Do "Screening" Coagulation Tests Predict Bleeding in Patients Undergoing Fiberoptic Bronchoscopy With Biopsy?*

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Objective: To determine if preprocedure coagulation testing predicts bleeding in patients undergoing flexible fiberoptic bronchoscopy (FOB) with biopsy.
Design: Retrospective chart review.
Setting: Southeastern, urban Veteran Affairs Medical Center.
Measurements and main results: Two hundred seventy-four patient charts representing 305 FOB with biopsy were reviewed for clinical predictors of bleeding, prebronchoscopy laboratory abnormalities, and incidence of bleeding complications. Thirty-five patients bled, and 3 had abnormal results of coagulation studies. Normal results of coagulation studies and no clinical risk factors were noted in 68 percent of patients who bled.
Conclusion: Patients undergoing flexible FOB with biopsy do not benefit from preprocedure coagulation testing.
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aPTT=activated partial thromboplastin time; FOB=fiberoptic bronchoscopy; PT=prothrombin time

Key words: bleeding, bronchoscopy, screening

Routine coagulation studies are obtained in approximately 70 percent of patients undergoing flexible fiberoptic bronchoscopy (FOB).[1] In contrast, routine coagulation testing adds little predictive value in patients without clinical risk factors for bleeding as determined by routine history and physical examination in patients undergoing other invasive procedures.[1-8] These five clinical risk factors are as follows: (1) history of anticoagulant therapy; (2) history or physical evidence of liver disease, *eg*, hepatitis, cirrhosis, hepatomegaly, ascites, or jaundice; (3) history, family history, or physical evidence of bleeding tendencies, *eg*, prolonged, delayed, or excessive bleeding, ecchymosis, hematoma, purpura, or petechiae; (4) active bleeding and/or preoperative transfusion therapy; or (5) no reliable history available. Purported risk factors predisposing patients undergoing FOB with biopsy to bleeding complications include the following: mechanical ventilation at the time of biopsy, pulmonary hypertension, AIDS, history or physical evidence of liver disease, concurrent anticoagulation therapy, and renal dysfunction.[4,9] Unnecessary testing adds to the already high costs of health care.[10] The purpose of our study was to determine if routine measurement of prothrombin (PT) and activated partial thromboplastin (aPTT) times aided in predicting bleeding complications in patients undergoing FOB with biopsy.

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Methods

Patient data and procedures performed (transbronchial, Wang, or forceps biopsy) were obtained from the Pulmonary Service's log book at the McGuire Veteran's Hospital, a tertiary care referral center. Information recorded in the log book at the time of each bronchoscopy included estimate of bleeding. The pulmonary section has 2.6 full-time faculty and two fellows. Each patient's hospital record was reviewed for clinical risk factors for bleeding, purported risk factors from the pulmonary literature, screening laboratory data, and presence of postprocedural complications. Laboratory data collected included complete blood and platelet count, creatinine, PT, and aPTT. When multiple values were available, those most proximal to the procedure were used. For all prolonged PT or aPTT values, additional information concerning further testing or medication change was noted. (Abnormal values are PT>11.5 s and aPTT>39 s.) Patients without medical record evidence of a history and physical examination or bronchoscopy report were excluded.

The severity of bleeding was quantitated according to standard definitions: minimal (<20 ml hemorrhage), moderate (20 to 100 ml), and significant (>100 ml). Local vasoconstrictor therapy (norepinephrine, lidocaine), emergent intubation, or transfusion was also noted.

χ^2 analysis was used to test the previously identified variables for their ability to predict bleeding complications using $p<0.05$ as significant.

Results

Four hundred sixty FOBs with biopsy were performed from 1983 to 1991. One hundred sixteen charts (25 percent) were not located, and 59 charts (17 percent) did not contain the required information (bronchoscopy report, history, and physical examination). Seventeen percent of patients were missing PT/aPTT values, 7 percent hemoglobin, 15 percent platelets, and 11 percent creatinine; they were excluded during the subset portions of the analysis. Prolonged coagulation studies were present in 28 (10 percent) patients, abnormal hemoglobin (<14 g/dl)

Table 1—*Prevalence of Bleeding Among 28 Patients With Abnormal Coagulation**

	Bleeding	
	Yes	No
Coagulation values		
Prolonged	3	25
Not prolonged	28	190

*Totals less than 305 due to missing laboratory data.

in 81 (30 percent), creatinine >1.5 g/dl in 24 (9 percent), and platelets <130,000 in 9 (3 percent). At least one of the five clinical risk factors for potential bleeding complications was found in 61 patients (22 percent); 70 percent had signs of liver disease.

Two hundred seventy-four patient charts representing 305 FOBs with biopsy were reviewed for clinical predictors for bleeding, prebronchoscopy laboratory abnormalities, and incidence of bleeding complications. Thirty-five patients bled, giving an overall prevalence of 11 percent. Prevalence of bleeding amongst the 28 patients with abnormal coagulation was only 11 percent (3/28) (Table 1) and the prevalence of bleeding among patients with clinical risk factors was 11 percent (7/61) (Table 2). Of the 31 patients who experienced bleeding, only three (10 percent) had abnormal results of coagulation tests whereas of the 215 patients not experiencing bleeding, 25 (12 percent) had abnormal results of coagulation tests. Patients undergoing FOB with biopsy do not benefit from preprocedure coagulation testing as neither coagulation testing nor perceived clinical risk factors predict any more than chance alone which patients will bleed with the procedure.

Fifty-five percent of patients experienced mild, 42 percent moderate, and 3 percent significant bleeding. Patients experiencing the most bleeding were not in the group having abnormal results of coagulation tests. Bleeding stopped spontaneously in 67 percent of the patients whereas an additional 22 percent received vasoconstrictor therapy and an additional 11 percent underwent lavage and/or suction.

As expected, the presence of clinical risk factors was a statistically significant predictor for abnormal coagulation studies ($\chi^2=8.88$, $p<0.005$) (Table 3). Bleeding complications were not significantly predicted by presence of clinical risk factors (Table 2), purported pulmonary risk factors, type of biopsy, cancerous lesions, abnormal coagulation, platelet, hemoglobin, or creatinine values. Sixty-eight percent of the patients who bled had normal results of coagulation studies and no clinical risk factors.

Table 2—*Prevalence of Bleeding Among Patients With Clinical Risk Factors*

	Bleeding	
	Yes	No
Clinical risk factor		
Yes	7	54
No	28	216

Discussion

Routine preoperative testing for patients without clinically evident risk factors for bleeding is a low-yield, high-priced tactic. In a study of 1,000 medical and surgical patients, 82 percent of abnormal aPTT results were found in patients with predictable risk factors such as liver disease, anticoagulant therapy, malabsorption, and certain hereditary disorders.[3] In another study of 480 surgical and obstetric/gynecologic patients without indications for bleeding abnormality, 13 (2.7 percent) had an abnormal aPTT, and only 1 had significant bleeding (thought to be related to surgical technique rather than a bleeding disorder).[4] A variety of other studies confirm these conclusions.[5,6]

The incidence of bleeding after FOB with biopsy is reported as 1 to 4 percent, but can be as high as 25 percent in immunocompromised patients and 45 percent in uremic patients.[11] Risk factors include pulmonary hypertension (15 percent bleeding complication rate), thrombocytopenia (15 percent), mechanical ventilation (20 percent), coagulation disorders, and AIDS.[9] Cordasco et al[12] noted that the degree of bleeding was related to biopsy type with transbronchial greater than endobronchial biopsy. The majority of bleeding in their series resolved spontaneously.

Our retrospective chart review applied clinical risk factors to determine if they predicted abnormal coagulation values and, in turn, bleeding complications. We found risk factors predicted abnormal coagulation values, but not bleeding complications. No other parameter, including cancerous lesions, reliably predicted a postbronchoscopy bleeding complication. The reasons may have more to do with biopsy technique than patient characteristics. Patients undergoing surgery have multiple tissue planes incised for prolonged periods of time. In contrast, FOB with biopsy using either a needle, Wang technique, or forceps does not physically disrupt enough tissue to

Table 3—*Presence of Clinical Risk Factors**

	Clinical Risk Factor	
	Yes	No
Coagulation values		
Prolonged	14	14
Not prolonged	48	170

*Totals less than 305 due to missing laboratory data.

cause significant bleeding in most instances. Finally, prophylactic phenylephrine (Neo-Synephrine, Sanofi Winthrop, New York), sometimes used routinely by bronchoscopists, may stem bleeding.

There are a number of weaknesses in a study of this type. The retrospective design did not allow us to examine those patients excluded from biopsy solely because of abnormal coagulation values. We were unable to review 116 patient charts (44 percent). Because most bleeding was non-life-threatening, we have no other proxy (*ie*, blood bank, ICU records) to try to capture or compare these lost patients to the study patients. We did not use "blinded" reviewers but in the majority of patients the laboratory data were identified before reading the bronchoscopy report and identification of bleeding complications. We also had a low number of mechanically ventilated patients, patients with AIDS, and patients with pulmonary hypertension which could account for a beta (type 2) error. We probably overestimated the number of bleeding episodes in our patient population. Pulmonary fellows in the early part of their training are more likely to overestimate the significance of bleeding than more skilled and mature bronchoscopists (personal communication, David Allan Listello, MD, May 1993). Despite these potential biases, we believe this study provides important and original information to physicians evaluating patients for bronchoscopy and potential biopsy.

We recommend no preprocedure routine laboratory testing of patients undergoing FOB with biopsy since it does not identify patients at risk of bleeding. We did validate that certain risk factors identified by the history and physical examination (liver disease, anticoagulant medications, malabsorption, known or suspected bleeding disorder) did predict those patients with abnormal coagulation values.

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