

SCREENING COAGULATION STUDIES

When & when *NOT* to do
them

SCREENING TESTS

- No perfect test
- Most laboratory tests designed to be confirmatory rather than screening
- Most initial studies of laboratory tests done on populations with a high disease prevalence
- Assumes there is a screening process done prior to obtaining laboratory test

SCREENING TESTS

Perfect Test

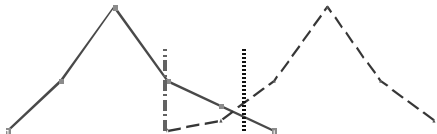
- Cheap
- Easy to do
- Perfectly discriminates positives from negatives

SCREENING TESTS

Prerequisites

- False negative rate virtually 0 (specificity virtually 100%), or
- Findings of positives need to trigger confirmatory workup
- Ideally, finding of positive, if confirmed should trigger change in therapy

SCREENING TESTS



- Changing cutoff points changes sensitivity & specificity
- Unless you change the technology, cannot change sensitivity without also changing specificity

COAGULATION TESTING

? Screening

- Clearly laboratory essential for diagnosis of coagulation abnormalities
- ? - Can laboratory pick out patients at risk for bleeding with procedures better than history/physical
- What tests are potentially useful as screening tests?

COAGULATION TESTING
Prerequisites for Screening Tests

- Cover broad range of potential abnormalities
- Sensitive to clinically significant problems of pro- & anti-coagulant proteins
- Can lead to other confirmatory tests to look for abnormalities
- Accurate at predicting who is at risk for problems

COAGULATION TESTING
Screening Tests

- PT needed to measure extrinsic pathway
- aPTT needed to measure intrinsic pathway
- Bleeding time only true measure for platelet function
- It was assumed (based on no data) that these tests would predict who would bleed

COAGULATION TESTING
Potential Screening Tests

- PT
- aPTT
- Fibrinogen
- Thrombin Time
- Bleeding Time
- Problems with hypercoagulation disorders
- All of above have been extensively used for screening purposes

COAGULATION TESTING
Screening - Bleeding Time

- Bioassay
- Make measured incision in forearm of skin, not over visible blood vessel, under constant hydrostatic pressure
- Blood *gently* aspirated from area every 30 seconds, via capillary action
- Measure time to stop bleeding
- Difficult to standardize
- Requires trained technician

COAGULATION TESTING
Screening Tests - Duplicate Tests

- Thrombin time dependent on fibrinogen, so this is duplicative
- Clinically significant hypofibrinogenemia picked up by PT & aPTT

COAGULATION TESTING
Bleeding Time

- Amount of pressure makes large difference in bleeding time (standard is 40 mm Hg; more reproducible at 80 mm Hg, but most cannot tolerate this)
- If platelet plug disrupted, results prolonged
- If incision not precise, results vary
- If incision horizontal rather than vertical, results vary
- If vein incised, results prolonged

COAGULATION TESTING

Screening - Bleeding Time

- Useful for assessing platelet function in patients with bleeding disorders; however
- Even with trained technician, bleeding times NOT predictive of who will bleed at procedures, even when markedly prolonged, because false positive rate MUCH too high

COAGULATION TESTING

Screening - PT/aPTT

- PT
 - Mix 2 parts patient's plasma (platelet poor), 1 part of Tissue factor/Phospholipid combination; then add calcium & measure time to clot
 - Measures extrinsic pathway
 - Very sensitive to factor VII levels

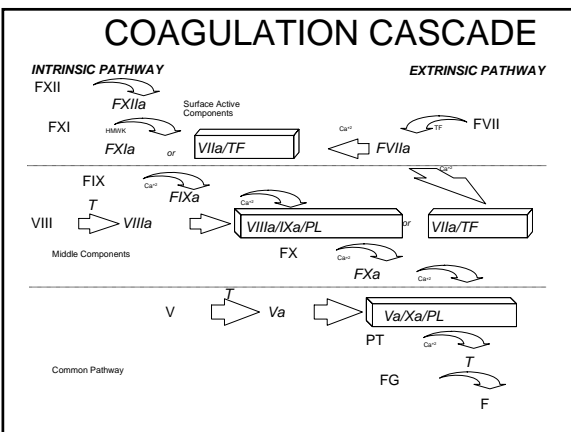
BLEEDING TIME AS SCREENING TEST

DON'T USE IT!!!!

COAGULATION TESTING

Screening - PT/aPTT

- aPTT
 - Add 2 parts patient's platelet-poor plasma, 1 part of combination of phospholipid & negatively charged surface active agent; then add calcium & measure time to clot
 - Measures intrinsic pathway
 - Sensitive to upper factors (XII, XI,) more than lower factors
- Unlike bleeding time, these tests are sensitive to bleeding problems in the hemostatic range



COAGULATION TESTING

Screening - PT/aPTT

- These have continued to be extensively used to assess those at risk for bleeding, without testing whether they are useful for that purpose
- Became engrained that all patients having procedures, and eventually all hospital admissions, should have screening PT/aPTT measurements
- As assays became automated, this became trivial to do

COAGULATION TESTING
Screening PT/aPTT

- Pediatrics never adopted this practice, & they had little-no bleeding problems with procedures
- Who is at risk for bleeding?
 - Patients with congenital/acquired/familial bleeding disorders
 - Patients on anticoagulants
 - Patients with liver disease
- If these groups eliminated, the pickup rate for screening PT/aPTT studies drops to < 0.5%!!!

COAGULATION TESTING
Who should get screening coags?

- Those at risk of bleeding
 - Patients with congenital bleeding disorders
 - Patients with positive family history of bleeding
 - Patients on anticoagulants
 - Patients presenting with bleeding or thrombotic disorders
 - Patients being placed on anticoagulants
 - Patients with significant liver disease or alcoholism

COAGULATION TESTING
Screening PT/aPTT

- At this rate of prevalence, positive predictive value drops to minuscule levels
- Even though clotting assays are excellent measures of clotting process in general, there are falsely positive tests, & in populations with low disease prevalence, false positives overwhelm true positives

COAGULATION TESTING
Who shouldn't get screening coags?

- Hospital admissions except as above
- Preoperative patients unless they fit one of the above categories
- Preprocedure patients unless they fit one of the above categories

COAGULATION TESTING
Screening PT/aPTT

- Why is this important?
 - Screening tests trivial in price, but
 - Confirmatory tests are not
 - Time lost in chasing false positives is problematic
 - Delay in diagnosis/procedure often not worth the time to chase down results of tests

COAGULATION TESTING
Historical assessment of those at risk

- History of bleeding problems in the family
- History of spontaneous bleeding
- History of heavy menses
- History of easy bruising
- History of prior blood transfusion
- History of prior tooth extractions
- History of prior surgery/pregnancy