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Case Report

세포교정영양요법(OCNT)을 이용한 골수섬유화증 환자의 암피로증후군 개선 사례

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A Case of Improvement in Cancer-Related Fatigue in a Patient with Myelofibrosis Using Ortho-Cellular Nutrition Therapy (OCNT)

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ABSTRACT

Objective: Myelofibrosis (MF) is a type of myeloproliferative neoplasm characterized by hematopoietic stem cell proliferation, bone marrow fibrosis, anemia, platelet abnormalities, and splenomegaly. MF may be accompanied by fatigue, dizziness, and loss of appetite, leading to a decline in patients' quality of life. Treatment goals include not only the improvement of hematological parameters but also symptom management and preservation of physical function. At present, Janus kinase 1/2 (JAK1/2) inhibitors are primarily used for MF treatment. Although these agents exhibit significant therapeutic efficacy, adverse events are frequently reported. Accordingly, integrative supportive care considering the patient's general and nutritional status, alongside anticancer or targeted therapy, has gained increasing attention in MF management.

Case Report: This case describes a Korean patient in their 50s diagnosed with MF and undergoing anticancer treatment. The patient was awaiting hematopoietic stem cell transplantation and presented with multiple symptoms, including chronic fatigue, generalized body aches, dizziness, poor appetite, and renal failure. Therefore, Ortho-Cellular Nutrition Therapy (OCNT), comprising anthocyanins, omega-3 fatty acids, bromelain, octacosanol, trace minerals, curcumin, beta-glucan, and chlorella, was administered. Following the intervention, the patient experienced improvement in overall physical symptoms and certain hematological parameters, resulting in the postponement of hematopoietic stem cell transplantation.

Conclusion: As this case involved a single patient, the generalizability of this regimen to other patients with MF is limited. Nevertheless, OCNT-based integrative supportive care tailored to the patient's condition may help improve physical condition and enhance therapeutic outcomes.

Keywords Ortho-Cellular Nutrition Therapy (OCNT), Myelofibrosis, Myeloproliferative neoplasm, Integrative supportive care

Introduction

Myeloproliferative neoplasms (MPNs) are chronic hematologic disorders characterized by pathologically increased bone marrow activity, leading to abnormal proliferation of hematopoietic stem cells and increased numbers of red blood cells, white blood cells, and platelets. In 1951, Dameshek grouped chronic myeloid leukemia (CML), polycythemia vera (PV), essential thrombocythemia (ET), and primary myelofibrosis (PMF), which share these characteristics, into a single category termed “myeloproliferative disorders (MPDs).” [1] Subsequently, the World Health Organization (WHO) reclassified these diseases in 2001 and 2008 based on histological, cytogenetic, and molecular data. During this process, the term “myeloproliferative disorders” was replaced with “myeloproliferative neoplasms.” [2]

Among these, myelofibrosis (MF) causes various systemic manifestations, including bone marrow fibrosis, splenomegaly, anemia, platelet abnormalities, systemic inflammatory responses, thrombosis, and bleeding, due to the proliferation of hematopoietic stem cells and alterations in the bone marrow

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microenvironment. Consequently, patients with MF may experience fatigue, dizziness, weight loss, decreased appetite, night sweats, abdominal discomfort, and bone pain, which can lead to a decline in their quality of life.[3] These burdens may substantially affect daily functioning and the continuity of treatment, including anticancer therapy. Therefore, the therapeutic goals for MF have expanded beyond the improvement of hematological parameters to include symptom management and the maintenance of functional capacity.

Ruxolitinib is currently used as a standard treatment for MF. This agent functions by inhibiting Janus kinase 1/2 (JAK1/2), key enzymes that regulate the JAK–STAT pathway involved in the pathogenesis of MF. As inflammatory cytokines transmit inflammatory signals through these enzymes, ruxolitinib is widely used to control MF-related symptoms. Indeed, treatment with ruxolitinib has been associated with reductions in splenomegaly and improvements in systemic symptoms. However, adverse events such as anemia, thrombocytopenia, neutropenia, and an increased risk of infection have also been reported.[4] Therefore, close monitoring is required during ruxolitinib treatment.

Moreover, in clinical practice, symptoms attributable to the disease itself, adverse effects and events during treatment, underlying conditions, nutritional status, and psychological factors may collectively influence the patient's overall condition and response to treatment. In particular, these factors may contribute to symptoms such as fatigue, poor appetite, gastrointestinal discomfort, and generalized weakness. Therefore, supportive care that considers the patient's general and nutritional status, in addition to anticancer and targeted therapies, has gained increasing attention in the management of patients with MF.[5]

This case describes a patient diagnosed with MF who was receiving targeted anticancer therapy. During treatment, the patient experienced various symptoms that interfered with activities of daily living. Accordingly, integrative supportive care based on Ortho-Cellular Nutrition Therapy (OCNT) was implemented. Following this intervention, improvements in the patient's symptoms and several hematological parameters were observed. Given its potential significance in the management of patients with MF, this case is reported with the patient's informed consent.

Case Study

1. Subject

This study involved a single patient with MF.

1) Name: Song OO (59 years old / F)
2) Diagnosis: MF
3) Date of onset: May 2018
4) Treatment period: July 2019 to August 2020
5) Chief complaints: Symptoms of cancer-related fatigue syndrome associated with MF and anticancer therapy, including shoulder stiffness, edema, hand numbness, fatigue, dizziness, and poor appetite
6) Past medical history: Gastrectomy for gastric cancer in 2008, use of medications for angina pectoris and heart failure, spinal stenosis, renal failure, and hospitalization for pneumonia
7) Social history: Long-term exposure to a paint-coating work environment
8) Family history: No information available
9) Present illness and current medication: Currently taking Jakavi (ruxolitinib), a targeted therapy for MF

2. Methods

The OCNT regimen prescribed to the patient is detailed in Table 1.

Results

The patient reported multiple symptoms associated with MF and anticancer therapy, including shoulder stiffness, edema, hand numbness, fatigue, dizziness, and poor appetite. Therefore, OCNT was administered to alleviate these symptoms. The regimen and dosage were adjusted stepwise according to the patient's response and overall clinical condition.

Seven days after the initiation of OCNT, the patient reported reductions in facial edema, shoulder stiffness, and hand numbness, along with an improvement in complexion. Approximately 2 months later, pruritus around the forehead and mouth and increased sputum production were observed; however, these symptoms subsequently subsided. Overall clinical improvement, including relief of dizziness, was maintained. During this period, white blood cell and platelet counts remained within their respective reference ranges.

Table 1. OCNT Regimen Prescribed to the Patient.

Duration (Months) / Prescription Regimen	1	2	3	4	5	6	7~12
Cyaplex F granules	111	111	111	222	222	222	101
Eufaplex Alpha stick	101	101	111	222	222	222	101
Nutaplex granules	101	101	111	222	111	111	–
Curculpex granules	–	–	111	222	111	111	–
Betaplex granules	–	–	111	222	111	111	–
Enzaplex F granules	101	101	–	–	–	–	–
Octaplex	101	101	–	–	–	–	–
Tmplex granules	010	010	010	–	–	–	–

* 010: One sachet once daily at lunch; 101: One sachet twice daily in the morning and evening; 111: One sachet three times daily in the morning, at lunch, and in the evening; 222: One sachet three times daily in the morning, at lunch, and in the evening.

Three months after the initiation of OCNT, the dose of the anticancer agent Jakavi was increased from 20 mg to 40 mg; nevertheless, the improvements in the patient's overall condition and fatigue persisted. One year after the initiation of OCNT, the patient's overall clinical symptoms associated with cancer-related fatigue syndrome were markedly improved, and her general condition had stabilized. In addition, although the patient had been awaiting hematopoietic stem cell transplantation, the procedure was deferred at the discretion of the medical team. The severity of the symptoms experienced by the patient during OCNT and detailed hematological parameters are presented in Table 2.

Discussion

This case concerns a Korean woman in her 50s who was initially diagnosed with MF in May 2018. At her first visit to the pharmacy, she stated that she was receiving ruxolitinib (Jakavi) and awaiting hematopoietic stem cell transplantation. The dosage of the targeted therapeutic agent was being progressively increased, raising concerns about deterioration of her overall condition, reduced metabolic function, and possible worsening of renal function.

More specifically, the patient reported persistent shoulder stiffness, which she described as feeling as though a heavy stone had been placed on her shoulders, chronic fatigue, dizziness, poor appetite, gastrointestinal discomfort, and generalized edema associated with renal failure. Physical observation of the patient also revealed edema, a pale complexion, and generalized weakness. These findings were considered to result from the combined effects of the burden imposed by the disease itself, adverse events during anticancer therapy, and multiple underlying conditions. Therefore, OCNT was applied concomitantly with the patient's ongoing treatment, taking into account her clinical condition and fatigue severity, as well as the burdens on the gastrointestinal, circulatory, and metabolic systems. The composition of the regimen was adjusted stepwise, and the dosage was modified according to the patient's response and overall clinical condition.

Throughout the OCNT period, Cyaplex F and Eufaplex Alpha were prescribed to reduce oxidative stress and modulate inflammatory and immune responses. Cyaplex F is rich in anthocyanins and fucoidan, while Eufaplex Alpha is rich in omega-3 fatty acids. Anthocyanins are flavonoids found in berries, currants, and certain leafy vegetables and are known to help regulate oxidative stress and inflammatory responses. Specifically, anthocyanins may enhance overall antioxidant capacity by directly suppressing reactive oxygen species, inhibiting enzymes involved in their generation, and activating antioxidant enzymes and endogenous defense mechanisms. They may also contribute to anti-inflammatory activity by suppressing inflammatory mediators and signaling pathways, including tumor necrosis factor-alpha (TNF-α), cyclooxygenase-2 (COX-2), and nuclear factor kappa B (NF-κB).[6]

Fucoidan is a sulfated polysaccharide abundant in brown algae. It contributes to the balance of immune responses by regulating the activity and responsiveness of immune cells, including macrophages, neutrophils, lymphocytes, and natural killer (NK) cells, as well as cytokine secretion and the NF-κB and mitogen-activated protein kinase (MAPK) pathways.[7] Eufaplex Alpha contains alpha-linolenic acid, a plant-derived omega-3 fatty acid, as one of its major constituents. This compound may also help modulate inflammation through the regulation of NF-κB and MAPK expression. In particular, it may contribute to the suppression of inflammation by inhibiting the phosphorylation of inhibitor of nuclear factor kappa B alpha (IκBα), which is involved in NF-κB expression, thereby blocking inflammatory signaling pathways.[8]

During the first 3 months of OCNT, the regimen was intended to improve overall nutrient absorption, support energy metabolism, and support physical functioning. For this purpose, Enzaplex, Octaplex, and Tmplex were prescribed. Enzaplex contains bromelain, a pineapple-derived proteolytic enzyme, as well as multiple other enzymes. In particular, bromelain is known to be involved in protein degradation in the body and may thereby help improve protein utilization and enhance overall nutrient absorption.[9]

Octaplex contains octacosanol as its principal ingredient. Octacosanol is a saturated aliphatic alcohol extracted from various plants and animals and has long been used in dietary and medicinal supplements, as well as an additive in animal feed. This compound may help exert overall antifatigue effects by

Table 2. Severity of Symptoms Experienced by the Patient and Hematological Parameters According to the Clinical Course of OCNT.
Symptom severity was rated on a scale from 0 to 5, with higher scores indicating greater discomfort experienced by the patient.

Duration (Months) / Symptoms	Seven days	1	2	3	4~6	7~12
Shoulder stiffness	5	1	1	1	1	0
Facial edema and complexion	5	1	0	0	0	0
Hand numbness	5	1	1	1	1	1
Edema	4	2	1	1	1	1
Fatigue	5	4	3	2	1	1
Dizziness	4	3	1	0	0	0
Poor appetite	5	3	2	1	1	1
Hematological parameters	-	-	-	Red blood cell count: 10.3 × 10^6/μL White blood cell count: 6,000/μL Platelet count: 289 × 10^3/μL		

0: No symptoms and no impact on daily activities; 1: Mild symptoms with minimal impact on daily activities; 2: Noticeable symptoms requiring minor adjustments in daily activities; 3: Symptoms significantly affect daily activities, making some tasks difficult; 4: Major difficulty performing tasks during daily activities; 5: Symptoms severely interfere with daily activities, causing substantial distress

attenuating the depletion of glycogen, an energy reserve, and reducing fatigue-related metabolic indicators, such as lactic acid.[10] Tmplex contains various trace minerals, including iron, manganese, selenium, zinc, chromium, molybdenum, and iodine. These minerals are essential for regulating and supporting diverse physiological activities in the body. For example, iron and manganese are involved in energy production, zinc and selenium support antioxidant and immune functions, and iodine and molybdenum are primarily involved in metabolic regulation. Moreover, these minerals may contribute to multiple physiological functions rather than serving only a single role.[11]

During months 3 to 6 of OCNT, the regimen focused on modulating factors involved in the pathogenesis of MF, restoring immune function, and supporting the development of an overall environment conducive to recovery, based on the patient's nutritional status improved through the preceding OCNT regimen. During this period, Curculpex, Betaplex, and Nutaplex were administered. Curculpex contains curcumin, a natural polyphenolic compound extracted from turmeric root. Curcumin is known for its potent antioxidant and anti-inflammatory properties and has been shown to inhibit the JAK2/STAT pathway, which is associated with the development of MF. Based on this mechanism, in vitro experiments demonstrated that curcumin inhibited cell proliferation and increased the proportion of apoptotic cells, even in cell lines harboring JAK2 mutations.[12] Therefore, curcumin may be beneficial as an adjunct to treatment in patients with MF.

Betaplex contains beta-glucan, a polysaccharide extracted from oats and mushrooms. Beta-glucan is known to be involved in a variety of immunological functions in the body, including the activation of immune cells such as macrophages, neutrophils, monocytes, and NK cells, the modulation of innate and adaptive immunity, and the enhancement of immune responses against tumor cells.[13] Chlorella, which is present in high amounts in Nutaplex, is generally known to help reduce heavy metal absorption and facilitate their excretion. In addition, chlorella has been reported to exert antioxidant activity, support hematopoietic function, and be rich in iron, folate, and vitamin B12, which are required for hematopoiesis.[14] Accordingly, these ingredients were used with the aim of helping improve the patient's symptoms and overall physical condition.

Following the OCNT regimen described above, the patient showed improvements in her overall physical condition and quality of life, and hematopoietic stem cell transplantation was ultimately deferred based on the medical team's judgment. This case highlights the potential importance of integrative therapy incorporating OCNT, in which the regimen was individualized according to the patient's overall physical condition while anticancer treatment was continued. However, as this report describes a single patient, there are limitations to generalizing the same OCNT regimen to all patients with MF. Nevertheless, this case suggests that appropriate supportive care and OCNT tailored to an individual patient's condition may play an important role in improving symptoms and quality of life. Therefore, this case is reported with the patient's consent.

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