Kinesiophobia and Related Factors in Tumor Patients with Tiaps During the Long Term: A Cross-Sectional Survey

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Abstract

Objective

This study is designed to investigate the status of kinesiophobia and related factors in tumor patients with the implanted port.

Methods

A total of 282 patients with the implanted port in the Oncology Department and the Daytime Chemotherapy Center in Ren ji Hospital, Shanghai Jiao Tong University School of Medicine, from April 1st,2021 to May 31 2021 were selected for the interview by using the self-made general information questionnaire, TSK-11 scale.

Results

The TSK-11 score of the 282 patients was(17.84 ± 6.06)points, 45.7% of the patients reported some degree of kinesiophobia (TSK-11 ≥ 18), and 18.4% of the patients had scores rated as moderate to severe (TSK-11 ≥ 25), the highest score was 34 points. Logistic regression analysis results showed that exercise habits ($P = 0.025$), pain ($P = 0.023$) and foreign body sensation ($P = 0.003$) were the important factors of kinesiophobia.

Conclusion

The occurrence of kinesiophobia is common in tumor patients with the TIAP, and it is closely related to the subjective experience of daily activities, which requires more attention and early intervention to reduce the potential adverse effects.

Introduction

Totally Implantable access Ports (TIAPs) is regularly used in clinical intravenous therapies such as chemotherapy and parenteral nutrition support [1]. TIAPs greatly improve the quality of life for tumor patients because of privacy-protected appearance and convenience of bathing. But at the same time, the fear of complications such as displacement and fracture bring about the unwillingness of limb movements, and some patients even dare not to carry out normal daily activities, which has certain impacts on their back to normal life. The concept of kinesiophobia was proposed by Kori et al. based on the fear-avoidance model [2]. In a broad sense, kinesiophobia refers to a phenomenon manifests itself as a fear of exercise for patients who fear harm caused by daily activities or functional exercises [3, 4]. Researchers at home and abroad have proved that fear of movement will cause limited limb movements, delay of postoperative recovery, and deterioration of the quality of life. This symptom has also gradually

attracted attention in various fields [5, 6]. At present, when it comes to complications related to subcutaneous ports, researchers worldwide focus a lot on infections and thrombosis. Less attention has been paid to the changes of limb movements and the consequent side effects. We investigated the status of kinesiophobia due to infusion ports in cancer patents, and analyzed the influencing factors of kinesiophobia, in order to provide theoretical basis for scientific health guidance to patients during the indwelling time.

Subjects And Methods

Subjects

From April 2021 to June 2021, 282 cancer patients with indwelling infusion ports who underwent therapies at the Department of Oncology and daytime Chemotherapy Center of Renji Hospital affiliated to Shanghai Jiao Tong University School of Medicine, were enrolled in this study. They were selected by convenience sampling. Inclusion criteria: 1) age of 18 or above, 2) definitive diagnosis and stable condition, 3) patents with a port implanted in upper arm or chest wall and 4) voluntary participation and communication barrier free. Exclusion criteria: 1) history of surgery or trauma on both upper limbs, 2) presence of motor dysfunction on the operative limb before port placement. All respondents gave informed consent and voluntarily participated in the study.

Dependent Measure

General data

The questionnaire was designed by researchers according to the research purpose and literature review, and two specialty nurses were invited to modify and improve the questionnaire based on the actual situation of clinical practices. The final items included gender, age, diagnosis, educational level, daily exercise habits, location (chest wall or upper arm), limb (left or right), catheter size (5F,6F or 6.5F), indwelling time (≤1,1-3,3-6 or ≥6 months), complications (infection, thrombus, turn or no), foreign body sensation, pain, and heart disease.

Kinesiophobia

To determine the level of kinesiophobia, Tampa Scale of Kinesiophobia-11(TSK-11) was used. Woby et al. [7] revised the initial TSK scale in 2005, and the new reversion has three dimensions including activity attitude, activity behavior cognition and activity behavior. There are a total of 11 items. For each item, subjects were asked to rate their agreement by themselves and provided their response from the following options: strongly disagree (1), disagree (2), agree (3) and strongly agree (4). The total score ranges from 11 to 44, with a higher value reflecting a higher degree of kinesiophobia. The Chinese version of this table has demonstrated good internal consistency and test-retest reliability, with a Cronbach's α coefficient of 0.883, and intra-class correlation coefficient (ICC) of 0.798 [8]. Jimenez et al. [3] divided the

degree of fear into four levels: no fear (≤17points), mild fear (18-24points), moderate fear (25-31points), severe fear (32-38points), extreme fear (39-44points).

Data collection

Before data collection, the investigation process and possible questions raised by the survey subjects were discussed and countermeasures were designed. All data were collected through one-on-one, face-to-face interviews with the researchers who explained the objectives and data collection way of the survey to everyone, and patients filling out questionnaires by themselves. Some information about implantable ports was obtained from our infusion port database and a retrospective review of routine medical records. A total of 285 questionnaires were sent out and 282 were effectively received in return, with an effective recovery of 98.9%. The three invalid questionnaires were all related to patients giving up the investigation halfway.

Statistical analysis

SPSS 24.0 software was used for data analysis. The measurement data whose statistical description results were in accordance with normal distribution were expressed as mean ± standard deviation. Enumeration data were expressed by number of case (%). The data of normal distribution were compared by independent sample T test between two groups and by one-way ANOVA between multiple groups. The statistically significant factors in ANOVA and T test were included in Logistic regression analysis as independent variables. The test level was set as α=0.05, and the results were considered statistically significant if the probability level of the test was lower than the predetermined significance level (P 0.05) .

Results

Current situation

The mean score of TSK-11 is (17.84±6.06) points with a total of 282 patients included in this study. 45.7% of patients reported kinesiophobia (≥18points), and 18.4% presented moderate to severe values of kinesiophobia (≥25 points). The highest score was 34 points. See Table 1 and Table 2 for the details.

Table 1 The TSK-11 scores of patients after the port of infusion implantation and their differences(*n*=282)

Indicator	*n（%）*	*TSK-11**	*P value*
Sex			0.524
Male	145（51.4）	17.67±5.89	
Female	137（48.6）	18.02±6.25	
Age/year			0.393
18-45	41（14.5）	16.61±5.54	
46-65	139（49.3）	18.37±6.17	
≥65	102（36.2）	17.62±6.15	
Educational level			0.471
Primaryschool and below	140（49.6）	18.24±5.99	
High school	64（22.7）	17.75±6.73	
University and above	78（27.7）	17.21±5.60	
Diagnose			0.347
Lung Cancer	32（11.3）	17.79±6.03	
Breast Cancer	64（22.7）	17.16±5.70	
Gastrointestinal Cancer	154（54.6）	18.21±6.20	
Others	32（11.3）	18.09±6.21	
Indwelling site			0.167
Thoracic wall	56（19.9）	17.41±6.06	
Upper Arm	226（80.1）	17.95±6.07	
Left/Right			0.809
Left	52（18.4）	17.79±6.19	
Right	230（81.6）	17.85±6.05	
Catheter type (single lumen)			0.370
5F	227（80.5）	18.04±6.14	
6F	37（13.1）	16.92±6.11	
6.5F	18（6.4）	17.28±4.86	

Indwelling time/months			0.415
≤1	33（11.7%）	18.45±6.46	
1-3	78（27.7%）	17.87±5.99	
3-6	73（25.9%）	18.33±5.88	
>6	98（34.8%）	17.24±6.14	
Complication			0.143
Infection	4（1.4%）	19.75±6.60	
Thrombus	3（1.1%）	15.00±1.00	
Turn	-	-	
No	275（97.5%）	17.84±6.09	
Exercise habits			0.017
Yes	112（39.7%）	19.08±6.27	
No	170（60.3%）	17.02±5.79	
Pain			0.014
Yes	21（7.4%）	21.95±6.23	
No	261（92.6%）	17.51±5.94	
Foreign body sensation			0.008
Yes	118（41.8%）	19.32±6.45	
No	164（58.2%）	16.77±5.54	
Cardiac disease			0.145
Yes	7（2.5%）	21.14±6.82	
No	275（97.5%）	17.76±6.03	

Note: *: TSK-11≤17 points indicates the presence of fear symptoms, and the highest score of this sample is 34 points

Table 2 The classification of the kinesiophobia

Kinesiophobia	No	Yes				
		Mild	Moderate	Severe	Extremely severe	Total
n（%）	153（54.3）	77（27.3）	47（16.7）	5（1.8）	0（0.0）	129（45.7）

The top three items with the highest scores in TSK-11

Top three scores for TSK-11 were items 5, " My accident has put my body at risk for the rest of my life ", 1, " I'm afraid that I might injure myself if I exercise " and 9, " Pain lets me know when to stop exercising so that I don't injure myself ". They were (2.76±1.25) points, (2.76±1.15) points, (1.71±0.88) points, respectively. See Table 3 for details.

Table 3 The scores of each item of the TSK-11

Items	Score（point）
Attitude	**2.04±0.36**
1 I'm afraid that I might injure myself if I exercise	2.76±1.15
11 No one should have to exercise when he/she is in pain	1.32±0.66
Cognition	**1.70±0.50**
5 My accident has put my body at risk for the rest of my life	2.76±1.25
8 I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1.71±0.86
6 Pain always means I have injured my body	1.66±0.92
2 If I were to overcome it, my pain would increase	1.10±0.46
3 My body is telling me I have something dangerously wrong	1.02±0.16
4 People aren't taking my medical condition seriously enough	1.02±0.13
Activity	**1.49±0.22**
9 Pain lets me know when to stop exercising so that I don't injure myself	1.71±0.88
7 Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1.49±0.82
10 I can't do all the things normal people do because it's too easy for me to get injured	1.27±0.52

Factors affecting kinesiophobia

The degree of kinesiophobia was no statistical difference about general demographic characteristics and different parameters of ports among the subjects. Pain (P= 0.014), exercise habits (P= 0.017), and foreign body sensation (P=0.008) are related to patients' fear of movements. Specific results are shown in Table 1.

A two-regression model was built to check for variables independently affecting kinesiophobia. The score of TSK-11 was used as the dependent variable. When the score raged from 1 to 17, it means denying activity fear, and was assigned as "0"; otherwise, it means accepting activity fear and was valued as "1". The variables with statistically significant difference in univariate analysis ($P < 0.1$) were taken as independent variables for avoiding missing. The result showed that exercise habits (P= 0.025), pain (P=0.023) and foreign body sensation (P= 0.003) were the important factors affecting patients' activity fear (Table 4).

Table 4 Logistic regression analysis of the influencing factors of kinesiophobia

Variable	*B*	SE	Wald	*P value*
Exercise habits	0.587	0.262	5.036	0.025
Pain	1.334	0.586	5.171	0.023
Foreign body sensation	0.380	0.130	8.601	0.003

Discussion

The situation of kinesiophobia during indwelling

During the indwelling, the limited limb movement of the implanted side was more common. 45.7% of patients had kinesiophobia (TSK≥18) with varying degrees and 18.5% had moderate to severe kinesiophobia (TSK≥25). Most of the patients were worried about the adaptation to activities when the infusion device was implanted, but the degree of fear was relatively mild compared with other chronic patients who were afraid of serious negative experience after the activities [9,10]. Some studies also had shown that the degree of kinesiophobia is related to education [11]. Patients with lower educational level are more prone to fear, which may be related to the low financial ability to obtain medical resources [12]. However, in this study, there was no significant correlation between the degree of kinesiophobia and factors of gender, age, educational level, tumor and heart disease. The reason may be related to the region of the subjects in this study, where the availability of and convenience to obtaining relevant medical information about the port is high due to a high level of economic development. Considering that the position of the catheter-tip would move in the superior vena cava in accord with respiration and limb movements, "whether the patient has heart disease" was included as an influencing factor, but the results showed that it was not correlated with the fear of movement (P=0.145), which may be related to the

precise positioning of the tip during the operation and the fact that the patient's limb movements with the catheter did not cause cardiac discomfort. The duration of the indwelling of the infusion port had no effect on the degree of kinesiophobia of patients (P=0.415), the TSK score of patients with indwelling port had no difference between less than 1 month and more than 6 months. However, the fear of movement from patients with infusion ports continued until the infusion port was removed. The implantation site of infusion port did not affect the degree of motility of patients (P=0.167), regardless of the upper arm port or chest wall port. Meanwhile, no statistically significant effect on the degree of patients' motility was shown between left limb implantation and right limb implantation (P=0.809) in our study.

A study [13] have shown that non-right-handed infusion port implantation should be the first choice when the patient is right-handed, which can reduce the potential detrimental impact of infusion port implantation to the quality of life. However, a trans-left infusion port implantation will reduce the duration of the use of the infusion port and increase the risk of catheter-related thrombosis [14,15]. Meanwhile, trans-left infusion port implantation is inconvenient for operators. It is suggested that infusion ports should be comprehensively evaluated before implantation, and patients should be fully communicated with. The implanted side should be selected after weighing the advantages and disadvantages.

Activity cognition and attitude of tumor patients during indwelling

The score of activity cognition and activity attitude was higher than that of activity behavior, indicating that the kinesiophobia was mainly manifested in psychological cognition during the period of indwelling. The items with high scores were “My accident has put my body at risk for the rest of my life " and " I’m afraid that I might injure myself if I exercise", indicating that the patient's fear of moving was due to his concern about the safety of catheter. According to a study of indwelling experience [16], when it comes to daily life situations, catheter is described as a continuous reminder of disease and discomfort. Although most patients do not think the port has negative effects on the body, they still feel repulsive about it. Fatigue and low mood will also increase the discomfort of tumor patients with port and will be linked to negative outcomes of the port such as poor satisfaction and treatment compliance [17]. Medical staff should be reminded of paying attention to the psychological experience, emotional changes and coping styles of tumor patients during indwelling, and carry out necessary interventions as early as possible. For patients who use cognitive avoidance as a coping strategy, the problem will exacerbate. Medical staff can play an important role in correcting adverse coping types and avoiding harmful dispositions. Psychological education interventions for patients and their families can help develop better cognitive and behavioral strategies to better adapt patients’ daily life to vascular access devices.

Exercise habits

Regression analysis showed that exercise habits were an important factor influencing the fear of motility (P=0.025). Patients with exercise habits (19.08±6.27 points) had a higher TSK-11 score than those without exercise habits (17.02±5.79 points). It may be related to the fact that the patients who have the habit of exercise are involved in a greater range and intensity of activities, and they are more concerned

about whether the infusion port will break or turn due to the activity. Proper physical exercises are beneficial to the survival and quality of life of cancer patients [18], and it can help reduce the incidence of complications such as thrombosis and shoulder dysfunction caused by infusion devices implanted. A systematic review about the influence of fear of movements on the outcome of total knee replacement showed that although the effect on the outcome of postoperative rehabilitation was complicated, the presence of kinesiophobia would have a negative impact on the outcome of limb function up to one year [19].

It is suggested that medical staff should include the evaluation of exercise habits of patients into the comprehensive evaluation before they decide which limb to be operated on, so as to meet the exercise needs of patients during their stay with the port. In the health guidance, nurses should fully consider that the physical strength of tumor patients, a special group, will be affected by diseases and treatment [20], and offer different activity and exercise guidance for different groups. We should not only reduce fears and concerns of limb activities caused by TIAPs for our patients, but also make them be aware of the possible harm caused by vigorous arm swings and other movements during the catheterization, so as to truly meet the needs of different groups and improve their quality of life.

Pain and foreign body sensation

Both pain and foreign body sensation are related to the subjective negative experience from patients, including local pain caused by surgery and each injection of port needle, unexplained pain during catheter placement, visual experience and touch sensation of port protruding under the skin, and pulling sensation of large movements. These experiences cause patients to pay more attention to the extent and scope of their activities during the indwelling of the infusion port [11], leading to their fear of movements. Clinical practices have proved that infusion port is a better device for cancer patients for their treatment. But in some patients, the implant can lead to emotional distress, anxiety and depression, which may be related to patients' individual differences, and sensitivity to the physical symptoms [21,22]. Particularly, the visibility of infusion port further reminds patients of their illness.

Medical staff should fully reduce the pain of patients when performing the surgery and injecting needles into the infusion port [23], and strengthen postoperative health education, including avoiding heavy lifting in the first week after implantation and informing patients that normal activities of the limbs on the surgical side can be carried out. Patients with positive personalities can maintain internal control over medical strategies and more likely to accept the negative influence of implants. Patients with negative personalities have less confidence in the treatment effect and are more sensitive to discomfort and complications. Therefore, medical staff should help and encourage patients to increase their abilities of coping with disease cognition and behaviors.

Limitations and recommendations for future research

Some limitations to our single center cross-sectional study are worth noting. We were unable to determine the true effect of temporal changes on kinesiophobia and subsequent influence on physical activities.

Data with multicenter trials will be needed to prove our conclusion.

Conclusion

To sum up, after implanted into the infusion port, some patients will show kinesiophobia, which is mainly manifested in the change of activity cognition and attitude. Exercise habits, pain and foreign body sensation are the main influencing factors. Although the overall intensity of fear is in low-medium level, it persists, which deserves attention and early intervention to improve the quality of life of cancer patients.

Declarations

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Availability of data and material

Not applicable.

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Authors' contributions

Ya-wen Wang drafted the first manuscript. All authors contributed to study design, data collection and analysis. All authors read and approved the final manuscript.

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Consent for publication

All authors are in agreement with the publication of the manuscript.

Code availability

Not applicable.

Conflict of Interest

No conflict of interest has been declared by the authors.

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