Acute Phase Reaction after Femur Fracture in a Child with Griscelli Syndrome

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Griscelli syndrome (GS) is an autosomal recessive disorder that is characterized by partial albinism of the skin and hair shaft. Prompt and early diagnosis is a crucial step for the follow up and management of GS, which would otherwise dramatically decrease the life expectancy of the patients. This case report presents the clinical course of a femoral fracture treated with closed reduction and pelvic-pedal cast, and progression of acute phase reaction during the follow up period.

Key Words: Griscelli syndrome, acute phase reaction, femur fracture, propofol, remifentanyl

Introduction

Griscelli syndrome (GS) is a rare autosomal recessive disease characterized by partial albinism in the skin and hair. Whilst albinism and neurological disorders are prominent in one and immune deficiency (*Partial Albinism Immunodeficiency Syndrome-PAID*, Type II) is prominent in the other type, dermatological disorders are seen in the third type of the disease. Silvery-grey hair, which occurs due to deposition of melanosomes in the melanocytes, attracts attention (1, 2). Griscelli et al. (3) was the first to report two cases of GS. Survival in such children depends on early diagnosis and bone marrow transplantation (4). The present case report introduces the clinical course of a child after femur fracture that was being followed for hepatosplenomegaly and had the signs of partial albinism and had been diagnosed with GS at a quite later age.

Case Presentation

An 11-year-old boy (39 kg weight) had been treated with closed reduction and pelvic-pedal cast at an external centre due to diaphyseal femur fracture, which occurred 19 days ago by falling down. He was referred to our orthopaedics clinic for open reduction because of loss of position in the cast. The consent, which is necessary to share our experience concerning clinical follow-up of this case together with the literature information as a scientific paper, was obtained from his parents.

Preoperative assessment: The patient, who was planned to be treated with close reduction and pelvic-pedal cast under general anaesthesia, had been diagnosed with type II GS two years ago based on his hair structure and peripheral blood smear findings. On physical examination; his general status was good, he was conscious; He had a normal skin turgor and tone, and light-colored eyebrows and hair. His liver was palpable just below the right subcostal margin and he had an enlarged spleen, palpable 4 cm below the left costal margin. Chest-X-ray demonstrated enlarged mediastinum, and ECG was normal. Results of laboratory analyses were as follows: AST 71 U/L, ALT 31 U/L, serum albumin 2.3 g dL⁻¹, Hb 7.9 g dL⁻¹, Htc 24%, leukocyte count 5 000 K mL⁻¹, PTT 17.3 sec, aPTT 35.5 sec, INR 1.2, thrombocyte count 108.000 mm³. The patient was receiving spironolactone, propranolol, lansoprazole, zinc, and calcium preoperatively. His low serum sodium concentration (126 mEq/L) was elevated to 135mEqL⁻¹ by replacement therapy. Prior to the procedure, the patient received albumin replacement and 5 mg of vitamin K because of high bleeding parameters.

Anaesthetic approach: Attention was shown for the patient to be taken as the first case of the day, for meticulous disinfection of the operating room and anaesthesia devices, and for using disposable circuit and mask. Prophylactic antibiotic

use was considered unnecessary since an open surgical procedure was not planned. Anaesthesia induction was performed using 2.5 mg kg^{-1} propofol, a size 3 laryngeal mask airway (LMA) was placed; and total intravenous anaesthesia (TIVA) was performed with $6 \text{ mg}^{-1} \text{ kg}^{-1} \text{ hr}$ propofol and $0.2 \text{ } \mu\text{g}^{-1} \text{ kg}^{-1} \text{ min}$ remifentanyl for the maintenance of anaesthesia. The patient was ventilated with an air/oxygen mixture by preserving spontaneous breathing. The procedure lasted for one and a half hour. The patient was monitored in the recovery room and transferred to the ward with normal vital signs, and he was discharged from the hospital three days later.

Orthopaedic procedure: Under fluoroscopy guidance closed reduction was performed under general anaesthesia, and pelvipedal cast was applied. Upon observing adequate reduction on his control X-ray, the procedure was completed. The cast was removed at 8 weeks after obtaining adequate bone healing (Figure 1A-C).

Acute phase period: Four months after the procedure, the general condition of the patient worsened (39°C fever, abdominal distension, hepatosplenomegaly and swelling in the lower extremity) and he was hospitalized at the paediatrics clinic with a pre-diagnosis of osteomyelitis. Low albumin and sodium levels of the patient were corrected, vitamin K was administered and fluid obtained by paracentesis was determined as exudate. Bone scintigraphy of the patient revealed fracture-related secondary inactive osteomyelitis. As his bone marrow culture was positive for coagulase-positive staphylococcus, antibiotic therapy was commenced. He was included in the liver transplant waiting list by the council's decision and was discharged from the hospital on the 32nd day of hospitalization. Twenty days after discharge, he was re-admitted to the paediatrics clinic because of confusion, swelling in the whole body, and impaired general condition, and supportive treatment was commenced. However, he developed cardiac arrest on the 5th and 6th days of hospitalization and died despite all efforts.

Figure 1. X-ray of the patient before reduction (A), X-ray of the patient in the early period after reduction in the cast (B) and 3rd month control X-ray of the patient after reduction when adequate union was achieved (C)

Discussion

It is reported that patients with Griscelli Syndrome die at early ages largely due to infection-related mortality and death is inevitable unless bone marrow transplantation is performed in case of uncontrolled activation of T-lymphocytes and macrophages (4). Because of similarity with certain syndromes, diagnosis of GS may usually be delayed (1). In the literature, attention is drawn to the importance of differential diagnosis because of a patient, who had been treated with a diagnosis of Reye's syndrome and atypical dermatitis at the age of 2 years, and was diagnosed to have GS at the age of 3.5 years (5). Rath et al. (6) reported that an 8-month infant with grey-colored hair and recurrent infections was diagnosed with GS based on skin and hair biopsy findings, while Chediak-Higashi syndrome was considered. Diagnosis of GS was made by hair and peripheral blood examination in an infant, who presented with acute phase reaction at the age of 7 months; he received immunosuppressive therapy but could not be rescued; additionally, mutation was reported in the Rab27A gene (7). As was in the present patient case, it is stated that hepatosplenomegaly is usually a common sign in such patients and may delay the true diagnosis and treatment by drawing attention to the liver (8).

Although hypopigmentation and immune deficiency are prominent, easy bruising and epistaxis due to granule deficiency in platelets and postoperative bleeding have also been reported in GS patients (9). Plenty of immune cells, osteoblasts, cytokines and platelets, which are important determinants of bone healing, are found in the haematomas due to bone fractures. Any defect in these elements may cause problems in fracture healing (10). Pelvipedal cast, open reduction and internal fixation, external fixator and elastic intramedullary nails are the methods that can be used in the treatment of such fractures (11, 12). Since adequate reduction can be achieved under anaesthesia, fluoroscopy-assisted closed reduction and renewal of pelvipedal cast under general anaesthesia in the operating room were considered adequate for our patient. Organ failure is one of the important factors that influence anaesthesia plan in patients that would receive general anaesthesia. We preferred to use propofol and remifentanyl, which are short-acting agents that are not toxic to the liver and kidneys and do not suppress immune system and bone marrow, in the anaesthesia of our patient with Type II GS. Attention was paid for the environment and equipment to be prepared in accordance with disinfection rules in order to reduce the risk of infection and avoid contamination, and the patient was taken into the operating room as the first case of the day. Not administering prophylactic antibiotics and early hospital discharge after the initial intervention can be considered as the limitations of our approach.

It is likely that osteomyelitis that developed in our patient, whose general status was impaired 4 months after hospital discharge, have triggered the acute phase. Likewise, it has

been reported that a patient with GS had her first attack at the age of 4 years and died during the second attack although she responded to cytostatic therapy and showed improvement (13). On the other hand, there are cases in the literature that had been diagnosed early and had the chance of prolonged survival by undergoing hematopoietic stem cell transplantation (14, 15).

Conclusion

Partial albinism is an important indicator for the diagnosis of GS. Such children should be followed from the birth and necessary examinations should be performed for early diagnosis. Since even a non-invasive procedure might trigger an acute phase reaction as in the present patient, prophylactic antibiotic administration should not be ignored. Anaesthesiologists and surgeons should be aware of the risks for such patients and all recommended preventive measures should be taken during any intervention.

Informed Consent: Written informed consent was obtained from patients' parents who participated in this case.

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