



## Severe Airway Obstruction due to Massive Retropharyngeal Hematoma in a Warfarin-Taking Patient with a Normal International Normalized Ratio

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**Received:** July 20, 2020

**Revised:** August 20, 2020

**Accepted:** September 3, 2020

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Warfarin is used as part of the treatment of various diseases, and laboratory monitoring of its effects is required. Airway hematoma secondary to warfarin is rare, but can be fatal because of potential airway obstruction. Rapid definitive airway establishment is crucial if airway obstruction is suspected. This complication is more likely to occur in those with elevated coagulation laboratory values. However, we experienced a patient in whom a massive retropharyngeal hematoma caused airway obstruction after a non-severe motor vehicle collision. The patient had been taking warfarin, and had coagulation parameter values within the normal ranges. A major fracture or hemorrhage was not anticipated. Upon examination, a massive retropharyngeal hematoma was noted. Orotracheal intubation failed due to an airway obstruction. Emergency tracheostomy and an operation for hematoma removal were performed. Physicians must always consider the possibility of airway hematoma in warfarin-taking patients with normal coagulation values regardless of the severity of mechanism of injury.

**Keywords:** Warfarin; Anticoagulants; Hemorrhage; Airway obstruction

## INTRODUCTION

Warfarin is used as part of the treatment of various diseases, and laboratory monitoring of its effects is required. The most frequent warfarin-related complication is bleeding. Physicians should be aware of this complication. The development of airway

hematoma secondary to warfarin use in the sublingual or retropharyngeal area is rare, but can be fatal because of potential airway obstruction. If airway obstruction is suspected, rapid and definitive airway establishment is mandatory to save the patient's life. This complication is more likely to occur in those with elevated coagulation laboratory values.

However, we experienced a patient in whom massive retropharyngeal hematoma caused airway obstruction after a non-severe motor vehicle collision. The patient had been taking warfarin, but the coagulation parameter values were within the normal ranges. The mechanism of injury was assumed to be not significant. Therefore, major fracture or hemorrhage was not anticipated. Upon examination, we identified a massive retropharyngeal hematoma. Physicians must always consider the possibility of airway hematoma in warfarin-taking patients with normal coagulation values, regardless of the severity of the mechanism of injury.

## CASE REPORT

A 63-year-old man presented to Dankook University Hospital emergency department (ED) after a motor vehicle collision. He was driving his car by himself and ran into a parked car. The speed of his car at the time of the accident was not high (approximately 30 km/hour according to his statement) and the mechanism of injury was assumed not to be severe. He complained of only mild posterior neck discomfort. He presented no dyspnea or sore throat, and was fully alert. No external wound or neck swelling was observed. A neurologic examination and the rest of the physical examination were unremarkable. The patient's blood pressure was 150/94 mmHg, his heart rate was 65/minute, his respiratory rate was 16/minute, and his body temperature was 37°C. He had been taking warfarin (2.5 mg) daily because of a previous cerebellar infarction, but took no other drugs. Cervical sprain was suspected. Non-contrast brain and cervical computed tomography (CT) was performed and blood samples were tested, including coagulation parameters. The laboratory



**Fig. 1.** Brain tissue loss was noted in the left cerebellum. This may have been due to the preexisting cerebellar infarction.



**Fig. 2.** Severe prevertebral swelling was noted at the C3-7 level on cervical computed tomography, with prevertebral soft tissue distances of 24.4 mm at C3, 32.3 mm at C5, and 23.4 mm at C7.

values were as follows: an international normalized ratio (INR) of 1.2, an activated partial thromboplastin time of 32.2 seconds (reference range 24–37 seconds), a normal hemoglobin level, and a normal platelet count. Some cerebellar brain tissue loss was observed on brain CT (Fig. 1). No cervical spine fracture was observed on cervical CT. However, severe prevertebral swelling at the C3-7 level was noted (Fig. 2). The distances of the prevertebral soft tissue were 24.4 mm at C3, 32.3 mm at C5, and 23.4 mm at C7. The patient experienced dyspnea after returning to the ED after the CT scanning, and a definitive airway needed to be established to ensure airway patency. Orotracheal intubation with direct laryngoscopy was attempted but visualization of the vocal cord was not possible due to tongue base swelling. A reattempt was tried with video laryngoscopy, but the visualization failed again. During the intubation attempt, the patient's oxygen saturation fell to 30% and the heart rate decreased to 40/minute. The patient nearly developed cardiac arrest; therefore, 1 mg of epinephrine and 0.5 mg of atropine were administered intravenously. Simultaneously, I-gel was introduced into the oral cavity and positive-pressure ventilation was provided with a bag-valve mask. Since the airway was difficult, emergency tracheostomy was performed soon after restoration of the pulse rate and oxygen saturation. The patient was admitted to the intensive care unit. Surgery to remove the hematoma was done on the next day. Tracheostomy was maintained for 15 days, and then removed. The patient was discharged on the 20th hospital day without complications.

## DISCUSSION

Warfarin (brand name: Coumadin) inhibits the activity of vitamin K, which is related to the synthesis of factors VII, IX, X and proteins C and S; therefore, it decreases clotting activity. It is used for the treatment of venous or pulmonary embolism, mechanical valve replacement, cerebral venous thrombosis, ischemic stroke, and atrial fibrillation. The effects of warfarin are monitored by coagulation parameters including the INR, activated partial thromboplastin time, and prothrombin time. The recommended therapeutic range of the INR is 2–3 [1]. Warfarin

is also used for rodenticides so physicians often encounter warfarin-poisoned patients.

Bleeding is a well-known complication and the risk increases with INR elevation, especially above 4.5 [2,3]. Airway hematoma is a rare bleeding-related complication, but caution is needed because airway compromise can be fatal if it develops. Furthermore, it can be difficult to notice airway compromise, since its early signs can be subtle. In a meta-analysis including 34 articles related to warfarin-induced airway hematoma, researchers reported that most common site of hematoma development was sublingual (66.6%), followed by retropharyngeal (27%). Other possible sites are laryngeal, submaxillary, and epiglottal [4]. The meta-analysis also stated that no differences in patient age, warfarin dose, INR, or time to resolution were observed between airway-compromised patients and the non-compromised patients. The main symptoms were dysphagia, sore throat, and neck swelling, which were found in more than half of patients with airway hematoma. The mean warfarin dose was 5.34 mg and the mean INR was 8.07 in the meta-analysis. As is expected based on these findings, physicians can suspect bleeding or hematoma with ease if the INR value is elevated. However, our patient showed an INR of 1.2, corresponding to an upper normal marginal value. To our knowledge, only one previous case has been reported of warfarin-related airway hematoma in a patient with a normal INR [5]. That patient had discontinued prescribed warfarin for surgery. The coagulation parameters returned to the normal range, and surgery was then performed under general anesthesia and endotracheal intubation. Direct manipulation around the airway was given to this patient prior to surgery. Several days later, hematoma at the epiglottis developed. In our case, the patient had normal values of coagulation parameters and no direct trauma of the neck or airway was experienced. Nevertheless, retropharyngeal hematoma developed and caused severe airway obstruction. Other reports have documented the development of airway complications in patients with an elevated INR. INR values can be normal if the patient does not take the medicine regularly or if the dose is insufficient. However, our patient stated that he took no drugs except for warfarin, which he took regularly. Therefore, the possibility of drug interactions with warfarin was low. No baseline

values of coagulation parameters were identifiable at our hospital because the patient had received the warfarin prescription from another hospital. The crucial point of this case report is that severe airway hematoma can develop in patients with a history of taking warfarin even if the coagulation values are normal. Physicians must keep in mind the possibility of severe airway obstruction in patients with a history of warfarin regardless of the coagulation lab values or the severity of the injury mechanism.

The known predisposing factors for airway hematoma development are as follows: vigorous coughing [6,7], drug interactions [8,9], airway manipulation [5,10], trauma [11], and denture use [12]. The case of airway hematoma associated with denture-use involved the development of a massive sublingual hematoma due to usage of an uncomfortable new acrylic denture (the INR was 5.5). The patient underwent an operation for hematoma evacuation. The trauma case involved the development of a large retropharyngeal hematoma after negligible minor trauma caused by slipping and falling (the INR was 6.9). In these two cases, an elevated INR likely contributed to the development of a severe airway hematoma despite the non-significant mechanism of injury. However, our patient showed a normal INR value.

The average duration of hospitalization of patients with upper airway hematoma was 7.69 days [4], but our patient was hospitalized for 20 days because a hematoma removal operation was performed. The priority of treatment is to secure a patent airway and appropriate ventilation. For this purpose, early and preemptive endotracheal intubation or the surgical airway (if the endotracheal intubation fails) is necessary. The other treatment options include medical therapy, including vitamin K or blood products such as fresh frozen plasma, and surgical treatment, including hematoma evacuation if indicated. Some physicians use steroids, but the evidence supporting steroid use in such cases is unclear. Since bleeding risk can be increased by concomitant steroid use, caution is needed [13,14].

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