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Perioperative Management for a Patient with Severe Congenital Factor V Deficiency Undergoing Cochlear Implantation

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Abstract:- Congenital factor V deficiency (CFVD) is a rare coagulation disorder, also known as para hemophilia, that was first described by Owren in 1947. Until now, no specific protocols for the management of these patients have been established, owing to the variable spectrum of bleeding manifestations. However, available research suggests that perioperative infusion of fresh frozen plasma (FFP) may aid in maintaining FV levels to prevent bleeding. We present the case of a 47-year-old woman with congenital FV deficiency who underwent cochlear implantation with no postoperative hemorrhagic complications.

Keywords:- *Factor V, Congenital Factor V Deficiency, Perioperative Management, Cochlear Implantation, Hemostasis, Hematology, Case Report.*

I. INTRODUCTION

Congenital FV deficiency is identified as a rare bleeding disorder (RBD), is expressed in an autosomal recessive manner of inheritance with an estimated incidence of one per million in the general population. The disease is mostly prevalent in regions where parental consanguinity is commonly practiced. The disorder can occur up to 10 times more frequently [1]. FV deficiency, formerly known as parahemophilia or Owren's disease, was first described by Paul Owren in 1943 [1,2]. Only 200 patients with factor V deficiency have been described in the literature, and most of them became symptomatic in early childhood. Typical clinical signs are mucosal tract bleeding and excessive bleeding after invasive procedures [3]. Based on the FV activity, the disease can be classified into three groups: mild (with FV level at 10%), moderate (with FV level < 10%), and severe (with undetectable FV level) [4]. There are currently no well-established protocols for managing these patients. There is no commercially available recombinant FV or plasma-derived FV concentrate [5]. In some of these cases, pre-interventional fresh frozen plasma (FFP) infusions have been proven to minimize bleeding [3,6] . In this work we report a case of a severe congenital factor V deficiency that was operated for cochlear implantation with FFP infusions and no abnormal bleeding events.

II. CASE PRESENTATION

A 47-years-old woman candidate for a cochlear implant for which the preoperative coagulation tests showed a significantly prolonged prothrombin time (PT) 16% (Reference range RR 70-140%) and an elevated activated partial thromboplastin time (aPTT) 83.9s (RR 23-33s) with a normal level of fibrinogen 3.06g/l (RR 2-4g/l). The patient has no history of hemorrhagic syndrome. Subsequent factors assays revealed a decreased factor V activity at 1% (RR 70-140%), the results of other factor assays was (all RR 70-140%): factor II at 88%, factor X at 86% and factor VIII at 140% (searching for a combined factor V and VIII deficiency). FV inhibitor using a mixing test (mixture of equal volume of patient's plasma with normal plasma) was normal. The family investigation revealed the existence of a brother with isolated factor V deficiency (factor V at 1%), concluding to a severe congenital factor V deficiency.

We established a transfusion protocol including the infusion of FFP at 20 mL/kg to control bleeding. Our objective was to have a factor V rate > 20% with an infusion of 5 units of FFP on day 1 preoperatively; an infusion of 5 units of FFP on day 0; an infusion of 5 units of FFP on day 1 postoperatively; and an infusion of 5 units of FFP on day 2.

Coagulation assays were performed pre and post infusion of FFP (Figure 1).

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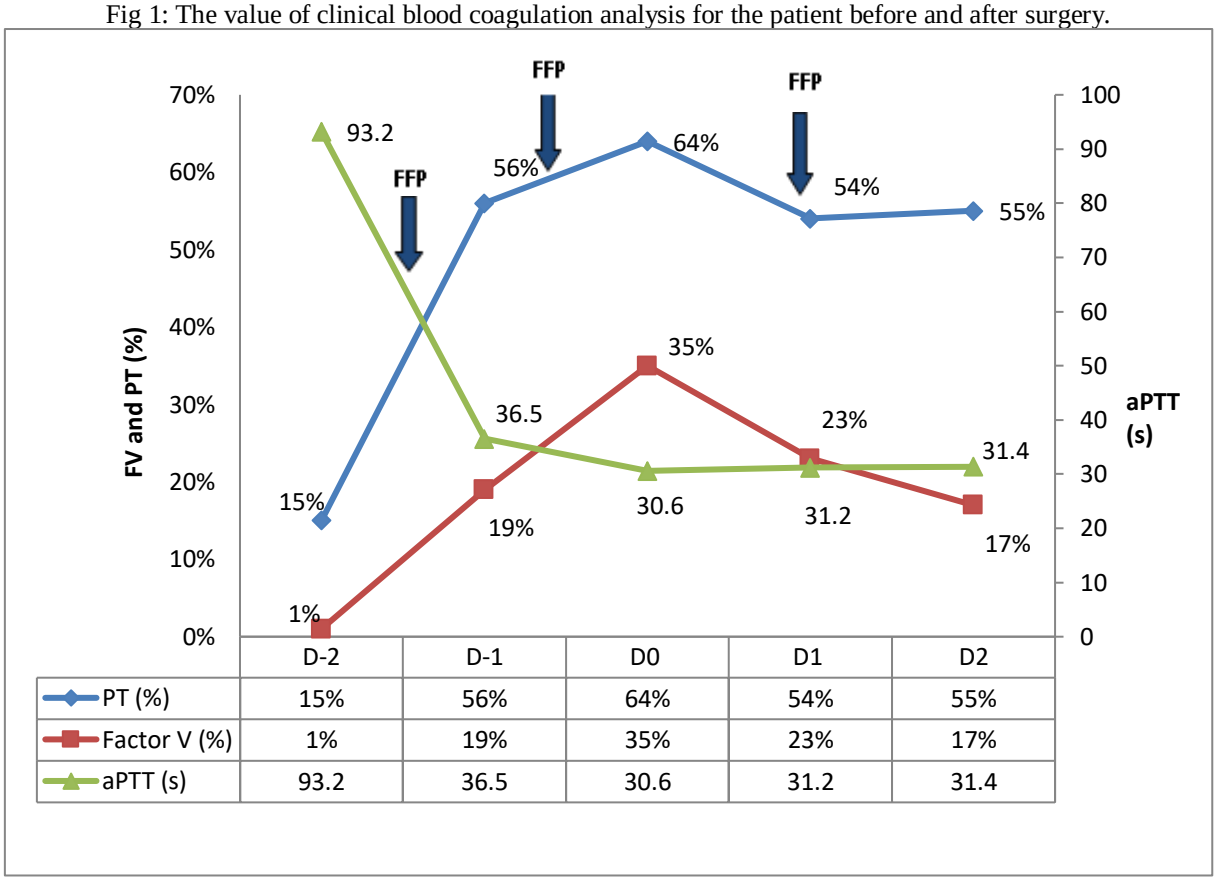
Fig 1: The value of clinical blood coagulation analysis for the patient before and after surgery.



	D-2	D-1	D0	D1	D2
PT (%)	15%	56%	64%	54%	55%
Factor V (%)	1%	19%	35%	23%	17%
aPTT (s)	93.2	36.5	30.6	31.2	31.4

The level of factor V increased by 35% compared to normal during the infusion of FFP. The levels of aPTT and PT were corrected to 70% of normal after the infusion of the FFP.

During and after the surgery, no evidence of active bleeding or major complications were reported, and the patient was discharged after 3 days. During the one month follow-up, she had no evidence of bleeding.

III. DISCUSSION

Congenital Factor V deficiency is thought to be passed down through families via an autosomal recessive gene (q23-24)2, which affects one in every million people and has no gender or race association [7]. Clinical symptoms of FV deficiency vary in severity and type. They vary in severity from minor mucosal and soft tissue bleeding to potentially fatal hemorrhage such as gastrointestinal and cerebral bleeding [6]. The most common manifestations in later life are mucous hemorrhages, most commonly epistaxis in men and menorrhagia in women [8].

The vast majority of FV deficiency-causing mutations are one-of-a-kind and limited to a single family or region [4]. One-third of all hereditary genetic disorders are caused by premature termination codon mutations (PTC). PTC is a type of nonsense-mediated mRNA decay (NMD) that contains translation [9]. PTC-causing mutations have long been linked to severe forms of FV deficiency [4].

It is a glycoprotein generated by the liver, with around 80% of it found in plasma and 20% in platelet alpha granules [10,5]. FV is a procoagulant cofactor that helps to create fibrin by causing prothrombin to develop. Thrombin, which is created through a different activation mechanism, catalyzes FV activation. Factor Va (FVa) activates factor Xa (FXa) in the second phase of the coagulation cascade, leading to the conversion of prothrombin to thrombin. FV interferes with the anticoagulant cascade by inhibiting factor VIII activity [11].

The clinical features and family history, as well as routine and specific laboratory tests, are used to make the diagnosis of FV deficiency. Concurrent prothrombin time (PT) and activated partial thromboplastin time (aPTT) prolongation is required before performing more specific assays, such as the FV activity assay. In the case of low FV activity, mixing studies should be performed to rule out the presence of an FV inhibitor. To rule out the possibility of combined FV and FVIII deficiency, the FVIII level must also be determined. Molecular analysis can also be used to confirm the disease [12].

Despite the fact that our patient had no history of significant bleeding, preoperative laboratory testing revealed a prolonged PT and aPTT as well as an FV level of 1%. A family investigation revealed the existence of a brother with isolated factor V deficiencyAccording to some researchers, residual platelet FV may be critical for maintaining proper hemostasis in people with FV levels below 1%, which could

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explain the difference between FV levels and different bleeding presentations [10].

Because of its rarity, no guidelines or protocols for treating this unusual entity have been developed [6]. When a factor V concentrate was unavailable, FFP was the best factor substitute. To reduce the bleeding, we infused FFP at a rate of 20 mL/kg before and after surgery to raise FV levels. In cases of invasive testing, bleeding, or surgery, FFP maintains FV activity at >25 percent to 30 percent [5,13,14], which is similar to our case.

With no signs of severe bleeding, our patient received five units of FFP on Day -1, Day 0 (3H preoperatively), and Day 1 postoperatively, and was discharged three days later with no current bleeding or major problems. Some authors recommended FFP transfusions three to ten days after surgery to maintain FV levels and prevent hemorrhage [15].

IV. CONCLUSION

In patients with prolonged PT and aPTT, congenital FV deficiency should be explored. Major surgical treatments can be carried out on those people. Assuming that FV levels are carefully monitored prior to surgery, the precise role and application of FFP in these challenging situations remains to be defined.

Competing interests

There are no competing interests declared by the authors.

Authors' contributions

The diagnosis and clinical management of the patient were the responsibility of ZB, BO, and SS. The paper was written by ZB. HB assisted with the initial draft's analysis, supervision, and writing. BO conducts an intellectual content evaluation and edits the paper. The final manuscript was read by all authors and approved by them.

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