Diagnosis of von Willebrand disease during the management of deep neck abscess: A case report

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ABSTRACT
Von Willebrand disease (VWD), which causes mucocutaneous haemorrhage, is the most common heritable bleeding disorder. However, a lack of awareness regarding VWD results in underdiagnosis and nontreatment. This study describes the first reported case of VWD diagnosed during the treatment of a deep neck abscess (DNA). A 55-year-old man underwent emergency surgery for DNA, which is a life-threatening disease, with subsequent difficulty in haemostasis both intraoperatively and postoperatively. Hence, coagulopathy was suspected, and VWD was eventually diagnosed. Administration of blood products helped control bleeding. Coagulopathies, including VWD, should be suspected in patients with refractory bleeding. This is especially important for otolaryngologists, who often treat mucocutaneous bleeding, such as epistaxis and oral mucosal bleeding.

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Introduction
Von Willebrand disease (VWD) is an autosomal dominant hereditary disease that affects 1% of all citizens in the United States, making it the most common hereditary bleeding disorder [1]. However, the lack of awareness regarding VWD results in its underdiagnosis and nontreatment [2]. VWD is characterised by subcutaneous and mucosal haemorrhage, such as nasal and oral haemorrhage; hence, it is important for otorhinolaryngologists to be aware of the characteristics of this disease [1]. VWD is caused by abnormal platelet aggregation due to dysfunctional or a reduced level of von Willebrand factor (VWF) and is classified as type 1, 2, or 3 according to the level of them; type 1 VWD affects approximately 75% of symptomatic persons who have VWD [1]. Therefore, the level of this factor must be appropriately managed when patients with VWD undergo haemostatic procedures, including surgeries. There are two principal treatments of choice in VWD: 1-deamino-8-D-arginine vasopressin (DDAVP) and substitution therapy with blood products containing VWF (with/without factor VIII; FVIII). Other forms of treatment can be considered as adjunctive or alternative to those mentioned above [3].

Deep neck abscess (DNA) is a life-threatening infectious disease that requires emergency treatment with antibiotics and drainage [4]. In patients with severe laryngitis and epiglottitis, tracheostomy is simultaneously performed to avoid airway obstruction [5].

We present a case of VWD that was diagnosed during the treatment of DNA with acute epiglottitis, in which haemostasis was perioperatively achieved with the administration of blood products.

Case report
A 55-year-old man presented with a cervical swelling associated with high fever, pharyngeal pain, dyspnoea, and dysphagia. He was referred to our hospital for surgical management after DNA was diagnosed using computed tomography (CT) in a different hospital. The patient had no significant medical history but had difficulty in haemostasis following a dental extraction, which had never been adequately investigated and diagnosed. His mother also had a similar experience. The activated partial thromboplastin time
(APTT) was slightly elevated at 43.9 s, prothrombin time (PT) and platelet count were within normal limits, and the patient’s blood group was O.

CT revealed abscess cavities extending from the left peritonsillar region to the left thyroid cartilage (Figure 1). Moreover, a swelling of the left side of the oropharyngeal wall from the oropharynx to the hypopharynx was observed on endoscopic examination, along with acute epiglottitis, which could have caused airway obstruction. He underwent emergency surgical treatment, including tracheostomy and incision and drainage of the abscess, and a drainage tube was placed in the involved area. There was slight difficulty with intraoperative haemostasis, and mucocutaneous bleeding was observed in several areas. The surgery was completed after adequate measures for haemostasis.

Intravenous antibiotic therapy was continued postoperatively, and the patient’s laboratory data, including inflammatory markers, improved dramatically. However, on postoperative day 4, a recurrent swelling of his left peritonsillar region was identified, and several blood clots without purulence were observed on incision under local anaesthesia. Furthermore, the previously placed drainage tube was obstructed, and the cervical swelling recurred. A repeat CT scan showed an extensive low- and isodense area in the operated space, suggestive of postoperative bleeding (Figure 2). An emergency reoperation was performed to control the bleeding. The cavity identified on the CT scan was almost entirely filled with blood clots without purulence. Although there was no specific bleeding source, mucocutaneous bleeding was observed in several areas. Adequate haemostasis was achieved, and a drainage tube was placed again.

The patient’s International Society on Thrombosis and Haemostasis-bleeding assessment tool (ISTH-BAT) score, which is a standardised tool for assessing abnormal bleeding, was 12 (normal range in men, <4) [6,7]. Laboratory data revealed low levels of VWF antigen (VWF:Ag), VWF ristocetin cofactor activity (VWF:RCo), and coagulation factor VIII activity (FVIII:C), which were respectively 16.0 IU/dL, 11.0 IU/dL and 23.5 IU/dL, confirming the diagnosis of VWD (Table 1). Continuous oozing from the wounds, which was identified after reoperation, was controlled by the intravenous administration of 48 IU/kg of plasma-derived VWF/FVIII (pdVWF/FVIII). VWD type 1 was diagnosed based on the results of multimer analysis and the ratio of VWF:RCo/VWF:Ag.

The patient’s clinical condition gradually improved, and he underwent decannulation 8 days after the reoperation, as the airway had been maintained open endoscopically. One month later, he underwent tracheocutaneous fistula closure, with administration of pdVWF/FVIII (48 IU/kg/day) for 4 days perioperatively. The bleeding was appropriately managed.

Later, the patient underwent DDAVP responsiveness challenge to assess whether DDAVP reversed his coagulation deficits for the prophylactic management of abnormal bleeding in future haemostatic procedures. DDAVP administration elevated VWF:Ag and FVIII levels, which proved its effectiveness.

Discussion

VWD is the most common heritable bleeding disorder and affects approximately 1% of the general population [1]. VWD results from a quantitative...
and/or qualitative deficiency of VWF and is classified as type 1, 2, or 3 [8]. Type 1, which is the most common subtype, is defined as a quantitative decrease in VWF levels. Types 2 and 3 are defined as the presence of qualitatively abnormal VWF and complete absence of VWF, respectively [8]. VWF plays a role in platelet adhesion to the damaged endothelium and carries FⅧ. Normal PT and platelet count and prolonged APTT are generally identified in most VWD cases. VWD is diagnosed based on low levels (<30 IU/dL) of VWF:Ag and/or VWF:RCo [1]. A previous study reported that patients with type O blood group tend to have lower levels of VWF:Ag and VWF:RCo than patients with other ABO blood groups [9]. VWF multimers are used in the diagnosis of the subtype. The adhesive activity of VWF depends on the presence of high-molecular-weight (HMW) multimers. The analysis of VWF multimers, as well as determining the presence of HMW multimers and monitoring their quality and quantity, helps in the diagnosis of VWD, and can be used in the evaluation of VWD treatment and in monitoring responses to treatment [10–12].

DNA requires antibiotic administration and drainage in accordance with severity, because late treatment may cause fatal complications, such as sepsis, jugular vein thrombosis, and mediastinitis [4]. In cases of concurrent severe acute laryngitis and epiglottitis, emergency tracheostomy is needed to avoid airway obstruction [5]. Despite having a slightly elevated APTT, our patient underwent emergency tracheostomy and drainage to prevent airway obstruction due to DNA and pharyngo-laryngeal swelling caused by pharyngo-laryngitis and epiglottitis. Although his condition temporarily improved after surgery, he was suspected to have a bleeding disorder based on the difficulty in achieving haemostasis, prolonged APTT, normal PT and platelet count, history of abnormal bleeding, and family medical history. ISTH-BAT is a useful and easy scoring system used to objectively assess bleeding history and includes epistaxis, cutaneous bleeding, bleeding from minor wounds, bleeding from the oral cavity, abnormal bleeding after tooth extraction, and abnormal bleeding after surgery [6,7]. The patient’s high ISTH-BAT score was consistent with VWD diagnosis.

VWD was diagnosed based on the low levels of VWF:Ag and VWF:RCo and classified as type 1 based on the results of multimer analysis and the VWF:RCo/VWF:Ag ratio. Early diagnosis enables the prevention of future abnormal bleeding with the administration of blood products, such as pdVWF/FⅧ and DDAVP, which boost plasma levels of VWF and FⅧ [1]. In our patient, these products effectively enhanced coagulation function, and complete haemostasis was obtained after the administration of pdVWF/FⅧ. In the subsequent surgery for tracheocutaneous fistula closure, perioperative bleeding was managed using these products. Early diagnosis is important in terms of heritable characteristics, and patients should be adequately counselled [1].

To the best of our knowledge, this is the first report of a case of VWD that was identified during DNA treatment. In otorhinolaryngology, cases of haemorrhage involving VWD have only been reported in patients with peritonsillar abscess and in those undergoing tonsillectomy [13,14]. Bleeding disorders, such as VWD, should be suspected in patients with refractory mucocutaneous bleeding, considering any history of abnormal bleeding and laboratory data.

**Conclusion**

Coagulopathies, including VWD, should be suspected in patients with refractory bleeding. This is especially important for otorhinolaryngologists because mucocutaneous bleeding, such as epistaxis and oral mucosal bleeding, is very common in patients with VWD.

**Ethical approval**

This study has not been published or presented elsewhere in part or in entirety. This material is the authors’ own original work.

**Informed consent statement**

The patient described in the study provided informed consent for the publication of this case report, and the study protocol was approved by the Ethics Committee of Nara Medical University Hospital (the proposal number was 3299).

**Disclosure statement**

No potential conflict of interest was reported by the authors.
Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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