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Case report

Perioperative management for patient with congenital factor VII deficiency who underwent laparoscopic cholecystectomy: Case report

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ABSTRACT

Introduction and importance: In patients with congenital factor VII (FVII) deficiency, perioperative bleeding events are concern, so recombinant activated factor VII (rFVIIa) is favorably used, but the optimal dosage regimen has not clearly established. We report management of a patient with congenital FVII deficiency who underwent laparoscopic cholecystectomy.

Case presentation: A 70-year-male with congenital FVII deficiency was diagnosed as acute cholecystitis, so we planned laparoscopic cholecystectomy. FVII activity and prothrombin time international normalized ratio (PT-INR) were intraoperatively monitored as scheduled. At the start of surgery, FVII activity was 3.1% (75–130%) and PT-INR was 3.37 (0.8–1.2), so 1 mg of rFVIIa was administered. Both of these values then improved to 325.0% and 0.73, respectively. Laparoscopic cholecystectomy was successfully completed without unexpected bleeding or oozing. When FVII activity and PT-INR was re-checked 6 h after the first administration of rFVIIa, these values were 23.9% and 1.53, respectively. Additional 1 mg of rFVIIa was used only once after the operation. The patient was discharged on the sixth day after surgery without postoperative complication.

Clinical discussion: In this case, rFVIIa was used just twice and there were no bleeding events during the perioperative period. Previous reports suggested using 15–30 μg/kg of rFVIIa before surgery and subsequent every 4–6 h in the first 24 h, then increasing the interval to 8–12 h. It is necessary to evaluate optimal dose of rFVIIa based on the risk and surgical invasiveness for each case.

Conclusion: Our patient with congenital FVII deficiency uneventfully underwent laparoscopic cholecystectomy.

1. Introduction and importance

Congenital factor VII (FVII) deficiency is a rare coagulopathy that is inherited as an autosomal recessive trait; prevalence is estimated to be 1:500,000 [1]. Various symptoms are presented, the most common being epistaxis and menorrhagia [1]. Some patients are asymptomatic, but others have severe symptoms, such as hemarthrosis and central nervous system (CNS) bleeding. The severity of clinical symptoms is said to be unrelated to the coagulant activity level [2]. Several replacement therapies can be used for patients with congenital FVII deficiency, but recombinant activated factor VII (rFVIIa) is most favorably used. When a patient with congenital FVII deficiency requires surgical treatment, perioperative bleeding events are a concern. To avoid these post-operative complications, rFVIIa are commonly indicated, although the optimal dosage regimen for rFVIIa has not yet been clearly established. The amount and number of rFVIIa uses are determined based on the FVII activity level, there are several reports and theories on use of rFVIIa in the perioperative period [3,4]. We considered management of a patient with congenital FVII deficiency who underwent laparoscopic cholecystectomy.

The work has been reported in line with the SCARE criteria [5].

2. Case presentation

2.1. Present and past history

A 70-year-male with congenital FVII deficiency presented with right abdominal pain. Abdominal computed tomography (CT) showed three stones, all <5 mm, in the neck of the gallbladder (Fig. 1). Congenital FVII deficiency had been diagnosed in the preoperative examination for rectal cancer at age of 67. Abnormal coagulation values were indicated; prothrombin time (43.3 s: normal range 10.0–12.0 s) and prothrombin

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time-international normalized ratio (PT-INR) were prolonged (3.58: normal range 0.8–1.2) and activated partial thromboplastin time (APTT) and platelet count were within normal limits (29.6 s and 23.1 × 10^4 μl, respectively Table 1). In the value of coagulation factors, only FVII activity was shown to have significant decrease to 1.4%. The patient was not taking any drugs that inhibit FVII activity and did not have FVII inhibitor, so congenital FVII deficiency was therefore finally diagnosed. He previously underwent laparoscopic low anterior resection under appropriate perioperative management [6]. Past history other than congenital FVII deficiency included hypertension and chronic atrial fibrillation. He was medicated for hypertension.

2.2. Perioperative management

Laparoscopic cholecystectomy was required and we made a management plan that considered FVII activity and PT-INR was intraoperatively monitored and maintained more than 10% FVII activity [7].

At the start of surgery, FVII activity and PT-INR were 3.1% and 3.37, so 1 mg of rFVIIa was administered. After an administration of rFVIIa, both of these values improved to 325.0% and 0.73. Laparoscopic cholecystectomy was finished successfully (Fig. 2). There were no intraoperative difficulties such as unexpected bleeding or oozing. Operation time was 110 min and blood loss volume was 5 ml. Additional rFVIIa during the operation was not needed. When FVII activity and PT-INR was re-checked 6 h after the first administration of rFVIIa, the values were 23.9% and 1.53, respectively. Additional 1 mg of rFVIIa was used only once after the operation. The patient was discharged on the sixth day after surgery without postoperative complications. The whole perioperative course of PT-INR and FVII activity and timing of administration of rFVIIa are shown in Fig. 3.

3. Clinical discussion

Our patient had laparoscopic cholecystectomy and congenital FVII deficiency, and was successfully managed during the perioperative period using rFVIIa by monitoring FVII activity and PT-INR intraoperatively.

Half-life of rFVII is reported to be 4–6 h and the trough level is 10–15% [8]. In a surgical case of FVII deficiency, it was suggested to use 15–30 μg/kg rFVIIa before surgery and subsequently every 4–6 h in the first 24 h, then to increase the interval to 8–12 h [8].

In the previous surgery, this patient had undergone laparoscopic low anterior resection [6]. During the perioperative period, FVII activity and PT-INR were monitored. FVII activity was checked during surgery every 2 h to maintain FVII activity above 10%. At that time, he was intravenously administered rFVIIa before surgery. Intraoperative blood loss

Table 1
Laboratory data.

Value		(Unit)	Value		(Unit)
WBC	48.9	(10^2/μl)	AST	27	(IU/l)
RBC	480	(10^4/μl)	ALT	13	(IU/l)
Hb	13.9	(g/dl)	ALP	173	(IU/l)
Ht	43.0	(%)	T-bil	1.3	(mg/dl)
PLT	20.2	(10^4/μl)	D-bil	0.1	(mg/dl)
Neu	66.9	(%)	Cre	0.81	(mg/dl)
Eosin	4.7	(%)	eGFR	71.9	
Baso	0.6	(%)	BUN	16	(mg/dl)
Mono	7.8	(%)	Na	138	(mEq/l)
Ly	20.0	(%)	K	4.5	(mEq/l)
CRP	1.02	(mg/ml)	APTT	32.8	sec
CEA	2.9	(ng/ml)	PT (ratio)	≤25.0	(%)
CA19-9	14.6	(UA/ml)	PT-INR	3.79	
Alb	3.7	(g/dl)	HbA1c	6.1	(%)

WBC: white blood cell, RBC: red blood cell, Hb: hemoglobin, Ht: hematocrit, PLT: platelet, Neu: neutrophil, Eo: eosinophil; Baso: basophil; Mono: monocyte, Ly: lymphocyte, CRP: C-reactive protein, CEA: carcinoembryonic antigen, CA19-9: carbohydrate antigen 19-9, Alb: albumin, AST: aspartate aminotransferase, ALT: alanine aminotransferase, ALP: alkaline phosphatase, T-bil: total bilirubin, D-bil: direct bilirubin, Cre: creatinine, eGFR: estimated glomerular filtration rate, BUN: blood urea nitrogen, Na: natrium, K: kalium, APTT: activated partial thromboplastin time, PT: prothrombin time, PT-INR: International Normalized Ratio of Prothrombin Time, HbA1c: glycated hemoglobin.

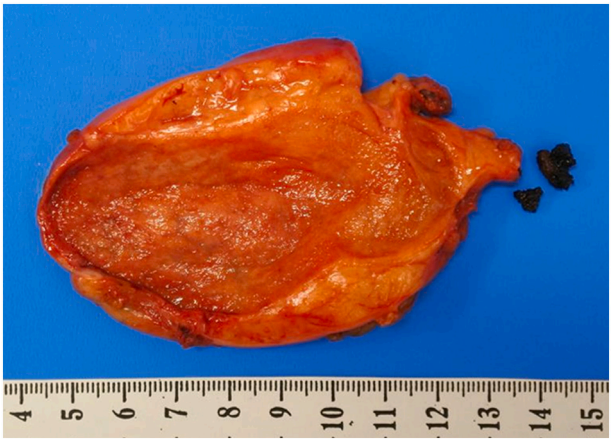


Fig. 2. Gross appearance of resected gallbladder.

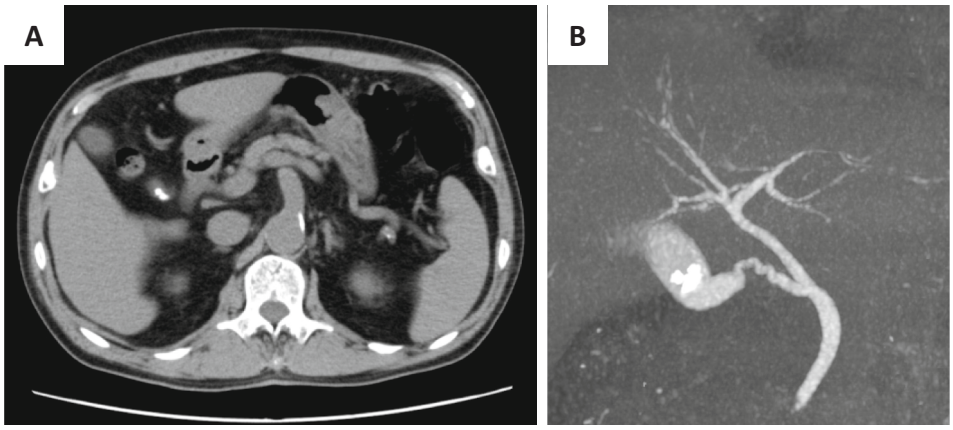
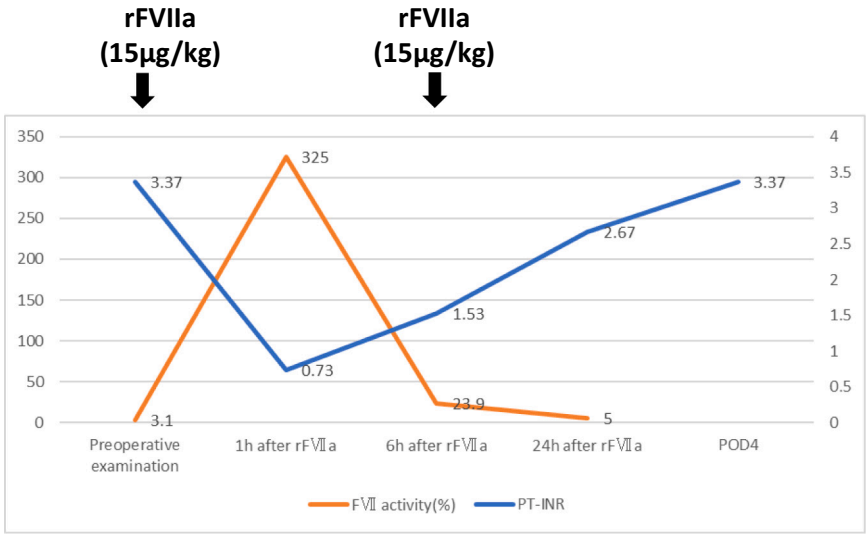


Fig. 1. A: Abdominal computed tomography (CT). There were three stones less than 5 mm in the neck of the gallbladder.
B: Drip infusion cholecystocholangiography-computed tomography (DIC-CT). There was no anatomical variation of the cystic duct.



	Preoperative examination	1h after rFVIIa	6h after rFVIIa	24h after rFVIIa	POD4
PT-INR	3.37	0.73	1.53	2.67	3.37
FVII activity (%)	3.1	325	23.9	5	NA

Table1. The course of PT-INR and FVII activity
PT-INR: Prothrombin Time International Normalized Ratio
POD: postoperative day
rFVIIa: recombinant activated FVII

Fig. 3. The dynamic results of Prothrombin Time International Normalized Ratio (PT-INR), FVII activity and the dose of recombinant activated FVII (rFVIIa) during the perioperative period.

was only 15 ml, operation time was 226 min and no blood transfusion was needed. On the second day after the surgery, however, the amount of drainage increased and the color of drain discharge became bloody, so additional rFVIIa was used.

As another dosing schedule, continuous infusion during surgery has been reported [9]. Although rFVII helped in preventing bleeding events during the perioperative period, it also risked side effects such as thrombus and the development of inhibitory antibodies [10]. Levi et al. reported that use of high dose rFVIIa in an on- and off-label basis increased the risk of arterial thromboembolic events [11]. Deciding the appropriate amount of rFVIIa by careful monitoring in the perioperative period is therefore necessary.

In our study, we planned to check FVII activity every 4–6 h and used rFVIIa to maintain FVII activity above 10%. We used rFVIIa only twice, and there were no bleeding events during the perioperative period. It is therefore necessary to evaluate optimal dose of rFVIIa based on the risk and surgical invasion for each case.

4. Conclusions

Our patient, who had congenital FVII deficiency, uneventfully underwent laparoscopic cholecystectomy. The optimal schedule of rFVIIa for patients with FVII deficiency should be considered.

Abbreviations

APTT activated partial thromboplastin time
PT prothrombin time
PT-INR Prothrombin Time International Normalized Ratio
POD postoperative day
rFVIIa recombinant activated FVII

Availability of data and materials

Not applicable.

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Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Study conception and design: TY, SH, MK.
Acquisition of data: TY, SH, MK.
Analysis and interpretation of data: TY, SH, MK.

Drafting of manuscript: TY, SH, MK.
Critical revision: TY, SH, MK, MU, SH, KO, MM, YK, MN, HY.
All authors read and approved the final manuscript.

Registration of research studies

Not applicable.

Guarantor

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Declaration of competing interest

The authors declare that they have no competing interests.

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