# Labor and delivery in a patient with hemophilia B

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**ABSTRACT**
Hemophilia B is a rare X-linked disorder that may cause dramatic bleeding. Women account for only 3.2% of those clinically affected. The X-linked inheritance frequently delays the diagnosis in women and may expose the patient to an increased risk of adverse events. There is limited experience with these patients during labor and delivery. A 28-year-old primiparous woman with hemophilia B (bleeding phenotype) delivered a male infant by an unplanned cesarean delivery under general anesthesia following treatment with factor IX and normalization of her coagulation parameters, guided by thromboelastography. Postpartum vaginal bleeding required transfusion of two units of packed red blood cells. Factor IX supplementation continued for one week. Once diagnosed with hemophilia B, a multidisciplinary approach and advanced antenatal planning can increase the likelihood of a safe delivery. Neuraxial approaches and cesarean delivery are recommended only after normalization of the coagulation profile. The male fetus of a hemophilia A or B patient requires special attention. Operative vaginal delivery and invasive fetal monitoring should be avoided. Thromboelastography is an excellent technique to assess parturients with bleeding disorders or peripartum hemorrhage and may be underused.


***Keywords***: Hemophilia B; Labor and delivery; Coagulation; Cesarean section; General anesthesia; Thromboelastography

## Introduction

Hemophilia A and B are X-linked recessive disorders of coagulation with a prevalence of 1 in 10 000 and 1 in 100 000, respectively.[1] Bleeding results from decreased activity of factor VIII in hemophilia A and factor IX in hemophilia B.[1] Factor activity of <1% is classified as severe, 1 to 5% as moderate, and 5 to 40% as mild.[1] The X-linked inheritance pattern results in men expressing the disease and women typically being carriers.[1] Under rare circumstances a woman can also show a bleeding phenotype. For this to occur, the normal X-chromosome must be inactivated.[2–6] The rarity of this event explains the low frequency of women with clinical hemophilia.[7]

## Case report

A 28-year-old primiparous woman with hemophilia B (Christmas disease) presented for cesarean section. One year before delivery she presented to the University of Florida, Department of Hematology and Oncology for investigation of a bleeding disorder. She had a history of easy bruising and menorrhagia. Her family history was negative. At age 16 she suffered recurrent bleeding for three months following tonsillectomy. She was diagnosed with von Willebrand disease by her local hematologist and received desmopressin perioperatively for minor procedures such as tooth extractions. Despite desmopressin, bleeding would often continue for several days. One year before this presentation she had been treated at another facility for a retroperitoneal hematoma secondary to an ovarian cyst. She required blood transfusions and factor replacement following documentation of low factor IX levels; however, it was unclear if this was due to a consumptive coagulopathy or a production defect.

Tests were performed including factor activities of II, VIII and IX, a platelet function assay, and a ristocetin cofactor assay. These tests were chosen to evaluate for von Willebrand disease, confirm factor IX deficiency, ensure that another vitamin K-dependent (factor II) was normal, and to exclude hemophilia A (factor VIII). All tests were normal except the factor IX activity, which was 11% (normal: above 60%) leading to the diagnosis of mild hemophilia B. Now pregnant for the first time with an uncomplicated pregnancy, a multidisciplinary treatment plan was established. She was to receive factor IX supplementation only in the case of bleeding or if a cesarean delivery was necessary. The patient was not in favor of neuraxial anesthesia. Additionally, because she was carrying a male fetus, an operative vaginal delivery and invasive fetal monitoring were both relatively contraindicated.[8,9] After a normal antenatal period, the patient went into spontaneous labor at 39 weeks. However, at 6 cm cervical dilation labor arrested despite oxytocin augmentation. Her most recent

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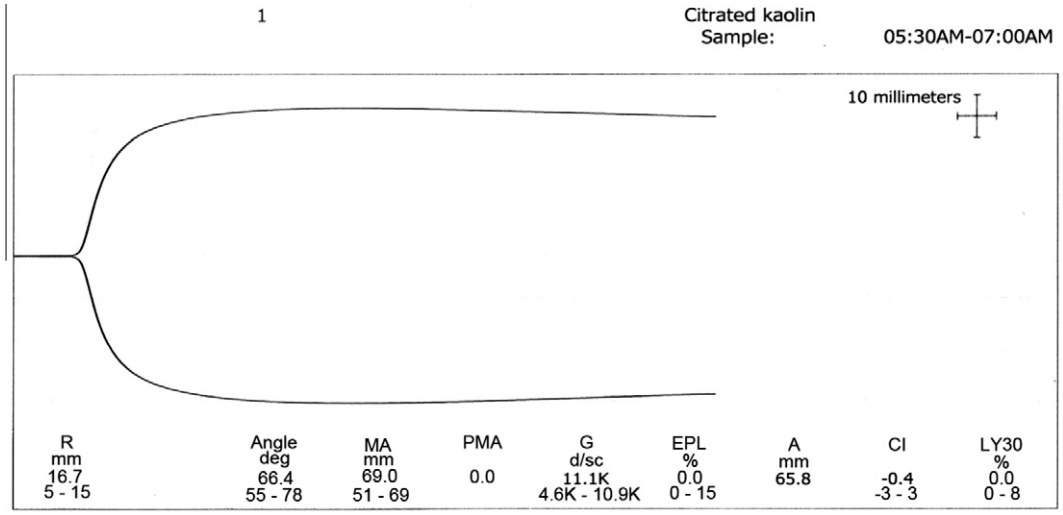


**Fig. 1** Thrombelastogram (TEG) before factor IX administration: prolonged R-interval.

factor IX activity was 12% with an activated partial thromboplastin time (aPTT) of 43 s (normal range 25–35 s). The decision was made to perform a cesarean delivery under general anesthesia with factor IX supplementation using 9090 U of recombinant factor IX based on body weight administered intravenously 30 min before incision.

A thromboelastogram (TEG) drawn before factor supplementation showed an increased R-interval of 16.7 mm (normal 5–15), consistent with a coagulopathy (Fig. 1). The TEG was rechecked after factor IX administration and demonstrated normalization with an R-interval of 9.2 mm; aPTT was 35 s (Fig. 2).

The delivery of the baby via cesarean section was uneventful. Estimated blood loss was 800 mL and a 40-U oxytocin infusion in the operating room produced effective uterine contraction.

Factor IX supplementation was decreased in dose and frequency over seven days postpartum. However, she experienced vaginal bleeding on days 1 and 2 due to uterine atony. There was no incisional bleeding, which would have been expected with inadequate recombinant factor IX replacement. Her hematocrit fell to 18% and she received 2 units of packed red blood cells. Her subsequent hospital course was uneventful. As she was able to ambulate after her delivery and her body mass index was $<30$ kg/m$^2$, she did not receive pharmacological thromboprophylaxis. Acetaminophen and opioids were used for postoperative analgesia.

## Discussion

Severe hemorrhage is a leading cause of morbidity during childbirth.[10,11] It is therefore clear that coagulation disorders must be identified before labor. Parturients with a bleeding phenotype of hemophilia A or B present much less frequently due to their X-linked inheritance pattern. In fact this pattern may lead to delayed or improper diagnosis as in our patient where mild hemophilia B, with a factor IX activity of 11% resembled von Willebrand disease.[12–14] Irrespective of the diagnosis, a multidisciplinary approach is essential for patients with coagulation disorders.[10,15,16] A treatment plan should be established and accepted by the parturient before labor and delivery.

The anesthesiologist will most likely be involved during the peripartum period. There is little available in the literature regarding neuraxial techniques in parturients with inherited coagulation disorders. Choi et al. reviewed the literature describing neuraxial techniques (block or lumbar puncture) in patients with common bleeding disorders.[17] Of those patients with known hemophilia A or B, factor activity was increased to normal before the needle was inserted; there were no maternal complications; however, an infant with unrecognized hemophilia suffered a spinal hematoma causing paraplegia.

Chi et al. found encouraging results in pregnant women with inherited bleeding disorders.[18] Following the normalization of coagulation defects, either by intervention or spontaneously, neuraxial anesthesia was not associated with increased complications compared to the normal population. However, patients and coagulation must be monitored. Of note, this analysis did not include patients with the bleeding phenotype of hemophilia B and unlike patients with von Willebrand disease, factor levels in patients with the bleeding phenotype of hemophilia B do not normalize during pregnancy.[18] Our patient opted against a neuraxial technique. Factor IX administration was reserved in case of operative delivery or severe hemorrhage during pregnancy or vaginal delivery. A cesarean delivery was deter-