operation, the patient should reasonably know the early activity according to his own condition, rationally use drugs, especially the use of postoperative pain relief drugs, and actively take measures to prevent vomiting and aspiration for frail patients who are not awake under general anesthesia.

5. Insufficient research

The sample size of this study is small, and it is limited to males, which cannot represent all elderly patients and cannot make comprehensive inferences; only patients with good communication skills who were able to complete the survey on their own were included, which had an impact on the representativeness of this study; in this study, we only divided the participants into the non-frailty group and the frailty group, which weakened the influencing factors of the pre-frailty group; in the actual survey, due to time constraints, they were not followed-up, so the predictive validity of the study could not be more validated.

6. Conclusion

In this study, we compared the application ability of the FRAIL Frail, Fried Frailty Phenotype (FP) and Tilburg Frailty Assessment Scale (TFI) in the preoperative frailty risk screening of PKRP patients, and determined that the TFI scale had the highest accuracy and stronger applicability. Therefore, the Tilburg Frailty Assessment Scale (TFI) should be preferred when choosing an assessment tool for preoperative frailty screening in patients with PKRP, especially in the perioperative care of PKRP patients.

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