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A summary of nursing care for a patient after carotid endarterectomy based on evidence-based medicine

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Abstract: An evidence-based nursing plan was developed for a patient with Carotid artery webbing who underwent carotid endarterectomy. According to the PICO principle, questions were raised based on the patient's clinical manifestations. Computerized searches were conducted in databases such as CNKI, Wanfang Data, PubMed, and Web of Science to collect relevant literature on the nursing of patients undergoing carotid endarterectomy. After strict evaluation, the scientificity of the research design, the representativeness of the sample, and the reliability of the results were analyzed. Finally, 44 high-quality literatures were included. The best evidence was obtained from the literature, combined with clinical experience and the actual situation of the patient, and the best nursing plan was formulated and implemented. After the implementation of this plan, complications such as hypertension, myocardial infarction, and infection were promptly discovered and effectively intervened. No complications such as bleeding and hematoma, cerebral hemorrhage and cerebral .

1. Introduction

Evidence-based nursing refers to the process in which nursing staff carefully, explicitly and wisely combine scientific research conclusions with clinical experience and patients' wishes during the planning of nursing activities, obtain evidence, and use it as the basis for clinical nursing decisions. It has the advantages of improving nursing quality, enhancing patient satisfaction and promoting the development of the nursing discipline [1,2]. Carotid artery webbing is a membranous structure located within the carotid artery, usually at the origin of the internal carotid artery or the bifurcation of the common carotid artery, protruding from the vessel wall into the lumen, resembling a web [3]. It is a relatively rare vascular anatomical variation that can be detected in imaging examinations such as angiography [4,5]. It can affect hemodynamics, increase the risk of thrombosis and arterial embolism, and thereby potentially trigger ischemic cerebrovascular diseases [6]. Carotid artery webbing is extremely rare and is one of the causes of cryptogenic stroke of unknown origin, accounting for 9.4% to 37% of cryptogenic strokes [7]. For patients with symptoms or severe carotid stenosis and poor response to drug treatment, carotid endarterectomy (CEA) is an

effective treatment method [8]. However, current research on Carotid artery webbing is mainly focused on imaging diagnosis, clinical characteristics, and surgical treatment [5-8], and there are few studies on perioperative nursing for patients with Carotid artery webbing undergoing carotid endarterectomy [7]. On December 4, 2023, a patient with Carotid artery webbing was admitted to the emergency intensive care unit of the First Affiliated Hospital of Henan Polytechnic University. The patient had severe stenosis of the right internal carotid artery and moderate stenosis of the left internal carotid artery, and underwent carotid endarterectomy. Evidence-based nursing was implemented for this patient, and the report is as follows.

2. Case Presentation

2.1 General Information

Patient, male, 63 years old, presented with dizziness and a sense of lightheadedness without obvious trigger 10 days ago and was admitted to the hospital on December 4, 2023. He had a history of hypertension for 20 years, diabetes for 10 years, and hepatitis B with small three positive bands for 40 years. He had a smoking history of 40 years, smoking 20 cigarettes daily, and a drinking history of 40 years, consuming 150g of alcohol daily. There was no family history of genetic diseases and no allergy history. The clinical diagnosis was: right internal Carotid artery webbing (severe), left internal Carotid artery webbing (moderate), cerebral infarction, hypertension, diabetes, and hepatitis B with small three positive bands. Physical examination: T: 36.8℃, P: 62 beats/min, R: 18 breaths/min, BP: 135/66 mmHg, clear consciousness and fluent speech. The muscle strength of both upper limbs was grade 5, muscle tone was normal, both lower limbs could not stand, limb dysfunction, muscle strength was grade 0, muscle tone was reduced, and sleep was normal at night, diet and defecation and urination were normal. The patient's self-care ability score was 30 points, pressure injury score was 15 points, and fall (bed fall) risk assessment score was 50 points. Laboratory test results showed: GLU 9.8 mmol/L, total cholesterol 5.62 mmol/L, triglycerides 1.17 mmol/L, high-density lipoprotein 1.9 mmol/L, low-density lipoprotein 3.01 mmol/L. On December 5th, CTA of the carotid artery and CTP of the brain showed: cerebral arteriosclerosis; mixed plaque at the bifurcation of the left common carotid artery, mild stenosis of the lumen; soft plaque at the proximal end of the left internal carotid artery, moderate to severe stenosis of the lumen; mixed plaque at the bifurcation of the right common carotid artery, moderate stenosis of the lumen; mixed plaque at the proximal end of the right internal carotid artery, severe stenosis of the lumen.

2.2 Treatment Process and Outcome

After communication between the doctor, the patient and his family, considering that the stenosis degree of the right carotid artery has significantly worsened over the past half year, and after the multidisciplinary consultation on carotid artery webbing and cerebrovascular diseases, the patient and his family, after careful consideration, decided to undergo carotid endarterectomy. Before the operation, the patient was treated with control of blood sugar, stabilization of plaques, control of infection, and close monitoring of blood pressure and blood glucose changes, with good results. On December 11th, the patient underwent right carotid endarterectomy under general anesthesia. After the operation, the patient was given comprehensive treatment including anti-inflammatory, anticoagulant, antiplatelet aggregation, improvement of neurological function, dehydration and reduction of intracranial pressure, control of blood pressure, control of blood sugar, maintenance of nutrition, electrocardiogram monitoring and oxygen inhalation. At 14:00 on December 12th, the patient complained of headache, with blood pressure of 162/92 mmHg. Immediately, in accordance

with the doctor's instructions, 20% mannitol injection was rapidly intravenously infused to reduce intracranial pressure, and urogesic injection was used to control blood pressure. At 20:00, the patient experienced compressive pain in the precordial area, which lasted for about several minutes and then relieved. The bedside electrocardiogram showed ST segment depression in V4, V5, and V6 leads. Urgent examination of myocardial enzymes and troponin was performed, and the results showed: AST: 45 U/L, CK: 232 U/L, CKMB: 33 U/L, MYO: 123.9 ug/L, hs-cTNT: 4.188 ug/L, CKMBmass:12.5 ng/mL, NT-Pbnp: 2592 pg/ml. Dynamic monitoring of electrocardiogram, myocardial enzymes, troponin, and intravenous infusion of nitroglycerin were given. At 06:00 on December 13th, the body temperature was 38.3℃. Physical cooling was given, and cefoperazone sodium was used for anti-infection treatment. On December 14th, the body temperature returned to normal. On December 22nd, the patient was discharged from the hospital after rehabilitation.

3. Evidence-based Nursing

3.1 Establish an evidence-based practice group and identify nursing issues

The evidence-based nursing team is composed of the head nurse of the department, the head nurse of the ward, and the responsible nurses, with each group consisting of 3 members and there are 4 groups in total. All the members have received training on evidence-based nursing knowledge. The team, based on the patient's condition in this case, aims to make better use of medical and nursing resources, dynamically observe and grasp the existing or potential risk factors of the patient, describe the problem using the PICO tool, and identify the possible problems for the patient: hypertension, myocardial infarction, infection, and prevention of complications.

3.2 Evidence-Based Support

Search for domestic and foreign literatures on the nursing care of patients undergoing carotid endarterectomy by using the database. The aim is to find empirical evidence from the research field. The specific steps are as follows: Determining the keywords "carotid endarterectomy, prevention of complications, postoperative care"; Using databases such as CNKI, Wanfang Data, PubMed, and Web of Science to screen out relevant high-quality literatures within the past 5 years, including randomized controlled trials, systematic reviews, etc. We evaluated the retrieved literatures strictly, and analyze them from aspects such as the scientificity of the research design, the representativeness of the sample, and the reliability of the results. Finally, 44 high-quality literatures were included. Each group is responsible for 11 literatures. Each person independently evaluates each literature, completes the quality evaluation and evidence level assessment of the literature, and then discusses in the group. Finally, the best research evidence is obtained from the literature, combined with clinical experience and the actual needs of patients, and the best nursing plan is formulated and implemented.

3.3 Evidence-based Nursing Interventions

3.3.1 Hypertension

After the operation, patients should be closely monitored for their vital signs, especially blood pressure changes [9,10]. Due to various factors, blood pressure is prone to fluctuate within 24 to 48 hours after the operation. The blood pressure should be controlled within an appropriate range, with systolic blood pressure controlled at 120 to 140 mmHg and diastolic blood pressure controlled at 80 to 90 mmHg [11]. Due to the patient's previous history of hypertension and the severity of stenosis of

the right carotid artery, as well as other factors, the patient experienced hypertension symptoms on the first day after the operation, with the highest blood pressure reaching 162/96 mmHg. Evidence-based nursing measures: Immediately following the doctor's instructions to rapidly infuse 20% mannitol injection intravenously to reduce intracranial pressure, using lidegar to control blood pressure, using a micro-pump for infusion, precisely adjusting the dosage and speed of the drug to avoid blood pressure fluctuations. Performing left radial artery puncture and continuously monitor the invasive arterial blood pressure with a micro-pump, closely observe changes in the patient's vital signs, including heart rate, respiration, body temperature, and blood oxygen saturation, especially focusing on changes in blood pressure, adjusting the dosage and speed of the drug according to the changes in blood pressure to achieve a smooth and stable decrease in blood pressure and maintain it within an appropriate range, and conducting proper observation of the condition. We can raise the head of the bed about 30° to promote intracranial venous reflux, reduce brain edema, and reduce intracranial pressure. And also we can take steps to avoid neck compression, excessive distortion or compression to prevent the impact of blood flow in the neck vessels. . We should provide psychological care for the patient, maintain emotional stability, avoiding emotional agitation, reducing factors that cause blood pressure fluctuations, and explain the condition and treatment plan to the patient, eliminating their fear and anxiety, and enhancing their confidence in treatment.

3.3.2 Myocardial Infarction

Due to the patient's pre-existing atherosclerotic burden and perioperative cardiac stress, myocardial infarction occurred on the first day after surgery. Evidence-based nursing measures: Completing preoperative preparations, conducting comprehensive preoperative assessment, and screening CAD through electrocardiogram, echocardiography, coronary angiography, etc. For high-risk patients, considering staged or simultaneous treatment of coronary artery lesions. The patient should strictly control blood pressure, blood sugar and blood lipid levels, and also give up smoking and limit alcohol intake. Continuous electrocardiogram monitoring should be carried out to the patient, and nurses should closely monitor vital signs such as heart rate, rhythm, blood pressure, etc. Record them every 15 to 30 minutes. If any abnormality is detected, report it to the doctor immediately for handling. Regularly conducting electrocardiogram checks to observe ST segment, T wave changes, and the presence of new arrhythmias by the doctor. Meanwhile Comparing preoperative and postoperative electrocardiograms to promptly detect dynamic changes in myocardial infarction by the doctor, The nurse should follow doctor's advice to draw blood samples at regular intervals, to monitor changes in myocardial enzymes, troponin, etc., and the doctor assesses the degree of myocardial injury based on these indicators . The nurse should closely observe the patient for any chest pain symptoms, assess the location, nature, degree, and duration of the pain, and using a pain scoring scale for quantitative assessment and provide the patient with a comfortable position to reduce cardiac load. The nurse also can follow doctor's advice to administer analgesic drugs such as morphine and pethidine, and paying attention to observing adverse drug reactions. After 1-3 days of onset, the patient should rest absolutely, keep the environment quiet, reduce visits, avoid emotional excitement and physical exertion, and wait for the condition to stabilize before gradually increasing activity levels according to the patient's recovery status. Nurses should provide patients with light and easily-digestible food, with frequent small meals instead of large ones. They should avoid overeating and foods that are irritating to prevent the heart from bearing an excessive burden cardiac load.

3.3.3 Infection

Due to the patient's advanced age, long-term smoking history, and postoperative physical

weakness, along with concurrent myocardial infarction, necrotic myocardial cells being absorbed by the body, postoperative pain, anxiety and other emergency reasons, the patient developed fever after the operation, with the highest body temperature reaching 38.3℃. Evidence-based nursing measures: Encourage the patient to quit smoking, instruct the patient to master the methods of deep breathing and effective coughing and expectoration, and turn the patient over and tap the back regularly to promote the discharge of sputum, reduce the risk of infection. According to the doctor's advice, nurses give the patient inhalation of budesonide suspension, N-acetylcysteine solution, and intravenous injection of ambroxol solution to humidify the airway, dilute the sputum, facilitate the sputum expulsion, and prevent respiratory tract infection. Due to the patient's movement disorder in both lower limbs and postoperative bed rest, skin care should be done well, keeping the skin clean and dry, changing the bed sheets and quilts immediately when they are damp, turning over frequently to prevent pressure sores from forming and skin infection. Nurses regularly check the condition of the surgical incision, pay attention to whether the patient has fever, whether there is redness, swelling, pain, or fluid exudation at the wound, and report and handle any abnormalities in time. At the same time, nurses should keep the incision dry and clean, if the dressing on the incision is damp, it should be replaced immediately under sterile operation to ensure the cleanliness of the skin around the incision. Medical staff can try to avoid cross-infection, such as reducing visits and having nursing staff perform hand hygiene before contacting the patient. The patient should have a balanced diet and enhance the body's resistance.

3.3.4 Preventing the occurrence of other complications

Evidence-based support indicates that common postoperative complications of this disease include bleeding and hematoma, cerebral hemorrhage and cerebral infarction. Postoperative wound bleeding occurs when blood accumulates in the interstitial space of the neck tissues and forms a hematoma. As the pneumothorax continues to expand, it may compress the trachea, causing breathing difficulties or even asphyxia [12]. Postoperatively, close observation is required for any swelling or bruising of the neck skin, as well as for any bleeding or exudate from the incision. Medical staff should listen to the patient for any discomfort such as neck pain or pressure sensation. At the same time, closely observe whether the drainage tube is unobstructed, whether negative pressure suction is maintained [13,14], the color and volume of the drainage fluid. If the drainage volume increases or the color of the drainage fluid turns bright red, and the neck rapidly swells accompanied by breathing difficulties, it suggests the formation of bleeding or hematoma, and immediate assistance from the physician is required. The patient should follow the doctor's advice to use appropriate hemostatic drugs and observe the efficacy and adverse reactions of the drugs. Postoperative fluctuations in blood pressure, hyperperfusion syndrome, and the use of anticoagulant and antiplatelet drugs can easily cause cerebral hemorrhage. Plaque detachment during the operation and cerebral thrombosis formation after the operation can easily cause cerebral infarction. Cerebral hemorrhage and cerebral infarction can cause symptoms such as hemiplegia, aphasia, and consciousness disorders, with poor prognosis and even death. Preventing cerebral hemorrhage and cerebral infarction is of vital importance [14]. Postoperatively, doctors and nurses must closely monitor vital signs, adjust the dosage and method of medication in a timely manner based on changes in blood pressure, and closely observe the patient's consciousness, pupils, language function, etc. Nurses strictly follow the doctor's instructions to administer anticoagulant drugs and antiplatelet drugs, and pay attention to any bleeding signs on the patient's skin, mucous membranes, gums, etc. Meanwhile, medical staff should encourage the patient to perform early bed exercises and follow the principle of gradual progression to prevent the formation of deep vein thrombosis. And provide a low-salt, low-fat, low-sugar, high-vitamin, high-protein diet, eat more fresh vegetables, fruits, whole grains to patients, etc. Medical staff instruct the patient to keep the bowels

unobstructed and avoid straining during defecation.

3.3.5 Implement continuous care strategies to enhance disease management level

Instruct the patient to rest well after discharge, maintain a regular lifestyle, ensure sufficient for 7-8 hours every day, go to bed early and get up early, avoid staying up late and overexertion, and keep the living environment quiet and comfortable. After the operation, the patient should quit smoking and limit alcohol intake. The patient should pay attention to functional exercises of the limbs, avoid strenuous activities within 1-2 months after the operation, and avoid excessive movement and pressure on the neck. Instruct the patient do not wear tight-necked clothes, have a balanced diet, eatat less high-fat foods such as animal offal, fatty oil, fried food, candies, chocolate, pastries, and milk tea. the patient should avoid high-sugar foods such as pickles, salted eggs, and cured meat.and eat more fresh vegetables and fruits. Inform the patient that they can carry chocolates, sugar cubes, etc. with them for use in case of hypoglycemia. Explain the symptoms of hypoglycemia to the patient, such as hunger, palpitation, sweating, and tremors. In case of hypoglycemia, If hypoglycemia occurs, the patient can immediately eat some foods with high sugar content that can quickly raise blood sugar, such as candies, biscuits, and fruit juice. Instruct patients to learn how to monitor their blood pressure and pulse by themselves and keep records. If there are significant fluctuations in blood pressure or abnormal pulse readings, seek medical attention promptly. Meanwhile instruct patients to Pay close attention to symptoms such as headache, dizziness, and numbness in the limbs. If these symptoms may indicate changes in the condition, seek medical attention immediately. For patients with Carotid artery webbing, the follow-up time after carotid endarterectomy usually includes: 1 month, 3 months, 6 months, and every year thereafter. The family members should do a good job in the safety care of the patient. Due to the patient's incomplete function of both lower limbs, they should try to accompany the patient at all times to prevent accidents and ensure their safety.

4. Results

After the operation, through symptomatic treatment, observation of the condition, psychological care and other measures, complications such as hypertension, myocardial infarction and infection were promptly detected and effectively intervened. No cases of hyperperfusion syndrome or death occurred. No common complications such as bleeding and hematoma, cerebral hemorrhage and cerebral infarction, and nerve injury occurred. The patient was discharged from the hospital on December 22nd after recovery.

5. Discussion

Carotid artery webbing is a rare vascular anatomical variation, which is prone to cause thrombosis and embolism as well as carotid stenosis, thereby affecting the cognitive function of patients and increasing the risk of stroke. Carotid endarterectomy is an effective treatment method. The surgery involves removing the webbing-like structures and thickened intima within the carotid artery to restore the normal diameter and blood flow of the carotid artery, and reduce the risk of thrombosis and cerebral infarction. Evidence-based nursing is a nursing practice method based on scientific evidence, aiming to provide the best nursing services for patients. The implementation steps include formulating questions, searching for evidence, evaluating evidence, applying evidence, Evaluating effects. Compared with the traditional nursing mode, the evidence-based nursing model has advantages such as scientificity, individualization, and systematicness. Nurses through evidence-based support and in combination with the patient's clinical situation and personal wishes,

propose targeted nursing questions, implement personalized nursing plans centered on the patient, and do a good job in observing the patient's condition, psychological care, prevention and intervention of complications, meeting the living needs, improving the quality of treatment and nursing, and improving the treatment effect.

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