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Case report

Radicular cyst in a patient with untreated Wiskott–Aldrich syndrome: A case report

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ABSTRACT

Wiskott–Aldrich syndrome (WAS) is a condition with variable expression, which causes persistent thrombocytopenia and, in its complete form, also causes small platelets and humoral immunodeficiency. A 14-year-old boy, diagnosed with WAS but never treated, presented with symptoms of heart and renal failure. His right buccal region was swollen and his right first molar showed a cyst-like image on dental X-ray films. The boy's symptoms were attributed to an infected cyst, greatly aggravated by WAS-related immunodeficiency. The boy was sedated and the affected tooth and cyst were enucleated. Invasive treatment was safely achieved by paying close attention to whole-body management.

1. Introduction

Wiskott–Aldrich syndrome (WAS) is a congenital X-linked immunodeficiency characterized by frequent infections, thrombocytopenia with small platelets, eczema, and an increased risk of autoimmune disorders and malignancies [1]. The syndrome was named after Robert Anderson Aldrich [2], an American pediatrician who described the disease in a family of Dutch–Americans in 1954, and Alfred Wiskott [3], a German pediatrician who first noticed the syndrome in 1937. Resulting from thrombocytopenia, the first signs of WAS are usually petechiae and bruising. In 1994, WAS was linked to mutations in a gene on the short arm of the X chromosome, encoding the WAS protein [4]. Thus, an attractive option for treating WAS is gene therapy, which leads to a complete cure.

Untreated patients with typical WAS have a poor prognosis with infections, bleeding, lymphoproliferative disorders, and malignancies being the most common causes of death. The life span of a typical patient is quite short, with an expected mean survival time of 6.5 years from birth [5]. We report a 14-year-old boy with untreated WAS who underwent a successful mandibular ystectomy.

2. Case report

A 14-year-old boy with severe symptoms of cardiac and renal failure was brought to the emergency center of our hospital in an ambulance. At 4 months of age, he had developed blood platelet degradation and hepatomegaly, and was diagnosed with WAS. He frequently developed epistaxis, which was stopped by inserting a 0.001% epinephrine plug into the affected nostril. His parents were informed that he required bone marrow transplantation, but they refused this treatment. The patient exhibited some delay of mental development, but did not manifest any neurological or physical developmental abnormalities.

When the patient arrived at the emergency room, his hemoglobin and hematocrit levels were extremely low (Table 1). A chest radiograph showed bilateral pulmonary edema (Fig. 1) and an ultrasound cardiogram showed that the ventricular ejection fraction was 40%. A large swelling was observed in his right buccal region and his right first molar had severe caries; a cyst-like image was observed in the apical area of that tooth (Fig. 2a). The boy's symptoms were attributed to an infected cyst, greatly aggravated by the immune deficiency caused by WAS.

After hospitalization, antibiotics were administered intravenously and local irrigations with water and povidone-iodine were performed, regularly. The boy was placed on a renal disease diet of 1700 kcal, containing 30 g of protein, and his water intake was limited to 500 mL/day. He received intravenous antibiotics and a blood transfusion. His general condition improved gradually, and he was moved from the emergency room to a pediatric ward (Fig. 3).

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Table 1
Changes in perioperative laboratory values.

Days of hospitalization	1 (ER)	13 (Pediatric ward)	35 (Preoperative day)	36 (Post platelet transfusion)	37 (POD1)	43 (POD7)	56 (POD24)
WBC	9.3	4.5	4	2.8	3.7	4.1	4.9
RBC	99	178	186	170	182	212	181
Hb	2.7	5.2	5.3	4.9	5.1	5.9	4.8
Plt	4.7	1	1.3	6.8	6.9	1.4	1.4
BUN	68	33	28		26	38	58
Cr	7.5	4.8	2.5		2.8	3.8	5.2
K	6.4	5.2	4		4.8	5.2	4.5
CRP	12	0.2	0.6		0.7	0.2	1.7

ER, emergency room; POD, postoperative day; WBC, white blood cell (1000/μL); RBC, red blood cell (1000/μL); Hb, hemoglobin (g/dL); Plt, platelet (10,000/μL); BUN, blood urea nitrogen (mg/dL); Cr, creatinine (mg/dL); K, potassium (meq/L); CRP: C-reactive protein (mg/dL).

A cystectomy was necessary to eliminate the cause of the local inflammation, but it was impossible because of the renal failure and parents' refusal to allow initiation of dialysis. Under hospital control, the patient's renal function was gradually improved with the restricted diet, limited water intake (700 mL/day), and internal use of sodium polystyrene sulfonate. After the patient's general condition improved, a cystectomy was planned for Day 36, post-hospitalization.

Intravenous administration of cefotaxime (1.0 g/day) was started 6 days before the operation and was changed to intravenous administration of sulbactam/ampicillin (1.5 g/day), beginning on the final preoperative day. The patient received a 200 mL transfusion of blood platelets 2 days prior to surgery and again immediately before surgery. Immediately before the operation, the patient's hemoglobin value was 4.9 g/dL, and his platelet count was 68,000/μL (Table 1).

The affected tooth and cyst were enucleated after inducing deep, intravenous sedation (propofol and midazolam) and applying a local anesthesia (3% mepivacaine without epinephrine). Standard intraoperative monitoring involved electrocardiography, non-invasive blood pressure monitoring, and measurements of the heart rate and oxygen saturation. Supplemental oxygen was administered with a nasal cannula. For sedation, a bolus dose of 10 mg propofol was administered intravenously. Sedation was maintained by administering a continuous infusion of 2 mg/kg/h propofol, which was aimed at achieving the Observer's Assessment of Alertness/Sedation scale of 10–12/20. In this case, we administered 1 mg midazolam when body movements occurred; this was followed by administration of 4 mg/kg/h propofol. The total amount of propofol and midazolam administered was 138 mg and 1 mg, respectively. First, 3.6 mL of local anesthetic was used and an additional 1.8 mL was administered during curettage. The operation was completed safely and without any complications; the surgical time was 50 min, and the duration of sedation was 70 min (Fig. 2b). Post-surgically, the wound was kept open with an atelocollagen sheet in the wounded area and packed with gauze (Fig. 4a); a plastic protective cover was also kept in place for 2 weeks. The blood clot under the plastic protective cover was weak (Fig. 4b), but no defluvium of the clot or postoperative bleeding occurred.

The postoperative course of the oral wound was good (Fig. 4c and d), without the development of any gingival necrosis. On the ninth postoperative day, a bacterial infection occurred in a left ankle arthrosis, and antibiotics were administered (Fig. 3). The patient was discharged 24 days after the operation with an epithelialized wound region (Fig. 4e and f).

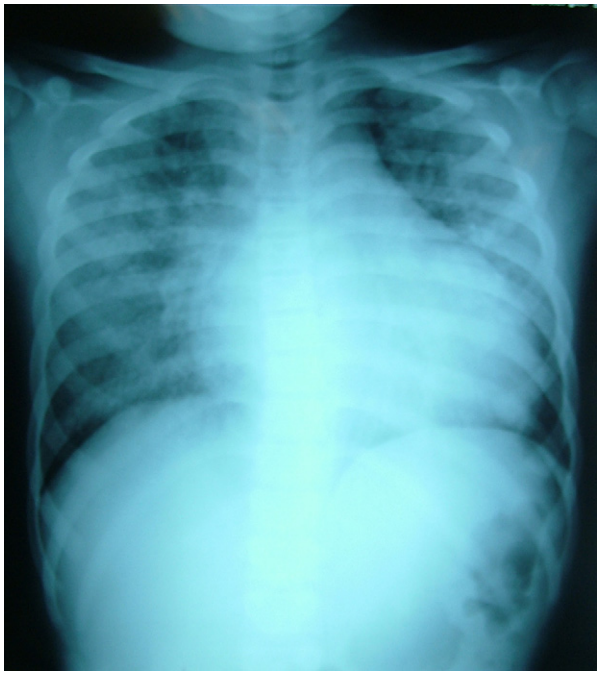

Fig. 1. Chest X-ray findings. There was a significant finding of cardiomegaly and bilateral pulmonary edema.

3. Discussion

The patient exhibited a range of symptoms, including increased susceptibility to infection, renal insufficiency, abnormal hemostasis due to thrombopenia, local necrosis caused by anemia, and noncooperation due to intellectual disability. It was also necessary to limit the patient's water intake and maintain strict dietary restrictions in order to correct electrolyte imbalances and prevent aggravation of renal dysfunction. These challenges warranted a re-evaluation of the procedures that might be used more routinely to treat similar conditions in other patients.

The threshold for prophylactic platelet transfusion for an invasive procedure is a blood platelet count of 50,000/μL or less. If a patient has a blood platelet count of 10,000–20,000/μL, an operation such as a tooth extraction can normally be performed safely with local hemostasis. This patient seemed to experience epistaxis when his platelet counts fell below 15,000/μL. In this case, the patient received preoperative platelet transfusions to prevent bleeding and postoperative development of anemia.

Most local anesthetics have inherent vasodilating effects. In the case of local anesthetics injected into the highly vascular oral tissues, an adequate effect is not obtained due to rapid diffusion. Vasoconstrictors, mixed with local anesthetics, are used to increase the duration of local anesthesia by constricting the blood vessels, thus making it safe to use the anesthetic agent for an extended duration and reducing the risk of hemorrhage [6,7,8]. Both epinephrine and felypressin are used as vasoconstrictors for the oral area, in Japan, and both may induce necrosis when used

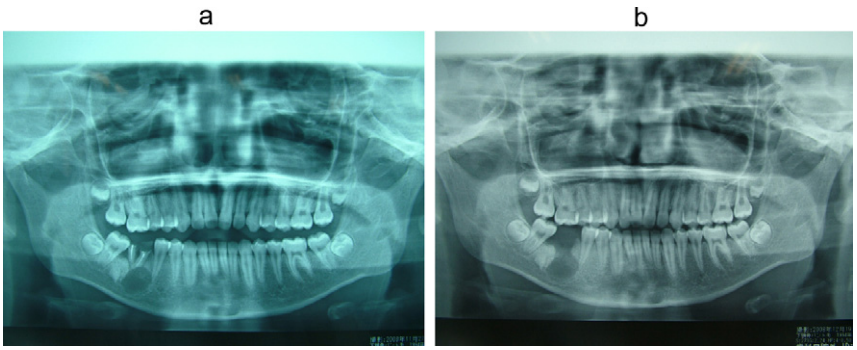

Fig. 2. Panoramic X-ray findings. A cyst-like image is observed in the apical area of the right first molar.

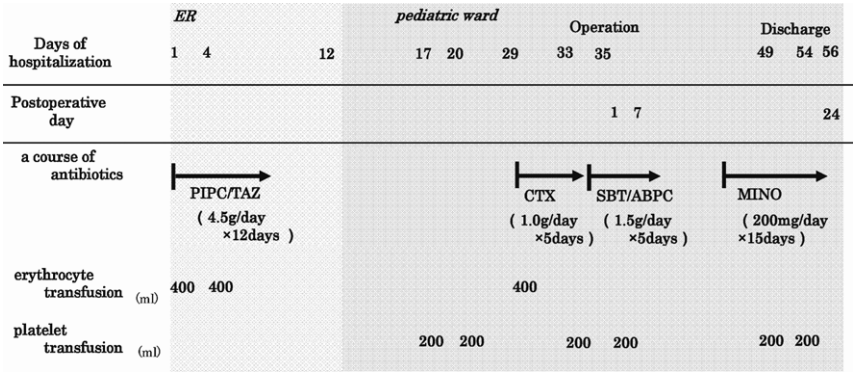

Fig. 3. Summary of the therapeutic procedure. We administered the antimicrobial agents and performed transfusion appropriately. ER, emergency room; PIPC/TAZ, piperacillin/tazobactam; CTX, cefataxime; SBT/ABPC, sulbactam/ampicillin; MINO, minocycline.

in anemic tissues. Mepivacaine hydrochloride is an amide-type of local anesthetic that has a reasonably rapid onset and a medium duration of action. Because mepivacaine does not have a vasodilating effect, the addition of a vasoconstrictor is unnecessary. For these reasons, mepivacaine was used as the local anesthetic, which helped to minimize the risk of delayed wound healing due to local anemia.

The patient was uncooperative while undergoing treatment, refusing to open his mouth even for the daily, local irrigations. General anesthesia was considered to be a high risk, based on the evaluation of his general condition. Therefore, intravenous sedation was performed to avoid undue cardiac stress and to facilitate patient cooperation. Propofol is the sedative of choice for these procedures because it is metabolized mainly by the liver [5,6], thereby reducing the burden on the patient's kidneys. No side effects, such as respiratory depression, vomiting, or excessive sedation, were observed.

Thus, using a combination of procedures, mandibular cystectomy was successfully performed in a patient with untreated WAS.

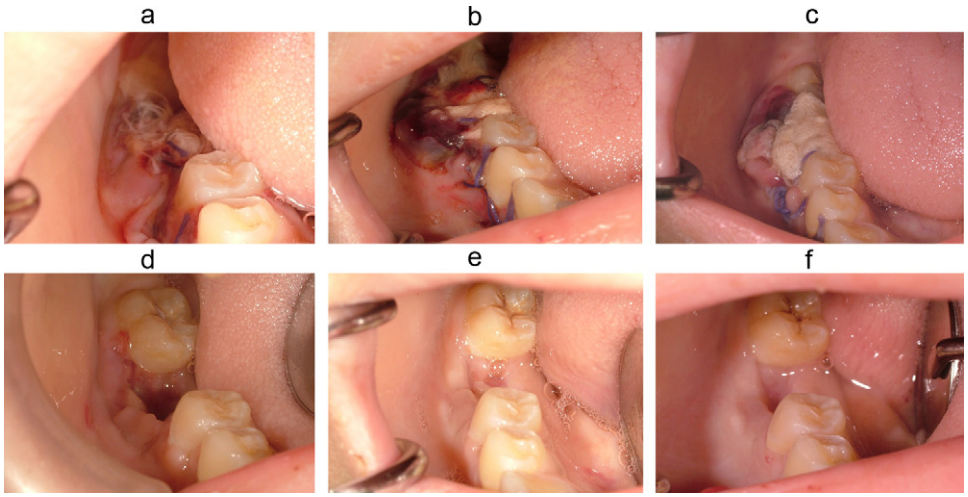

Fig. 4. Photograph of the postoperative course. (a) Immediately after surgery. The wound was kept open and packed with gauze. (b) Postoperative first week. The blood clot under the plastic protective cover was weak. (c) Postoperative second week. The wound was packed with gauze for 2 weeks. (d) Postoperative 17th day. We recognized an epithelization tendency. (e) Period of discharge. We recognized epithelization. (f) One month after the surgery. We can see wound healing.

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