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Original Article

Analysis of risk factors and nursing strategies in patients with HSPN complicated by pulmonary infection

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Abstract: Objective: The objective of this study was to explore risk factors and nursing strategies for patients with henoch schonlein purpura nephritis (HSPN) complicated by pulmonary infection. Methods: A retrospective analysis was carried out in 127 patients who were diagnosed with HSPN. The SF-36 health survey was carried out with the patients before and after nursing and included items on physiological function, pain, social function, mental status, and overall health condition. A prognostic follow-up lasting one year was performed for patients to record the recurrence rate of HSPN. Results: The conditions of persistent rash and applications of renal puncture, intubation, venous indwelling catheter, and hormones and immunosuppressants in the HSPN group were significantly less than those in the infection group ($P < 0.01$). The applications of renal puncture, intubation, venous catheter, hormones, and immunosuppressant were risk factors for HSPN complicated by pulmonary infection ($P < 0.05$). The average SF-36 score after treatment in the HSPN group was significantly improved from (60.68±6.44) to (75.86±6.23) ($P < 0.05$); the average SF-36 score after treatment in the infection group increased from (60.21±6.68) before treatment to (75.71±6.71). The recurrence rate in the HSPN and infection group was 12.3% (8 cases) and 17.02% (8 cases), respectively. Conclusion: Risk factors of HSPN complicated by pulmonary infection are the application of kidney puncture, venous indwelling catheter, intubation, and hormones, as well as immunosuppressant. Medical professionals should pay close attention to and monitor the vital signs of patients, and give nursing care strictly according to each patient's actual situation.

Keywords: Purpura, nephritis, pulmonary infection, risk factors, comprehensive nursing

Introduction

Purpuric nephritis, also known as henoch schonlein purpura nephritis (HSPN), is a kidney injury disease marked by the pathological changes of necrotizing vasculitis in the occurrence of the anaphylactoid purpura [1]. Clinical manifestation of the disease is mainly hematuria, and it occurs often in children under 10 years old [2]. According to statistics reported in Gaskill et al. [3], 1.6 million patients were newly diagnosed with anaphylactoid purpura in 2015, and 37.68% of them had HSPN. In addition, Tudorache et al. [4] reported that since 2010 the incidence of HSPN has continuously increased, and the patient population has gradually grown from mainly children to include both adolescents and adults.

At present, significant achievements have been made in finding a clinical cure for HSPN, and Xiong et al. [5] showed that HSPN's clinical cure rate was basically around 90%, but its radical cure was very difficult. A number of investigation results [6-8] have shown that HSPN's recurrence rate was as high as 54.83%, so a longer treatment cycle is required for a complete radical cure of HSPN. During the course of treatment, the patient needs to use all kinds of hormones and immune agents for a long time, which makes the patient's immune function decrease further and significantly increases the risk of nosocomial infection [9]. Statistics reported by Yan [10] demonstrated that the incidence of nosocomial infection in HSPN was about 42.36%, and that was the most important difficulty to be solved at present. Furthermore, the fatality rate due to the infection was up to 42.52% [11]. However, there is still a dispute on how to solve the problem of infection in HSPN at home and abroad. Moreover, there are few studies on the occurrence of pulmonary infection in HSPN.

Therefore, this article analyzed retrospectively the risk factors of and the solutions for patients with HSPN complicated by pulmonary infection in our hospital so as to provide effective and reliable guidance on HSPN treatment in clinics in the future.

Materials and methods

General information

Patients with HSPN (n = 127) who were admitted to Rizhao People's Hospital were selected as the subjects of this retrospective analysis. All patients have signed informed consent. The inclusion criteria were patients who were: in compliance with the HSPN Diagnosis Criteria of the 2013 Vienna International Workshop [12], diagnosed with HSPN by a renal biopsy in the Pathology Department at our hospital, the ages of 3 and 50 years old, receiving follow-up treatment after diagnosis at our hospital, suffering from pulmonary infection and in compliance with the 2013 Nosocomial Infection Diagnosis Criteria [13], and they were represented by complete medical records. In all, 273 cases were included. The exclusion criteria were patients who had: cardiovascular and cerebrovascular diseases, important organ failure, combined tumor, multiple nosocomial complications, midway transfer, evidence of compliance with our hospital's medical and nursing professionals, and a family disease history. After these cases were excluded, 127 cases were left. Of these, 71 (without pulmonary infection) were included in the HSPN group, and 56 cases were included in the infection group (complicated by pulmonary infection).

Methods

All patients received diuretic, hypotensive, and anti-infective treatment at our hospital. During the treatment, invasive procedures such as intubation, venous indwelling catheter and renal puncture, and application of hormones and immunosuppressants were strictly restricted. Further, customized and comprehensive nursing care was adopted. This included keeping the patient rooms neat and at a comfortable temperature; maintaining room ventilation to avoid dampness and mosquito bites; reducing the visits of the family members and friends; having doctors in charge regularly explain disease-related knowledge to the patients; reminding the patients of disease-related cautions during the nursing process; encouraging patients to establish confidence and actively cooperate with treatment by the nurses; customizing dietary recipes according to the physique of the patients; paying attention to nutritional balance, as well as eating more protein and less salt; strictly monitoring the patients' urine states (such as color change, precipitation, hematuria, etc.); regularly drawing the patients' venous blood to determine renal function; daily observing the patients' purpura situations (such as size and color changes, etc.) and informing doctors in a timely manner regarding such situations so they can take the necessary corresponding actions; strictly following the doctor's advice and orders in drug administration; repeatedly reminding the patient of the precautions and potential reactions involved in the drug administration; notifying the doctors immediately in the event of reported patient discomfort so that they can provide timely treatment; and appropriately assisting the patient during rehabilitation to enhance the body's immunity.

Observation index

Clinical data (such as age, gender, weight, etc.) of the two groups of patients was obtained, as well as information concerning: persistent rash and the applications of intubation, kidney puncture, venous catheter, hormones, and immunosuppressants; and the SF-36 patient survey before and after nursing [14], which included aspects of physiological function, pain, social function, mental status, and overall health condition. For this survey, 100 was the maximum score. The higher the score, the better the patient condition. Prognostic follow-up was conducted with the patients for one year after treatment to record the HSPN recurrence rate.

Statistical method

The data were analyzed and processed with SPSS 22.0 statistics software, in which the measurement data, such as age, SF-36 score, etc. were expressed in the form of (mean ± standard deviation). Further, a t-test was applied for the comparison between groups. The count data, such as the gender of the patients, the persistent rash, etc. were presented with rate, and the Chi-square test was adopted to assess the between-group comparison. Logistic regression analysis was used for the risk factors related to HSPN complicated by

Table 1. Comparison of general data between the two groups of patients [n (%)]

	HSPN group (n = 71)	Infected group (n = 56)	t/X^2	P
Age	14.27±5.72	15.08±6.54	0.331	0.742
Body weight (KG)	42.83±13.44	43.27±14.67	0.182	0.863
Disease course (day)	19.63±8.12	18.27±8.57	0.944	0.367
Gender			0.223	0.642
Male	48 (67.61)	40 (71.43)		
Female	23 (32.39)	16 (32.39)		
Clinical manifestations			0.145	0.993
Anuria	12 (16.90)	10 (17.86)		
Acute nephritis	18 (25.35)	13 (23.21)		
Kidney disease type	21 (29.58)	16 (28.57)		
Chronic nephritis	20 (28.17)	17 (30.36)		
Place of residence			0.427	0.521
Urban	59 (83.10)	44 (78.57)		
Countryside	12 (16.90)	12 (21.43)		

Table 2. Two groups of patients cured [n (%)]

	HSPN group (n = 71)	Infected group (n = 56)	X^2	P
Continuous rash			15.252	0.004
Yes	21 (29.58)	36 (64.29)		
No	50 (70.42)	20 (35.71)		
Kidney puncture			11.145	0.003
Yes	31 (43.66)	41 (73.21)		
No	40 (56.34)	15 (26.79)		
Intubation			16.094	0.026
Yes	24 (33.80)	39 (69.64)		
No	47 (66.20)	17 (30.36)		
Indwelling catheter			13.773	0.001
Yes	21 (29.58)	35 (62.50)		
No	50 (70.42)	21 (37.50)		
Hormone use			19.631	0.025
Yes	19 (26.76)	37 (66.07)		
No	52 (73.24)	19 (33.93)		
Immunosuppressant use			12.576	0.034
Yes	22 (30.99)	35 (62.50)		
No	49 (69.01)	21 (37.50)		

pulmonary infection. P < 0.05 implied a statistically significant difference.

Results

Comparison of general information

In order to ensure accuracy and precision of the experimental results, the general information including age, weight, course of disease, and gender composition of the two groups of patients was not significantly different (P > 0.05), proving that the two patient groups were comparable. Please refer to **Table 1** for details.

Comparison of clinical cure

Patients with persistent rash and application of intubation, venous indwelling catheter, renal puncture, and hormone and immunosuppressant, respectively, accounted for 29.58%, 43.66%, 33.80%, 29.58%, 26.76%, and 30.99% of the HSPN group. The same proportions for the infection group were 64.29%, 73.21%, 69.64%, 62.50%, 66.07%, and 62.50%, respectively. The between-group comparison showed that the item scores were significantly lower for the patients in the HSPN group compared with those of the infection group (**Table 2**).

Analysis of factors related to HSPN complicated by pulmonary infection

Logistic regression analysis displayed no significant correlation between gender, clinical manifestation, persistent measles, and HSPN complicated by pulmonary infection (P > 0.05). The applications of renal puncture (P = 0.003), intubation (P = 0.022), venous catheter (P = 0.001), hormone (P = 0.024), and immunosuppressant (P = 0.034) were risk factors for HSPN complicated by pulmonary infection (P = 0.041) (**Table 3**).

Comparison of nursing

The average SF-36 score in the HSPN group after treatment was (75.86±6.23), which marked a significant increase (P < 0.05) compared with that before treatment (60.68±6.44), and the scores for physiological function, pain,

Table 3. Logistic regression analysis of HSPN associated factors in pulmonary infection

Factor	β	SE	X^2	OR	95% CI	P
Gender	0.28	0.43	0.421	1.19	0.84~1.68	0.341
Clinical manifestations	0.43	0.27	1.864	1.53	0.81~2.89	0.195
Continuous rash	0.60	0.51	3.592	0.73	0.52~1.03	0.073
Kidney puncture	1.43	0.82	16.746	1.54	1.24~1.92	0.007
Intubation	1.26	0.75	14.335	0.67	0.48~0.93	0.022
Indwelling catheter	1.53	0.86	18.247	1.80	1.31~2.47	0.004
Hormone use	1.30	0.79	13.862	1.59	1.07~2.37	0.024
Immunosuppressant use	1.22	0.68	11.948	1.72	1.05~2.83	0.038

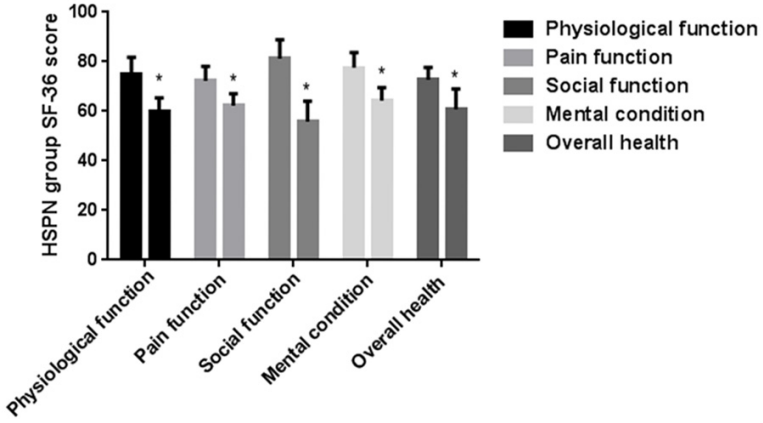

Figure 1. HSPN patients' SF-36 scores. *P < 0.05, compared with the pre-treatment SF-36 scores, the ghost stroke pen and treatment significantly increased SF-36 scores after treatment.

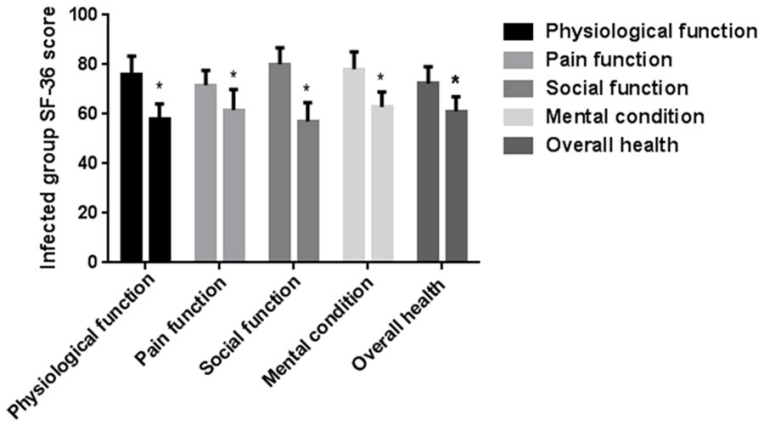

Figure 2. SF-36 scores of patients with infection. *P < 0.05, compared with the pre-treatment SF-36 scores, the ghost stroke pen and treatment significantly increased SF-36 scores after treatment.

social function, mental status, and overall health were (75.24±6.52), (72.33±5.82), (81.32±7.62), (77.59±6.21), and (72.82±4.96), respectively (**Figure 1**). These were all of statistical significance compared with each item before treatment (P < 0.05). The average SF-36 score in the infection group after treatment was (75.71± 6.71), which marked a significant increase compared with (60.21±6.68) before treatment (P < 0.05). Further, the scores in physiological function, pain, social function, mental status, and overall health were respectively (76.24±7.21), (71.59±6.04), (80.23±6.55), (78.14±6.95), and (72.33+6.82). These were all of statistical significance compared with each item before treatment (P < 0.05). There were no significant differences in SF-36 scores before and after treatment between the two groups (P > 0.05) (**Figure 2**) suggesting that the nursing mode was feasible.

Comparison of recurrence

Among all 127 patients, 112 patients were successfully followed up with. The follow-up success rate was 88.19%. There were 6 cases and 9 cases that were lost in the HSPN and the infection groups, respectively. The recurrence rate of the HSPN group was 12.3 (8 cases) and was lower than that of the infection group (17.02%, 8 cases), but there is no significant difference (**Figure 3**).

Discussion

HSPN is a very common autoimmune disease in the human body, characterized by glomerular mesangial proliferative lesions, which is usually accompanied by vasculitis (such as necrotic glomerular capillary loop necrosis,

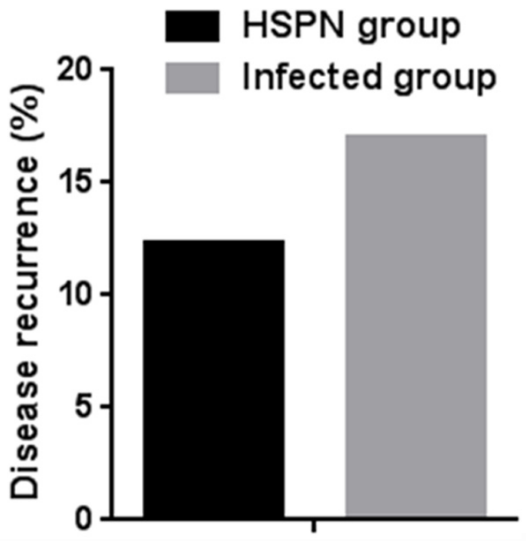

Figure 3. Disease relapse rates for both groups. The recurrence rate for the HSPN group was 12.3% (8 cases) whereas the recurrence rate for the infected group was 17.02 (8 cases). The recurrence rate of the HSPN group was lower than that of the infection group, but there is no significant difference.

crescent formation, etc.) [15]. Pathological changes of HSPN are usually manifested as diffuse or segmental distribution of the immunologic pathology IgA in the mesangial and para mesangial regions, and most of the cases may have been accompanied by the sediment of other immunoglobulin and complement components, while the distributions of IgG and IgM were similar to that of IgA [16]. IgA deposition is seen in some capillary walls, and is often associated with C3, and C1q. However, associations with C4 are rarely seen [17]. Research on the pathogenicity of HSPN has achieved significant breakthroughs. However, how to effectively improve the prognosis of HSPN patients is still a major challenge in the current clinical practice. HSPN has no apparent characteristics in the early stages, and patients often treat it as anaphylactoid purpura due to a lack of common sense. Missing the best period of treatment is another main cause of poor prognosis [18]. HSPN has damaged the normal operation of immune function within the human body, which makes patients extremely vulnerable to damage in various organs (especially the lungs, digestive tract, and joints) and infection during various periods of illness [19]. At present, there are few reports on HSPN complicated by pulmonary infection; there is also great controversy concerning how to reduce the risk of infection during HSPN treatment. Clarifying related factors and nursing measures in HSPN complicated by pulmonary infection will provide effective references for the treatment of HSPN in the future, which is of great significance to improving HSPN prognosis.

In this study, 127 cases of HSPN at our hospital were selected following strict inclusion and exclusion criteria, and a retrospective analysis was conducted based on scientific principles to provide the most accurate and reliable experimental results. The results of this study demonstrate that patients with HSPN complicated by pulmonary infection have more experiences with persistent rash and applications of renal puncture, venous catheter, intubation, hormones, and immunosuppressants compared with those with HSPN without infection. Logistic regression analysis was used to further confirm that renal punctures, venous indwelling catheters, intubation, and hormones, as well as immunosuppressive agents, were risk factors for HSPN complicated by infection. The comparison of SF-36 scores and HSPN recurrence rates between the two groups of patients before and after the treatment displayed significant improvements for both groups, and these comparisons, together with the studies of Huang et al. [20] and Wei et al. [21], demonstrated that the recurrence rates for patients in this experiment decreased significantly, because of the application of the correct nursing mode strategy, according to the analysis. The major cause of infection in patients with HSPN was bacterial [22]. However, Huang et al. and Wei et al. did not adopted targeted nursing measures, resulting in the prevalence of complications and recurrence. In this study, reduction of the risk of bacterial and secondary infections is enabled, to a great extent, by maintaining indoor cleanliness and limiting relative and friend visits. Second, the infection may be caused by allergic reactions occurring in the body [23], such as those induced by food, medicine, vaccines, etc. During the course of treatment, nursing workers should strictly follow medical advice to arrange patient medication and diet. Once any adverse reaction was found, the doctor was notified in time so as to achieve early detection and treatment. During the period of illness, the patients' immunity decreased, and invasive operations including

kidney puncture, intubation, etc., could easily induce secondary infection. Therefore, the principle of aseptic operation should be strictly performed during nursing staff operations to avoid the occurrence of cross infection. Chan et al. [24] demonstrated that the risk factors of HSPN complicated by pulmonary infection were mainly renal puncture, venous indwelling catheter, and intubation. The current study's expectations and results were consistent with these findings. The hormones and immunosuppressive agents are drugs with side effects, and patients are more likely to be negatively affected if they are not strictly controlled during the course of treatment [25]. During the course of hospitalization, communication between the patients, nurses, and physicians is critical, as is the education of the patients regarding HSPN-related knowledge. This not only ensures that close relationships will form between the doctors and patients, but also that the patients will gain a certain initial understanding of their disease, so they will naturally know how to avoid harm after being discharged from the hospital. This is also the reason why patient occurrence rates are significantly lower than those of other studies.

Because of the limited experimental conditions, the research sample was small, and the population was relatively simple, so it is possible related errors may exist. At present, the pathogenesis of HSPN is not yet clear, and we will follow this study for a longer period of time, further analyze the risk factors of HSPN complicated by lung infection in a larger sample, and continue to carry out deeper research and discussion.

In summary, risk factors of HSPN complicated by pulmonary infection are the applications of kidney puncture, venous indwelling catheter, intubation, hormones, and immunosuppressants. During the course of treatment, medical professionals should pay close attention to and monitor patients' vital signs and provide nursing care strictly according to patients' actual conditions.

Disclosure of conflict of interest

None.

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