

Observation of the Therapeutic Effect of Regular Bloodletting Therapy on Hemochromatosis and Nursing Practice in Liver Disease Outpatient Department

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Abstract

Objective: This study aims to outline the essential nursing practices for managing hemochromatosis patients undergoing phlebotomy therapy in a liver disease outpatient clinic. **Methods:** We conducted a total of 168 phlebotomy sessions on 14 hemochromatosis patients at our hospital's liver disease outpatient clinic. The approach involved comprehensive assessment and preparation prior to phlebotomy, vigilant monitoring during the procedure, and appropriate post-procedure management and health education. **Results:** Of the 168 phlebotomy sessions, one instance of syncope occurred due to bleeding when the patient's meal time exceeded two hours, and one session was prematurely concluded due to needle blockage. Post-treatment, all 14 patients exhibited good overall health, effective disease control, and stable emotional states, and were able to engage and persist with the treatment regimen actively. **Conclusion:** Regular phlebotomy therapy in an outpatient setting for hemochromatosis patients, characterized by a convenient healthcare model and low-cost treatment, coupled with thorough and comprehensive nursing care, can significantly enhance patient compliance and engagement, facilitate the establishment of a regular and orderly treatment cycle, and improve overall treatment outcomes.

Keywords

Hemochromatosis, Phlebotomy Therapy, Clinical Observation, Nursing Care

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1. Background

Hereditary Hemochromatosis (HH) arises from mutations in genes associated with iron metabolism, resulting in primary iron overload. Excessive iron accumulation can damage various organs, leading to symptoms such as skin pigmentation, hepatomegaly, liver cirrhosis, diabetes, cardiac enlargement, arrhythmias, and heart failure [1]. Phlebotomy is the primary treatment for HH [1], as regular blood removal helps eliminate excess iron and encourages the bone marrow to mobilize stored iron for hemoglobin synthesis in new red blood cells, thereby reducing iron overload [2] [3]. This treatment can alleviate skin pigmentation, enhance cardiac function, control diabetes, support liver function recovery, reverse liver fibrosis, decrease portal vein pressure, improve survival rates, enhance quality of life, and prevent complications such as cirrhosis, hepatocellular carcinoma, diabetes, arthritis, and others [3]. Initially, phlebotomy is performed weekly or biweekly, removing approximately 500 ml of blood each session, with the goal of reducing Serum ferritin (SF) to 50 - 100 ng/ml. Once serum ferritin and transferrin saturation normalize, the intervals between phlebotomies can be extended. The objective is to maintain ferritin levels below 50 µg/L during the induction phase and below 100 µg/L during the maintenance phase [4]. In the maintenance phase, phlebotomy of about 500 ml is conducted every 2 - 3 months, with the entire treatment spanning several months to three years [5] [6]. Previously, patients faced repeated hospitalizations, imposing significant economic burdens and hindering treatment continuity. Between November 2022 and January 2025, our department's nursing outpatient clinic administered 168 venous phlebotomy sessions using disposable blood collection bags for 14 hemochromatosis patients. Among them, 11 were male and 3 were female, aged 23 - 48, with an average age of 36. Each bloodletting and observation session lasts approximately 40 - 60 minutes. This convenient outpatient method greatly reduced the time and energy spent by patients traveling to the hospital, reduced interference with life and work, with relatively low treatment costs. All patients adhered to the treatment regimen, establishing a regular cycle and achieving favorable outcomes, thus providing a reference for outpatient hemochromatosis phlebotomy therapy practice. The report is as follows.

2. Pre-Phlebotomy Therapy Preparation

2.1. Assessment and Education

Prior to a patient's initial phlebotomy therapy, a thorough and detailed assessment is essential. This includes understanding the timing of the patient's hemochromatosis diagnosis, the progression of symptoms, and family medical history. Assessments should also include examining skin pigmentation, the size of the liver and spleen, joint conditions, and laboratory indicators such as serum ferritin and transferrin saturation. It is crucial to inquire about any history of needle phobia, hemophobia, or syncope, and to implement preventive measures accordingly. En-

sure the patient's physical condition is appropriate for phlebotomy therapy, and conduct the therapy in an outpatient setting as per medical instructions. For subsequent sessions, the patient should have a normal meal 1 - 2 hours prior to the procedure and after using the restroom. A complete blood count must confirm hemoglobin levels above 110 g/L before proceeding [3] [4]. Phlebotomy should not be performed on an empty stomach or when the patient is overly full, as the latter can redirect blood flow to the gastrointestinal tract, reducing cerebral blood supply and causing needle phobia, while the former can lead to hypoglycemia and reduced blood volume, resulting in hypotensive syncope. Prior to treatment, assist the patient into a supine position, and monitor and document vital signs before the procedure. Advise the patient to bring 500ml of an electrolyte drink for consumption post-phlebotomy.

2.2. Psychological Counseling

Prior to treatment, it is essential to engage in comprehensive communication with the patient, advising them to ensure sufficient sleep and rest before each session of bloodletting therapy. The process, objectives, and precautions of the therapy should be explained in detail to alleviate any anxiety or fear and to bolster the patient's confidence. A comfortable environment should be established, with the treatment room kept spacious, well-lit, and properly ventilated. Patients should avoid exposure to stimuli that might induce anxiety or fear before treatment. Techniques such as listening to music, engaging in conversation, deep breathing, or meditation can be employed to help the patient relax and approach the therapy with a calm demeanor.

2.3. Equipment Preparation and Venipuncture

Prepare necessary items including disposable blood collection needles, connecting tubes, blood collection bags, cotton swabs, iodine disinfectants, electronic scales, and dressings. Ensure the blood collection needle is properly connected to the blood collection bag, and meticulously inspect the bag for any damage, inadequate sealing, or expiration. Select the median cubital vein or basilic vein of the upper limb, which should be straight and elastic. Instruct the patient to extend their arm and clench their fist to make the vein more prominent, facilitating observation and puncture. Disinfect the skin using iodine disinfectant, starting from the puncture site and moving outward in a circular motion, covering a diameter of 6 - 8 centimeters, and perform this twice. Once the area is naturally dry, proceed with the puncture, covering the site with a dressing and securing the needle with tape to prevent movement. Alternate between the left and right hand veins for each treatment to protect the puncture sites.

3. Observation and Care During Bloodletting

3.1. Monitoring Vital Signs and Observing Symptoms

During bloodletting, it is crucial to closely monitor for any signs of tissue hypoxia

resulting from rapid blood volume reduction [7]. Continuous observation of the patient's consciousness, skin color, and breathing is necessary, with blood pressure and heart rate measured every 3 - 5 minutes. Patients should be asked about any discomfort, such as dizziness, nausea, or palpitations. In one instance, a patient became pale and sweaty after 300 ml of blood was drawn, with an increase in heart rate by 18 beats per minute compared to pre-procedure levels, but no drop in blood pressure, and a fingertip blood glucose of 5.6 mmol/L. Bloodletting was immediately halted, the patient's legs were elevated, oxygen was administered, and Ringer's solution was given intravenously, resulting in symptom relief within 10 minutes. Further inquiry revealed this was the patient's fifth session, and despite having eaten, the meal occurred over 2 hours prior due to delays in obtaining blood test results. The patient was advised to eat normally within 2 hours before each session and to consume electrolyte drinks to counteract transient hypovolemia symptoms like fatigue and dizziness [1].

3.2. Regulating Bloodletting Speed and Volume

Bloodletting speed should be adjusted based on the patient's physical condition and tolerance, typically set at 25 - 30 ml/min. Initial speeds may be slower to monitor for adverse reactions such as dizziness or palpitations [7]. The volume of blood removed is tailored according to the patient's weight, hemoglobin levels, and iron overload status, generally ranging from 400 to 500 ml per session. During the procedure, the tourniquet should be loosened every 2 - 3 minutes to alleviate upper limb discomfort, and patients should be instructed to intermittently clench their fists to maintain vascular filling and ensure smooth blood flow. In one case, blood flow slowed and stopped at 420 ml due to needle blockage, necessitating cessation of the procedure. This was attributed to the patient's narrow blood vessels, slow bloodletting speed, and potential blood coagulation.

4. Post-Phlebotomy Care and Patient Education

4.1. Hemostasis and Puncture Site Management

Following the completion of phlebotomy, the blood collection needle should be removed, and pressure applied to the puncture site using a cotton ball or gauze for 10 to 15 minutes to achieve hemostasis. Once bleeding has ceased, cover the site with a sterile dressing. It is crucial to maintain the puncture site clean and dry, avoiding any contact with water or contaminants for 24 hours post-procedure. Should there be any bleeding, exudation, or unusual symptoms such as redness, swelling, or pain at the puncture site, it is imperative to inform the nursing staff immediately for appropriate intervention. To prevent bleeding or infection, the puncture site should be shielded from pressure and friction until fully healed. Patients are advised to avoid tight-fitting clothing, opting instead for loose, soft cotton garments to minimize irritation at the puncture site. After the puncture site has healed, you can apply Hirudoid or Sophora Essence topically to prevent vascular sclerosis. During the treatment interval, appropriate

elastic band or upper limb anti-gravity training can be conducted to increase the vascular diameter [8].

4.2. Observation and Rest

Patients should be instructed to remain in the outpatient observation area for 15 to 30 minutes post-procedure to ensure there are no adverse reactions before discharge. They should be informed about the schedule for their next phlebotomy session and advised on necessary precautions, including dietary and rest recommendations, to facilitate successful continuation of treatment. Post-phlebotomy, patients should ensure adequate rest, avoiding strenuous activities and excessive fatigue to mitigate the risk of falls or other accidents due to physical weakness. It is recommended that patients remain in bed as much as possible during the first 24 hours following phlebotomy, gradually increasing physical activity as their condition permits.

4.3. Dietary Management

Reducing iron intake or decreasing its bioavailability serves as an adjunctive strategy to mitigate iron accumulation, thereby preventing organ damage and complications, and reducing the frequency of phlebotomy treatments required [1].

4.3.1. Avoid Iron Supplements

It is advisable to avoid foods high in iron and to limit the consumption of iron-rich foods such as animal liver, kidneys, heart, animal blood, and dried fruits, as well as iron-containing multivitamins and nutritional supplements. Refrain from using iron cookware and utensils, opting instead for glass, ceramic, or stainless-steel alternatives.

4.3.2. Avoid Vitamin C Supplements

Vitamin C significantly enhances the absorption of non-heme iron; therefore, the vitamin C content in fruits and vegetables should be considered. High doses of oral vitamin C can expedite iron accumulation and worsen cardiac conditions. Patients should exercise caution with vitamin C intake, particularly during periods of iron overload and induction therapy.

4.3.3. Limit Red Meat Consumption

The consumption of meat, especially red meat, should be moderated, as it can enhance the absorption of non-heme iron when eaten with vegetables.

4.3.4. Regulate Alcohol Intake and Consume Tea Moderately

Alcohol can alter iron indices, increase liver iron content, expedite liver fibrosis, and heighten the risk of cirrhosis, hepatocellular carcinoma (HCC), and liver-related mortality [3]. Individuals with elevated transaminases or hepatomegaly should abstain from alcohol or consume it minimally, and those with cirrhosis should avoid alcohol entirely. Teas such as black tea contain tannins that can inhibit iron absorption in patients with hemochromatosis [2].

4.3.5. Preventing Infection by *Vibrio vulnificus* and Severe Sepsis

To mitigate the risk of infection by *Vibrio vulnificus*, which can lead to severe sepsis, it is crucial to avoid direct handling or consumption of raw or undercooked shellfish. Additionally, open wounds or injuries should not be exposed to seawater.

4.4. Psychological Support

Hemochromatosis is a chronic condition necessitating prolonged treatment, and phlebotomy therapy can impose psychological stress and anxiety on patients. It is essential to provide compassionate care by attentively listening to patients, understanding their psychological needs, and offering psychological support and reassurance to alleviate their anxiety. Educating patients about the principles and successful outcomes of phlebotomy therapy for hemochromatosis is important, as is emphasizing the significance of adhering to a regular phlebotomy schedule. Although the treatment duration for hereditary hemochromatosis is extensive, symptoms will improve with active cooperation in the treatment regimen. This approach aims to deepen patients' understanding and appreciation of the treatment, thereby boosting their confidence and commitment to maintaining a regular phlebotomy schedule.

4.5. Routine Monitoring

It is important to conduct regular assessments of blood parameters such as complete blood count, serum ferritin, and transferrin saturation to evaluate the reduction in iron overload and the efficacy of phlebotomy therapy, allowing for timely adjustments to the treatment plan. Regular evaluations of liver function, electrocardiograms, and echocardiograms are also necessary to monitor the functional and structural changes in the liver, heart, and other organs, facilitating the early detection and management of potential complications.

5. Prevention and Management of Complications

During the process of bloodletting, patients may lose a substantial volume of blood, potentially resulting in a decrease in blood pressure and symptoms such as dizziness, nausea, and tachycardia. This can be particularly burdensome for individuals with pre-existing low blood pressure. Some patients might experience hypoxia due to psychological stress, fear, or excessive blood loss, leading to needle-induced syncope or fainting, which manifests as dizziness, pallor, and temporary loss of consciousness.

Management strategies: Upon detecting early signs of needle-induced syncope or fainting, such as dizziness, blurred vision, palpitations, nausea, and pallor, it is crucial to cease the bloodletting procedure and remove the needle immediately. The patient's legs should be elevated to enhance cerebral perfusion and facilitate venous return. Any constrictive clothing, such as collars or ties, should be loosened to maintain clear airways, and if necessary, the patient's head should be

turned to one side to prevent airway obstruction by vomit. Continuous monitoring of the patient's heart rate, blood pressure, respiration, skin color, consciousness, and other vital signs is essential to address potential complications like hypotension and hypoglycemia promptly. Patients experiencing needle-induced syncope or fainting may be administered a moderate amount of warm electrolyte solutions, warm sugar water, or 50% glucose to restore energy and hydration [1].

6. Conclusion

Primary hemochromatosis is a rare and complex disease that can lead to severe complications such as cirrhosis, diabetes, infections, shock, and cardiac abnormalities. Phlebotomy is an effective treatment that removes iron-rich blood, encouraging the bone marrow to utilize excess iron deposits from tissues for hemoglobin synthesis in new red blood cells. Post-phlebotomy, patients experience symptom relief, significant clinical improvement, and marked reductions in serum ferritin (SF) levels [1] [3] [8]. Given the frequent need for phlebotomy and the associated financial burden on patients, our department has introduced outpatient phlebotomy therapy for hemochromatosis to optimize treatment and ease patient burden. This approach offers significant convenience, allowing patients to undergo phlebotomy in an outpatient setting and return home the same day, maintaining their usual lifestyle and work routine. This is particularly beneficial for patients with stable conditions, enabling them to manage their time effectively without hospitalization, thus minimizing disruptions to daily life and work. Clinical practice has demonstrated that outpatient phlebotomy therapy encourages patient compliance, establishes regular treatment cycles, and significantly enhances therapeutic outcomes. While outpatient bloodletting therapy is convenient, its effectiveness is limited for patients with complex conditions or multiple complications, and it still needs to be combined with other treatment methods.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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