

Factors associated with perioperative complications in orthopedic surgery for patients with hemophilia

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Introduction and objectives

Intra-articular hemorrhage is one of the major symptoms of patients with hemophilia (PWH). Pain and limited motion of involved joints cause impairment of activity of daily living and quality of life of PWH. Orthopedic surgery is generally recommended if the conservative treatments prove to be ineffective. In recent years, it has become possible to perform orthopedic surgeries for PWH safely owing to the development of factor concentrates. However, perioperative infection rate in patients with hemophilia is still higher than patients without hemophilia due to hemorrhagic diathesis and viral infections. Moreover, there are several reports that suggest impaired wound healing. It is important to determine the frequency and risk factors for orthopedic surgeries for PWH, because it would become possible to make decisions for or against surgery and to inform patients of the possibility of risks appropriately.

The aim of this study was to investigate the rate of perioperative complications of orthopaedic surgery for PWH and identify the factors related to the occurrence of these complications.

Patients and methods

Patients

From 2006 to 2015, we performed 184 major orthopaedic surgeries for 100 PWH and other coagulation disorders in the Institute of Medical Science Research Hospital. We conducted a retrospective monocentric study examining clinical characteristics and outcome of these patients to identify risk factors for perioperative complications. Following data were collected from medical records: age, diagnosis, type of surgery, viral infection status, Child classification, blood test results at the time of surgery and perioperative complications. Investigated complications were patient's death, surgical site infection and delayed wound healing less than six months postoperatively.

Surgery and hemostatic treatment

All surgeries were performed by the same surgical team. Factor VIII or IX replacement therapy was administered to non-inhibitor patients by bolus and subsequent continuous infusion according to the department protocol; preoperatively, patients were given a bolus dose of clotting factor aiming for factor levels of 100%, followed by a continuous infusion of factor concentrate to maintain the levels at 80-100% for a several days according to the type of surgery. The bypassing agents, recombinant activated factor VII (rFVIIa, NovoSeven) or activated recombinant factor concentrate (FEIBA, Baxter) were used for hemophilia patients with inhibitors. No antithrombotic prophylaxis was used.

Statistical analysis

The effect of individual risk factors on postoperative complications was determined using a univariate analysis. Variables with a *p* value of less than 0.05 were included in the multivariate regression model evaluating for complications. Statistical significance was set at a *p* value of <0.05.

Results

From June 2006 to July 2015, 184 surgeries were performed in 100 patients in our institute. The main patients' characteristics are shown (Table I).

Table I

		Surgical cases
Gender	male	182
	female	2
Age	years (range)	41.0 (13-72)
Diagnosis	Hemophilia A (%)	142 (77.2)
	Hemophilia B (%)	40 (21.7)
	FVII deficiency (%)	1 (0.5)
	von Willebrand disease	1 (0.5)
	Surgery	THA or re-THA
	TKA or re-TKA	82
	TEA	2
	TAA	1
	AS	34
	others	42
Inhibitor	negative (%)	162 (88.0)
	positive (%)	22 (12.0)
Viral infection	HCV negative/HIV negative (%)	27 (14.7)
	HCV positive/HIV negative (%)	109 (59.2)
	HCV negative/HIV positive (%)	1 (0.5)
	HCV positive/HIV positive (%)	47 (25.5)
Previous infection	negative (%)	174 (94.6)
	positive (%)	10 (5.4)

Four patients died within six months postoperatively. Causes of death were chronic liver disease for two patients, acute myelogenous leukemia for one and suicide for one. Overall, the percentage of cases developing a postoperative infection was 12 cases (6.5%). There were 10 surgeries in patients with preexisting infection. Except for these cases, there were six postoperative surgical site infections. We defined these cases as new infection. Delayed wound healings were occurred in four cases

Univariate analysis identified presence of inhibitor as a significant risk factor for new infection (*p*= 0.024). Risk of delayed wound healing was significantly increased in patients with preoperative infection (*p*=0.003) and older age (*p*<0.001). Perioperative death was related to Child classification B or C, low preWBC, low preHb, low prePlt, high preGOT, high preALP and low preAlb (Table II).

Table II Risk for new infection Risk for delayed wound healing Risk for death

	p value	p value	p value
HBs positive	0.249	1.000	1.000
HCV positive	0.591	0.364	1.000
HIV positive	1.000	1.000	0.282
type of surgery	0.704	0.002	0.813
inhibitor	0.024	0.611	1.000
Child classification	1.000	1.000	0.009
diagnosis (hemophilia A/B)	1.000	1.000	0.153
preWBC	0.568	0.713	0.001
preHb	0.940	0.117	0.017
prePlt	0.208	0.822	0.014
preGOT	0.825	0.762	0.032
preGPT	0.465	0.182	0.827
preALP	0.148	0.241	0.000
preTP	0.057	0.001	0.081
preAlb	0.360	0.413	0.003
preCRP	0.614	0.055	0.823
age	0.474	<0.001	0.334
A/G ratio	0.773	0.213	0.068
preoperative infection		0.002	1.000

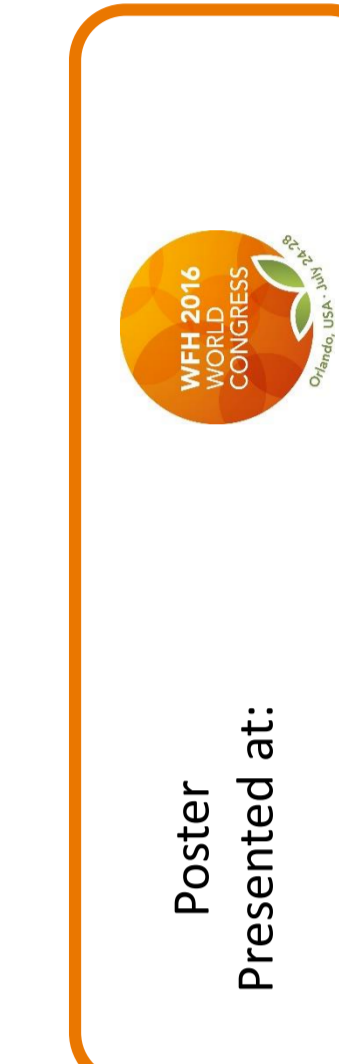
Multivariate logistic analysis showed that only independent risk factor for new infection was the presence of inhibitor (*p*=0.003), while risk factors for delayed wound healing were higher age (*p*=0.002), artificial joint (*p*=0.001) and high preAlb (*p*=0.012). HIV infection was not determined as a risk factor for any complications (Table III).

Table III

Risk for new infection	Risk for delayed wound healing		
	Odds ratio	95% CI	Adjusted p value
inhibitor	16.4	[2.6-102.6]	0.003
HIV positive	0.7	[0.1-6.7]	0.726
age	1.2	[1.1-1.3]	0.002
type of surgery (others)	28.9	[3.8-222.4]	0.001
preAlb	16.8	[1.9-151.1]	0.012
HIV positive	1.6	[0.2-13.1]	0.67

Conclusion

The presence of inhibitor was the most important risk factor for early infection in orthopedic surgery. In our study, HIV infection did not increase the risk of complications.



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Orthopedic issues
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