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Von Wlillebrand Disease

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Introduction

The topic that this nurse has chosen to investigate and present is a bleeding condition called von Willebrand Disease (VWD). This nurse has a child, which is a college endurance athlete that has been experiencing health issues such as Iron Deficiency Anemia. When searching blood disorders and their pathophysiology, VWD was the one condition that became . VWD is one of the most prevalent inherited bleeding disorder (James, 2017). This disorder is the result of a low levels of von Willebrand factor (VWF). VWF is a protein that binds to factor VIII; an essential clotting protein and platelets in the blood vessel walls that aids in production of a platelet plug during the clotting process (National Hemophilia Foundation, n.d.). This disorder was first described in 1926 by Erik von Willebrand. He distinguished that it differed from hemophilia and named it "pseudo hemophilia".

Three main types of VWD exist, which is based on the VWF; type 1 VWD, type 2 VWD and type 3 VWD (National Hemophilia Foundation, n.d.). On rare incidences, a fourth type of VWD can developed from other medical conditions; lymphoma's, leukemia's, disorder such as lupus and certain medications (Nordqvist, 2016). Type 1 is found in 60-80 % of individuals, there is an insufficient amount of VWF in the blood and symptoms are usually mild. Type 2 is found in 15-30 % of patients and symptoms range from mild to moderate. Type 3 is five to ten percent of with VWD and there is a complete deficiency of VWF. This type displays the most severe symptoms (Federici, 2016, p. 42). VWD equally affects men, women and children. According to James (2017), "90% of women being treated at hemophilia centers in the U.S. have VWD" (p. 21).There is also no geographical or ethnic affiliation with VWD (Lillecrap, 2013). Inheritance of VWD happens by way of autosomal dominant or autosomal recessive patterns. This disorder is the result of a low levels of von Willebrand factor (VWF). Chromosome 12 is the carrier of VWD. Symptoms of the disorder vary from mild to severe. This can make the diagnosis of VWD difficult in individuals with mild symptoms to be made. In many cases, individuals with mild symptoms go undiagnosed. Type 1 VWD is characterized by a short supply of VWF with normal structure and function. Type 2, is broken down into four different types according to the defect of VWF; 2A, 2B, 2M and 2N. Type 3 there is no functioning VWF (Swystun, James, 2016).

Pathophysiological Processes

Signs &Symptoms

Signs and symptoms may vary person to person depending on the level of residual VWF activity, the classification group VWD that the individual has and age and sex may play a role in the severity of signs and symptoms to some extent (Leebeek, Eikenboom, 2016). Type one is the most common type of VWD seen in individuals (CDC, 2016). Signs and symptoms are

- Nosebleeds; individuals may experience five or more nosebleeds in a year, that happen for no reason without injury. They last for long periods of time; usually more than 10 minutes and may need packing or cauterized to cease the nosebleed.
- Easy bruising; frequent bruising that happens with mild trauma. Hematomas that are diffused in a large surface area usually larger than the size of a quarter.
- Heavy menstrual cycles in women; heavy bleeding and passing of large clots during menstrual cycles. Women and adolescents with VWD may notice that they are soaking through two or more pads or tampons in a two-hour period.
- Mucocutaneous bleeding lasting more than five minutes from small lacerations. Post-surgical areas and prolonged bleeding after childbirth. Oozing of blood after dental work / dental extractions.
- In type 2N and type 3, joint bleeding maybe a complication (Leebeek, Eikenboom, 2016).
- Gastrointestinal bleeding is a possible severe clinical manifestation

Underlying Pathophysiology

Most commonly inheritance pattern for VWD is autosomal dominant. Type 2A, 2N and type 3 are known to be autosomal recessive (DeLong, Eikenboom, 2015). The underlying cause of VWD lies within a qualitive or quantitative defect of the VWF protein (DeLong, Eikenboom, 2015). "VWF is a high-molecular-weight glycoprotein with a key role in the first phase of hemostasis" (Casonato, Cattini, Barbon, Daidone, Pontara, 2015. p. 682). VWF is located as stated above on the short arm of chromosome 12, at the locus 12p13.3, which contains 52 exons that range in size from 1.3kb to 40bp (Swystun, James, 2015). Endothelial cells and megakaryocytes play an important role in the circulation of VWF, along with storage of VWF multimers in cigar-shaped vesicles known as Weibel-Palade bodies (WPBs) (Delong, Eikenboom, 2015). In type 1 VWD, observed is a partial VWF deficiency, with the variant location of the VWF gene on the external loci and variant location on exon 1-52 (pg.48). Type 2A VWD, is characterized by decreased VWF-platelet binding because of the deletion of high and intermediate molecular weight multimers (pg.51). Type 2B, is due to gain-of-function missense mutations within the Gplb binding site of VWF. This causes unplanned VWF interactions that result in the depletion of high molecular weight (HMW) multimers and subsequent thrombocytopenia (pg. 51). Type 2M VWD is due to the decreased VWF platelet interactions, however, multimerization is normal. Mutations are localized to the Gplb binding site in the A1 andA3 domain of VWF resulting in a decrease in VWF binding to sub endothelial collagen (pg.52). Type 2N VWD is initially known as autosomal Hemophilia A. These individuals present with a low FVIII level. This type of VWD is an, "homozygous or compound heterozygous manner, involving either two 2N alleles or a 2N and a VWF null allele" (Swytun, James, 2017, p. 53). Type 3 VWD is noted as the severe clinical phenotype with absent VWF in the plasma, along with very low factor VIII: C. In 80% of patients with type 3 VWD, genetic defects in the VWF genes are null alleles, which gives explanation to the absence of VWF in whole.

Underlying Patho. Cont.'

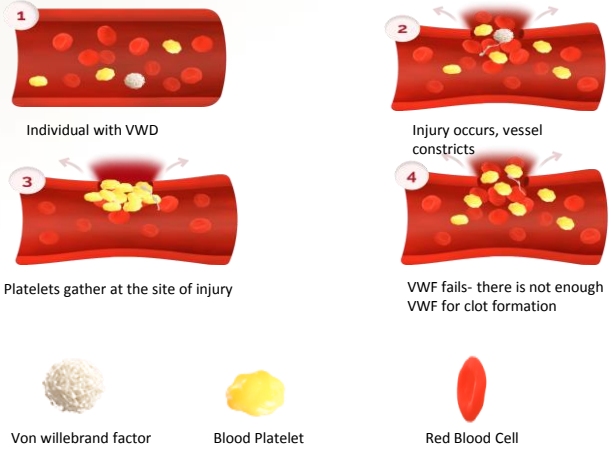
Type 3 VWD has a heterozygous mutational basis consisting of 80 or more variegated mutations, which would include VWF gene insertions, missense mutation and partial to total VWF gene deletions (Swystun, James, 2017).

In 35% of cases with type 1 VWD, no identifiable VWF mutations, this leads to looking at other identifiable VWF mutations: One theory is the contributor to quantitative variation of VWF and the ABO blood group. VWF levels is noted to be 25% lower on individuals of "O" blood type (Lillicrap, 2017). In acquired VWD, the most common causes include: Cardiac disorders; aortic stenosis being the most prevalent, lymphoproliferative diseases, hypothyroidism, drug related and systemic lupus erythematous (Hassan et al. 2013).

Significance of Pathophysiology

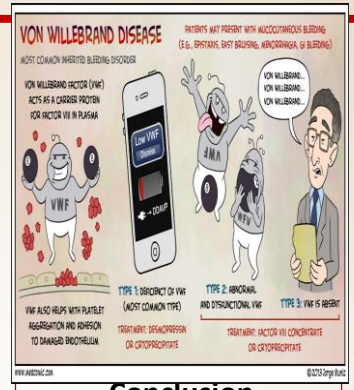
- 10% of women with VWD experience a history of endometrial hyperplasia
- Of the high occurrence of women that experience heavy menstrual bleeding (HMB) with no explanation has reported to range 5% to 36% adolescents.
- Women with VWD also suffer other forms of abnormal reproductive bleeding such as bleeding with ovulation resulting in a hemorrhagic ovarian cyst or peritoneal cavity bleeding.
- Antepartum bleeding, postpartum to severe postpartum hemorrhage, and perineal hematoma's increased by two to ten-fold in women with VWD (James, 2017)
- A threefold increase risk of hypothyroidism in patients with congenital VWD (Hassan et al., 2013)
- Gastrointestinal bleeding from angiodyplasia that is most commonly seen in elderly patients with type 2 and 3VWD
- Increase risk for arthopathy and decrease joint function resulting in intraarticular joint bleeding.
- Patients with type 3 are at greater risk for joint bleeding which results in a lower quality of life than those of the general population which is associated with bleeding phenotype
- As a result of the physiologic rise in VWF levels throughout life, patients with type 1 may experience levels within normal limits when they become older.
- With type 2 VWD patients, the VWF activity remains low due to the functional defect in the protein, which causes an increased risk for bleeding symptoms that could occur with increased age.

Figure 1.0 Illustration of VWD in an individual



Implications of Nursing

- Evaluating patients is to obtain a complete family history: It is important to know unnoticed mild symptoms, a family history of VWD or abnormal bleeding may not always be apparent
- Educate patients and their family members on VWD: how to decrease the risk of injury, steps needed to take to ensure patient safety during bleeding episodes. Discuss the importance of informing all healthcare about their diagnosis and type of VWD disease.
- Talk with the patient and family inn regards about notifying any sports coach about their (Nordqvist, 2016).
- Be educated on resources that are available to patients and family members such as; Hemophilia treatment centers, genetic counseling, physical therapist if joint bleeding is a complication and hematologist
- Educate patients to consult their physicians before taking over the counter (OTC) medications such as Aspirin, Ibuprofen and other NSAIDS that may hinder blood clotting (Nordqvist, 2016 section 7).
- Be familiar with VWD and the steps to guarantee hemostasis and decrease risk of complications related to VWD
- A Complete blood count, activated partial thromboplastin time (aPTT), prothrombin time (PT), fibrinogen level and platelet counts are important lab values that should be observed.
- Additional test VWF antigen (VWF: Ag), VWF ristocetin cofactor (VWF: RCO) and a factor VIII level
- Treatment for VWD is based on normalizing VWF and factor VIII levels, this is achieved by using medicines such as Desmopressin (DDAVP) or infusing exogenous coagulation factors such as high purity factor VIII VWF. VWF-factor VIII or VWF concertation or tranexamic acid is used in type 3 (Leebeek, Eikenboom, 2016)
- Birth control containing estrogen can aid in HMB in women
- Encourage a well-balanced healthy diet with exercise. Advise children with VWD to avoid contact sports that would increase the risk of injury (Nordqvist, 2016)



Conclusion

Although VWD is the most common inherited blood disease, many healthcare providers are unfamiliar about the disorder. While researching VWD, this nurse has gain knowledge that can assist in identifying patients that may be suffering from VWD. This nurse sought out to investigate a blood disorder due to a personal affiliation with a child that were experiencing similar signs and symptoms of VWD. VWD is a disorder that although complications can occur, many individuals that suffer from VWD can lead a normal life with the right education and resources.

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