REVIEW ARTICLE

Idiopathic Thrombocytopenic Purpura: A Practice Guideline Developed by Explicit Methods for The American Society of Hematology


IDIOPATHIC thrombocytopenic purpura (ITP, also known as primary immune thrombocytopenic purpura) is a hematologic disorder for which appropriate diagnostic and treatment strategies are uncertain. In 1994, the American Society of Hematology (ASH) established a panel to produce explicitly developed practice guidelines for the diagnosis and management of ITP. "Explicitly developed." evidence-based practice guidelines, which are being issued increasingly by medical specialty societies, combine a critical appraisal of scientific evidence with practice recommendations that state clearly to what extent the guidelines are based either on published scientific evidence or opinion (eg, clinical experience).1-4 More details about the clinical practice guideline movement are provided elsewhere.5-7

This report begins with a brief summary of the panel’s recommendations, followed by a more detailed analysis of its methodology, the findings of the comprehensive literature review, and a full presentation of the recommendations. The report concludes with recommendations for future research. As explained later, the recommendations are based on the panel’s opinion, derived from a systematic scoring methodology. (Only recommendations receiving scores of 1.0 to 3.0 or 7.0 to 9.0, as defined later in the text, are cited in this summary.)

SUMMARY OF RECOMMENDATIONS

Children

Diagnosis

The diagnosis of ITP is based principally on the history, physical examination, complete blood count, and examination of the peripheral smear, which should exclude other causes of thrombocytopenia. Further diagnostic studies (see Table 7) are generally not indicated in the routine work-up of patients with suspected ITP, assuming that the history, physical examination, and blood counts are compatible with the diagnosis of ITP and do not include atypical findings that are uncommon in ITP or suggest other etiologies. Patients with risk factors for human immunodeficiency virus (HIV) infection should be tested for HIV antibody, and an abdominal computed tomographic (CT) scan or ultrasound examination is appropriate in patients with suspected splenomegaly on initial physical examination. Bone marrow aspiration should be performed to establish the diagnosis in patients with persistent thrombocytopenia (lasting more than 6 to 12 months) and in those unresponsive to intravenous Ig (IVIg), but it should not be performed to establish the diagnosis before initiating IVIg therapy. Additional testing is also generally unnecessary, and sometimes inappropriate, when performed on a routine basis to establish the diagnosis before splenectomy or to evaluate patients who have not responded to glucocorticoid therapy, IVIg, and splenectomy (see Table 7).

Treatment

Children with platelet counts >30,000 should not be hospitalized and do not routinely require treatment if they are asymptomatic or have only minor purpura; they should not be given glucocorticoids, IVIg, or anti-Rh(D) as routine initial treatment. Children with platelet counts <20,000 and significant mucous membrane bleeding and those with counts <10,000 and minor purpura should be treated with specific regimens of IVIg or glucocorticoids (see text). Patients with severe, life-threatening bleeding should be hospitalized and receive conventional critical care measures, along with treatment for ITP: appropriate regimens include high-dose parenteral glucocorticoid therapy, IVIg, and platelet transfusions.

Splenectomy is clearly appropriate or inappropriate in specific clinical situations (see text). If an elective splenectomy is planned, appropriate preoperative therapy includes prophylactic IVIg therapy for patients with platelet counts

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<30,000, and IVIg, parental glucocorticoids, and anti-Rh(D) for patients with platelet counts <10,000. Inappropriate preoperative prophylaxis includes IVIg, oral glucocorticoid therapy, or anti-Rh(D) when platelet counts exceed 50,000, parenteral glucocorticoid therapy when platelet counts exceed 30,000, and platelet transfusions when platelet counts exceed 20,000.

When ITP symptoms persist after primary treatment (glucocorticoid, IVIg) and splenectomy, further treatment is indicated in children with platelet counts <30,000 who have active bleeding. Panel members suggested many treatments as reasonable options but did not reach consensus on any single regimen, reflecting the lack of evidence that any single treatment is more effective than another.

Adults

Diagnosis

The diagnosis of ITP is based principally on the history, physical examination, complete blood count, and examination of the peripheral smear, which should exclude other causes of thrombocytopenia. Further diagnostic studies (see Table 7) are generally not indicated in the routine work-up of patients with suspected ITP, assuming that the history, physical examination, and blood counts are compatible with the diagnosis of ITP and do not include atypical findings that are uncommon in ITP or suggest other etiologies. Patients with risk factors for HIV infection should be tested for HIV antibody. Bone marrow aspiration is appropriate to establish the diagnosis in patients over age 60 and in patients considering splenectomy. Additional testing is also generally unnecessary, and sometimes inappropriate, when performed on a routine basis to establish the diagnosis before splenectomy or to evaluate patients who have not responded to glucocorticoid therapy and splenectomy (see Table 7). Preoperative thyroid function testing is appropriate to rule out occult hyperthyroidism or hypothyroidism before elective splenectomy.

Treatment

Patients with platelet counts >20,000 should not be hospitalized if they are either asymptomatic or have only minor purpura. Patients with counts >50,000 do not routinely require treatment; they should not be given glucocorticoids or IVIg as routine initial treatment. IVIg is also inappropriate as initial treatment in patients with counts >30,000 who are asymptomatic or have only minor purpura. However, treatment is indicated in patients with platelet counts <20,000 to 30,000, and those with counts <50,000 and significant mucous membrane bleeding (or risk factors for bleeding, such as hypertension, peptic ulcer disease, or a vigorous lifestyle). Initial therapy with glucocorticoids (eg, prednisone) is appropriate in such patients. Hospitalization is appropriate for patients with platelet counts <20,000 who have significant mucous membrane bleeding. Patients with severe, life-threatening bleeding should also be hospitalized and should receive conventional critical care measures, along with treatment for ITP: appropriate regimens include high-dose parenteral glucocorticoid therapy, IVIg, and platelet transfusions.

Splenectomy is clearly appropriate or inappropriate in specific clinical situations (see text). It should not be performed as initial therapy in patients who have no bleeding, minor purpura, or even mucous membrane bleeding. In a patient who has had bleeding symptoms (eg, epistaxis, menorrhagia), splenectomy is often appropriate if platelet counts remain below 30,000 after 4 to 6 weeks of medical treatment. If an elective splenectomy is planned, appropriate preoperative therapy includes prophylactic IVIg or oral glucocorticoid therapy for patients with platelet counts <20,000. Inappropriate preoperative prophylaxis includes IVIg, oral or parenteral glucocorticoid therapy, and anti-Rh(D) when platelet counts exceed 50,000, and platelet transfusions when platelet counts exceed 10,000.

When ITP symptoms persist after primary treatment (glucocorticoid) and splenectomy, further therapy is recommended in patients with platelet counts <30,000 who have active bleeding. The most commonly recommended first-choice treatment options include IVIg, glucocorticoids, accessory splenectomy, and no additional treatment, but other agents may also be appropriate (see text). Women with ITP who are of childbearing age and have counts <10,000 after splenectomy and other treatments should be discouraged from becoming pregnant.

Pregnant Women

Diagnosis

The diagnosis of ITP during pregnancy generally does not require special laboratory testing (see Table 7). The patient’s blood pressure should be measured to rule out preeclampsia as an alternative diagnosis; liver function testing is also appropriate. Patients with risk factors for HIV infection should be tested for HIV antibody.

Treatment

Recommendations for pregnant women are different from other adults in some situations. Pregnant women with ITP and platelet counts >50,000 do not routinely require treatment and should not receive glucocorticoids or IVIg as routine initial treatment. Women with counts of 30,000 to 50,000 in the first or second trimester also should not receive routine initial treatment. Treatment is required for women with platelet counts <10,000, and for those with platelet counts of 10,000 to 30,000 who are in their second or third trimester or are bleeding. IVIg is appropriate initial treatment for women with platelet counts <10,000 in the third trimester, and for those with counts of 10,000 to 30,000 who are bleeding. In pregnant women who have failed glucocorticoid and IVIg therapy, splenectomy is appropriate in the second trimester in women with platelet counts <10,000 who are bleeding. Splenectomy should not be performed in asymptomatic pregnant women with platelet counts >10,000.

As labor and delivery approach, women with ITP do not require testing for maternal platelet antibodies. Percutaneous umbilical vein blood sampling (PUBS) or fetal scalp vein sampling to measure the fetal platelet count and predict the risk of neonatal bleeding are not necessarily required. PUBS and fetal scalp vein sampling are unnecessary in pregnant
women without known ITP even with platelet counts as low as 40,000 at term. Women with ITP should be delivered by cesarean section in selected circumstances (see text). In general, assuming the fetal platelet count (and the platelet count of previous babies) is unknown, cesarean section is not indicated when the maternal platelet count is >50,000. If the fetal platelet count is known, cesarean section is appropriate if the fetal count is <20,000. A maternal platelet count of >50,000 is considered sufficient to prevent complications from excessive maternal bleeding at vaginal delivery or cesarian section. Prophylactic platelet transfusions before delivery are appropriate in women with counts <10,000 who (1) have a planned cesarean section or (2) have epistaxis or other mucous membrane bleeding and are expected to deliver vaginally, but are unnecessary in women with platelet counts >30,000 and no bleeding symptoms.

Newborns (of Mothers With ITP)

Diagnosis

The neonatal platelet count should generally be measured for 3 to 4 days after birth. Brain imaging (eg, ultrasound) should be performed if the platelet count at birth is <20,000; brain imaging is also appropriate if the count is 20,000 to 50,000, even in the absence of neurologic abnormalities.

Treatment

In newborns without evidence of intracranial hemorrhage (ICH), treatment with IVIg is appropriate if the infant’s platelet count is <20,000. Newborns with platelet counts of 20,000 to 50,000 do not necessarily require IVIg treatment. Newborns with counts >50,000 should not be treated with IVIg or glucocorticoids. Newborns with imaging evidence of ICH should be treated with combined glucocorticoid and IVIg therapy if the platelet count is <20,000; they should not be treated with glucocorticoids alone. Women with ITP should not be discouraged from breast feeding.

METHODOLOGY FOR GUIDELINE DEVELOPMENT

Topic Selection and Objectives

The ASH selected ITP because of the frequency with which it is encountered by hematologists and because of uncertainty regarding the relative effectiveness and safety of current diagnostic tests and treatments. Although there are no reliable epidemiologic data on the incidence of ITP, estimates are that 10 to 125 per 1,000,000 persons (children and adults) develop ITP each year. The goal of the panel was to issue explicitly developed recommendations, based as much as possible on published, scientific evidence, regarding the diagnosis and treatment of patients with known or suspected ITP.

Panel Composition

The 15-member panel included 13 hematologists selected to represent the ASH membership. The hematologists included both university-affiliated physicians with research interests in ITP and private practitioners. Panel members represented both pediatric and adult medicine perspectives. The panel also included two members with expertise in clinical epidemiology and practice guideline methodology.

Definition of Target Condition

The panel defined ITP as isolated thrombocytopenia with no clinically apparent associated conditions or other causes of thrombocytopenia (eg, HIV infection, systemic lupus erythematosus, lymphoproliferative disorders, myelodysplasia, agammaglobulinemia or hypogammaglobulinemia, drug-induced thrombocytopenia, alloimmune thrombocytopenia, congenital/hereditary nonimmune thrombocytopenia). No specific criteria establish the diagnosis of ITP; the diagnosis relies on the exclusion of other causes of thrombocytopenia. For purposes of this review, the panel excluded from consideration patients with clinically apparent coexisting conditions that can cause immune thrombocytopenia (eg, systemic lupus erythematosus). Patients with isolated abnormalities on serologic tests (eg, antinuclear or antiphospholipid antibodies) but without a clinically evident disorder such as systemic lupus erythematosus were not excluded because positive serologic tests are frequently encountered in patients with typical ITP. However, the panel recognized that patients with thrombocytopenia and an associated autoimmune disease may have an illness comparable to ITP.

Literature Search

A computerized search of the MEDLINE database, performed in April 1994, sought English-language articles published between 1966 and 1994. Search terms (Medical Subject Headings) included: "THROMBOCYTOPENIA," "PLATELET COUNT," "AUTOIMMUNE THROMBOCYTOPENIC PURPURA," "COMPLETE BLOOD COUNT," "BONE MARROW EXAMINATION," "RETICULOCYTE COUNT," "ANTINUCLEAR ANTIBODY TEST," "IGG," "DIAGNOSIS (SH)," and "THERAPY (SH)." The database was also searched on the text word "ITP." The computerized search retrieved 581 articles. This initial reference list underwent substantial expansion after being supplemented with relevant articles from the files of panel members, publications from 1989 through 1995 retrieved with alternate search software ("Reference Update"), and cross-checking against the bibliographies of retrieved articles to identify additional publications (especially those published before 1966). Case reports, case series of less than five patients, review articles, and letters-to-the-editor without primary data were excluded from review. Statements in this report about the number of studies that have examined the efficacy of specific treatments and statements that "no published evidence is available" do not include case reports and other categories of inadmissible evidence.

Literature Review and Assessment of Evidence

Each article was evaluated independently by two panel members (J.N.G., G.E.R.) to assess scientific validity and verify results. Scientific validity was assessed using published guidelines. Literature on the clinical course of ITP was evaluated for the presence of an inception cohort of
strongest

completed by 11 panel members, and questions relating to
not be performed. Questions relating to adult patients were
was defined as a test or treatment that should be performed;
over 1,300 clinical scenarios. In these surveys, “Necessary”
necessity and appropriateness of diagnosis or treatment in
diatric and adult sections, asked respondents to measure the
assess quantitatively the opinion and strength of consensus
which no evidence is available, and for issues on diagnosis
of the panel, and these data provide the basis for statements
about opinion in the text and tables. The survey instruments
were designed at panel meetings in which members were
asked to identify the key diagnostic and treatment practices
for which opinion would be assessed. The appropriateness
of these practices was intentionally not discussed at the
meeting to avoid influencing the responses by the opinions
of more assertive panel members. A 41-page questionnaire
addressing these practices was mailed to panel members in
1994 to be completed independently, without discussion with
one another. The questionnaire, which included separate pe-
diatric and adult sections, asked respondents to measure the
necessity and appropriateness of diagnosis or treatment in
over 1,300 clinical scenarios. In these surveys, “Necessary”
was defined as a test or treatment that should be performed;
“Appropriate” was defined as a test or treatment that may
or may not be necessary, but performing it is not wrong;
“Unnecessary” was defined as a test or treatment that need
not be performed, but is not necessarily inappropriate; “In-
appropriate” was defined as a test or treatment that should
not be performed. Questions relating to adult patients were
completed by 11 panel members, and questions relating to
pediatric patients were completed by six respondents. A sec-
ond, 25-page questionnaire was circulated in early 1995 to
examine opinions regarding pregnancy and newborn care
and to clarify opinions regarding issues identified in the 1994
survey. The 1995 survey examined over 600 issues and was
completed by 13 panel members.

Using a modified RAND scoring system,16,17 the question-
naire asked panelists to quantify the strength of their opinion
on a 1 to 9 scale; “9” represented strong agreement with
the appropriateness/necessity of the practice and “1” repre-
sented strong disagreement. The mean response for each
question provided an overall assessment of the panel’s opin-
ion regarding the necessity and appropriateness of specific
practices. Panel votes are presented in this report only when
there was agreement among the panel regarding the necessity
or appropriateness of an intervention (mean panel score of
7.0 to 9.0) or agreement that the intervention is unnecessary
or inappropriate (mean panel score of 1.0 to 3.0).

The strength of the panel’s inter-observer agreement about
the appropriateness/necessity of tests or treatments was
graded using the standard deviations (SDs) for responses
to each question (Table 2). Panel responses were classified as
category A (“Complete or Almost Complete Unanimity”),
for example, if the variance in panel member responses to
a specific question was more than two SDs below the mean
variance. Thus, a score of “1.5, A” signified strong
agreement among the panel that the intervention is unneces-

Assessment of Opinion

Most of the literature on the treatment of ITP consists of
case series without a control group (level V). For those ther-
apies for which only level V evidence is available, or for
which no evidence is available, and for issues on diagnosis
that have not been addressed by clinical studies, the opinion
of the panel was assessed. Survey instruments were used to
assess quantitatively the opinion and strength of consensus
of the panel, and these data provide the basis for statements
about opinion in the text and tables. The survey instruments
were designed at panel meetings in which members were
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<thead>
<tr>
<th>Level of Evidence</th>
<th>Study Design</th>
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<td>I Strongest</td>
<td>Randomized trials with low false-positive and false-negative errors.</td>
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<tr>
<td>II</td>
<td>Randomized trials with high false-positive and false-negative errors.</td>
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<tr>
<td>III</td>
<td>Nonrandomized studies with concurrent control group.</td>
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<tr>
<td>IV</td>
<td>Nonrandomized studies with historical control group.</td>
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<tr>
<td>V Weakest</td>
<td>Case series without a control group.</td>
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</table>

Data from refs 11, 12, and 14.

consecutive patients, an explicit referral pattern, complete
follow-up, and use of objective outcome criteria. The term
“inception cohort” refers to a group of patients identified
at an early and uniform point in the course of their disease
so that patients who die or completely recover are included
with patients in whom the disease persists. Most of the ITP
literature reviewed in this report pertains to therapy. The
strength of the evidence for individual therapeutic ap-
proaches was assessed using the “level of evidence” criteria
outlined in Table 1.15,14 Evidence tables in the Results section
only present data from level I and level II studies.

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<table>
<thead>
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<th>Score</th>
<th>Definition</th>
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<td>1.0-3.0</td>
<td>“Inappropriate” or “unnecessary” (depending on question).</td>
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<tr>
<td>3.01-6.99</td>
<td>Uncertain appropriateness or necessity.</td>
</tr>
<tr>
<td>7.0-9.0</td>
<td>“Appropriate” or “necessary” (depending on question).</td>
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Consensus Codes†

A “Complete or almost complete unanimity” (panel variance more than 2 SD below the mean variance).
B “Strong agreement” (panel variance 1 to 2 SD below the mean variance).
C “Moderate agreement” (panel variance less than 1 SD below the mean variance).
D “Moderate disagreement” (panel variance less than 1 SD above the mean variance).
E “Strong disagreement” (panel variance greater than 1 SD above the mean variance).

* Represents mean panel score for response to questions asking for ranking of appropriateness/necessity on a scale of “1” to “9,” with “1” representing most “inappropriate/unnecessary” and “9” representing most “appropriate/necessary.” Separate scores were ob-
tained for appropriateness and necessity by asking separate, individ-
ually worded questions. “Necessary” = test should be performed,
“Appropriate” = test may or may not be necessary, but performing it is not wrong, “Unnecessary” = test need not be performed (but is not necessarily inappropriate), “In appropriate” = test should not be performed.

† Strength of agreement among the panel members about appro-
priateness/necessity, ie, the variance of responses around the mean
panel score.
establish the diagnosis of ITP, the mean panel score (on a scale of 1 to 9) was 5.3. However, the range of opinion on the panel was wide (category "E"), with one cluster of panel members labeling the practice as inappropriate and another considering it appropriate (Fig 1). Figure 1 also illustrates that scores for necessity are lower than for appropriateness. The results also illustrate trends in opinion across different clinical scenarios. For example, Fig 2 presents mean panel scores in response to a question about the appropriateness of not initiating specific treatment for ITP in children with various platelet counts. A trend of opinion is clear but agreement among the panel is not strong except at the highest platelet counts. At the lowest and highest platelet counts there is a consensus for inappropriateness (mean score <3) and appropriateness (mean score >7), respectively, for withholding initial treatment. Although these views reflect opinion more than science, the panel believes that a structured approach to defining and expressing its opinion is more precise and less subject to bias than arriving at recommendations through open discussion, in which decisions are more likely to be influenced by the opinions of more assertive panel members.

**Recommendations**

In almost all aspects of ITP level I evidence is lacking, and there are few level II, III, or IV studies to allow firm, evidence-based recommendations. In general, only level V evidence, or no studies, were available for making recommendations. Therefore, the panel issued recommendations based on opinion, indicating the mean panel score and variance to permit readers to judge the strength of the consensus. Although the sample sizes of voting members were small and some confidence intervals for panel votes were wide, the results can help readers assess the strength of opinion behind specific recommendations. The basis of recommendations is explicitly labeled in the text so that reader can appreciate which recommendations are based on evidence and which are based on opinion. The inherent weakness of opinion-based recommendations is acknowledged; these recommendations should not form the basis for definitive decisions on health care policy. Indications for which the panel could
not reach consensus (scores of 3.1 to 6.9) are generally not listed in the text; thus, recommendations frequently address only the "extremes" of inappropriate and appropriate practice and do not comment on intermediate clinical scenarios that may be common. The fact that the panel did not reach consensus regarding these indications does not necessarily signal the appropriateness or inappropriateness of clinicians' decisions to administer tests or treatments in these settings.

This practice guideline describes a range of approaches to the diagnosis and management of ITP. Its recommendations are not intended to serve as inflexible rules, and they are not all inclusive of all proper methods of care or other methods of care that may achieve similar results. Adherence to the guideline will not ensure a successful outcome in every case. The ultimate judgment regarding the care of a particular patient should be made by the physician in light of the clinical data and circumstances presented by the patient and the diagnostic and treatment options available.

Peer Review

Before the final panel meeting, the report was independently reviewed by eight private practice and university-based hematologists with expertise in adult and/or pediatric ITP (Drs Neil Abramson, Jacksonville, FL; Barbara Alving, Washington, DC; Diana Beardsley, New Haven, CT; Jack Levin, San Francisco, CA; Joan Parkhurst, Oklahoma City, OK; Graham Pineo, Calgary, Alberta, Canada; Gary Ratkin, St Louis, MO; Samuel Silver, Ann Arbor, MI).

RESULTS

ITP in Children

Clinical Course

A critical issue in caring for children with ITP is determining which patients require treatment, either at the time of diagnosis or in the management of chronic disease. To make informed management decisions, prognostic information is needed to predict (1) how platelet counts will respond, with or without therapy, (2) likely health outcomes without treatment, and (3) whether early response to intervention reduces the incidence of adverse outcomes.

Evidence. There have been no large prospective studies which assembled an inception cohort of children with ITP and followed the clinical course of untreated patients to document the incidence of clinically important bleeding and mortality. Data on the clinical course of untreated ITP in children come from two types of evidence: (1) case series in which selected children with ITP were not treated and were followed to document the incidence of spontaneous remission, clinically important bleeding, and mortality, and (2) data from untreated control groups in relatively small, brief randomized clinical trials evaluating the effectiveness of alternative treatments. The case-series data are summarized in Table 3.

The best data on untreated disease come from two series in which about 75% of patients were not treated initially. Most patients had platelet counts <50,000 at presentation, and in one of the reports most had platelet counts <20,000. Of the 221 untreated children, 2 (0.9%) had fatal bleeding associated with the acute presentation, and 191 (87%) had a complete remission from ITP. The platelet count normalized in 2 to 8 weeks, with one half to two thirds of the patients recovering within 4 weeks.

There are limitations to the inferences that can be drawn from these data. First, 25% of the inception cohort in each series were selected for treatment. If clinicians treated patients with the most serious clinical presentations, then the clinical course in the remaining patients may underestimate the frequency of important bleeding and mortality, and may overestimate the rate of spontaneous remission. However, even if it is assumed that patients selected for treatment would not have had a spontaneous remission, then the "least frequent" estimate of the probability of complete spontaneous remission is 191 of 298 (64%). Second, 7% to 14% of patients were lost to follow-up, some of whom may have suffered a relapse of ITP, with bleeding complications or death. In the remaining series in Table 3, the children selected to be followed without treatment represented only 10% to 56% of the inception cohort; patients with more severe clinical presentations were generally treated. Thus, the untreated patients in Table 3 may represent a select population with mild to moderate symptoms who may have a more favorable prognosis than the average child with ITP.

Further information about clinical course in children presenting with severe thrombocytopenia is provided by the control groups of prospective randomized studies. In one illustrative study, 53 patients, each of whom had platelet counts <20,000 and purpuric symptoms, were randomly assigned to treatment (IVIg or oral prednisone) or no treatment. Among the 16 children who received no treatment, platelet counts increased to >20,000 in a median of 4 days (range, 1 to 132 days) and to >50,000 in a median of 16 days (range, 2 to 132 days). Chronic ITP (defined as a platelet count <150,000 for more than 6 months) occurred in 3 of the 16 patients (19%, 95% confidence interval, 4% to 46%).

Only limited observational data are available regarding the complications of intracranial hemorrhage. In a review of 14 children with intracranial hemorrhage, Woerner et al reported that 4 died and 2 others may have had neurologic sequelae. Of the 30 children with intracranial hemorrhage described in this report and the references in Table 3, 12 (40%) occurred within the first 12 days after diagnosis, including 2 patients with a history of head trauma. The intracranial hemorrhages in the other 18 patients occurred between 1 month and 5 years after diagnosis, typically after glucocorticoids and splenectomy failed to induce a remission. At least 24 of these 30 patients were reported before 1981, when IVIg therapy was initially described.

Unlike ITP in adults, persistent thrombocytopenia is uncommon in children. In the 12 case series in Table 3, 10 defined chronic disease as 6 months of thrombocytopenia and 2 studies defined it as 12 months. In the 12 series, ITP resolved in 1,207 (76%) of the 1,597 children who were followed for these time periods. Features of the presenting illness that were associated with an increased risk of chronic persistent thrombocytopenia included a history of purpura for more than 2 to 4 weeks before diagnosis, female sex, age over 10 years, and a higher platelet count.
at presentation.22 The fate of children with chronic ITP is uncertain, although about one third appear to have spontaneous remissions several months to many years after diagnosis.33,36

Diagnosis

Few clinical studies have evaluated the sensitivity and specificity of the diagnostic tests used for children with suspected ITP, because in the absence of a "gold-standard" test for ITP the diagnosis is based only on the presence of thrombocytopenia with no other apparent cause. Other etiologies are uncommon: in a study of 127 consecutive children with suspected ITP who had bone marrow aspirations, other causes of thrombocytopenia were identified in only 5 (4%) children, all of whom had atypical presenting features.37 Therefore, in the absence of additional scientific evidence on the accuracy or effectiveness of diagnostic tests for ITP, the panel’s recommendations regarding the history, physical examination, laboratory tests, and special procedures are based entirely on opinion.

Directed history and physical examination. By definition, the diagnosis of ITP cannot be made without a compatible history and physical examination that excludes other causes of thrombocytopenia. The most likely alternate causes vary with the age of the child. For example, many case series exclude infants less than 4 to 6 months old in part because neonatal alloimmune or autoimmune thrombocytopenia cannot be ruled out at this age. The most important elements of the history and physical examination identified by the panel are presented in Table 4. The maternal and birth history are especially relevant when evaluating infants. The presence of congenital anomalies in the patient or family members may be a clue for congenital thrombocytopenia, an important consideration in children with persistent thrombocytopenia.38

Although the essential elements of the physical examination of children and adults with ITP are generally the same, one difference may be the presence of splenomegaly, which may be slightly more common in children, especially in infants. Data from six case series suggest that the spleen may be palpable in 12% of children with ITP.18,19,22,24,25,27 However, this may reflect the greater incidence of palpable spleens in children in general, which is estimated to be about 10%.39

Complete blood count with examination of the peripheral blood smear. A complete blood count and an examination of the peripheral blood smear are essential in ITP. The principal features of the examination of the blood smear that were identified by the panel are the same for children and adults (Table 5). Although most patients with ITP present with platelet-related bleeding, the condition may be first detected by the incidental discovery of thrombocytopenia on routine blood counts. Because ITP is defined by a low platelet count without another apparent cause, the clinician must know the normal values for the laboratory. Aside from thrombocytopenia, the blood counts of patients with ITP should be normal or otherwise readily explained by a coincident disorder (eg, thalassemia minor). The presence of platelet clumps suggests pseudothrombocytopenia (see Adult section, below). Ane-
resulting from chronic thrombocytopenia, but this is uncommonly associated with other diseases. Lymphocytosis or eosinophilia, if present, may be caused by bleeding or iron deficiency anemia, although some children with ITP may have atypical morphologies in their blood cell counts.

White blood cell morphology should be carefully examined, as it is uncommonly altered in ITP or suggests other disease etiologies. For example, a direct antiglobulin test, which the panel did not reach consensus on, should be performed in patients with a typical presentation of ITP and do not include atypical findings.

Other laboratory data. Recommendations regarding other laboratory tests were derived from opinion by a questionnaire completed by six panel members (see text above). The recommendations assume that the history, physical examination, and initial blood counts and smear are compatible with the diagnosis of ITP and do not include atypical findings that are uncommon in ITP or suggest other disease etiologies. For example, a direct antiglobulin test, which the panel did not recommend for patients with a typical presentation of ITP, may be appropriate if the peripheral smear shows red blood cell polychromatophilia with poikilocytosis and schistocytes. Indicators for which the panel did not reach consensus (score of 3.1-6.9) are not listed in the text but are summarized in Table 6.

The panel reached consensus that six diagnostic tests were unnecessary in the routine evaluation of children presenting with suspected ITP, and that an additional 12 tests were both unnecessary and inappropriate (Table 7). Recommendations that diagnostic tests are “inappropriate” refer to performing them on all patients at presentation. Testing for HIV antibody was considered necessary (8.7, B), and appropriate (9.0, A), in patients with risk factors for HIV infection. An abdominal CT scan or ultrasound examination was considered appropriate (8.2, B) in patients with suspected splenomegaly on initial physical examination. Bone marrow aspiration was considered both appropriate and necessary to establish the diagnosis in patients with persistent thrombocytopenia (> 6 to 12 months) (7.0, D) and in patients unresponsive to IV Ig (8.2, B). However, the panel concluded that it is neither necessary (1.3, B) nor appropriate (2.7, C) to perform a bone marrow aspiration to establish the diagnosis of ITP before initiating IV Ig therapy. The test is also unnecessary (3.0, C) to establish the diagnosis in patients who require more than an initial course of IV Ig or to allay parental anxiety.

The panel also reached consensus regarding testing in the following specific clinical situations:

1. To establish the diagnosis before splenectomy: Tests that the panel considered unnecessary for this purpose included platelet antigen-specific antibody assay (2.0, C), abdominal CT scan or ultrasound (2.0, C), and serum Ig level (3.0, D). Tests that the panel considered unnecessary and inappropriate included (scores are for appropriateness): serum complement level (1.8, C), chest x-ray (2.5, C), thyroid function studies (2.5, D), platelet survival study (2.5, D), and platelet-associated IgG assay (2.7, C).

2. To establish the diagnosis in patients who have failed to respond to glucocorticoid therapy, IV Ig, and splenectomy: Tests that the panel considered unnecessary for this purpose included platelet-associated IgG assay (1.2, A), platelet antigen-specific antibody assay (2.0, C), and abdominal CT scan or ultrasound (2.8, C), platelet survival study (2.8, D), lupus anticoagulant or antiphospholipid antibody (3.0, C), and thyroid function testing (3.0, D). Tests that the panel considered unnecessary and inappropriate included chest x-ray (2.2, C) and serum complement level (2.5, D) (scores are for appropriateness).

Treatment

Essentially all evidence regarding the efficacy of treatment of ITP is indirect, inferred by measuring a surrogate outcome.

Table 4. Principal Elements of the History and Physical Examination in a Child With Suspected ITP

<table>
<thead>
<tr>
<th>History</th>
<th>Physical examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding symptoms</td>
<td>Bleeding signs</td>
</tr>
<tr>
<td>Type of bleeding</td>
<td>Type of bleeding (including retinal hemorrhages)</td>
</tr>
<tr>
<td>Severity of bleeding</td>
<td>Severity of bleeding</td>
</tr>
<tr>
<td>Liver, spleen, and lymph nodes</td>
<td>Liver, spleen, and lymph nodes</td>
</tr>
<tr>
<td>Evidence for infection</td>
<td>Evidence for infection</td>
</tr>
<tr>
<td>Presence of dysmorphic features suggestive of congenital disorder, including skeletal anomalies, auditory acuity</td>
<td>Presence of dysmorphic features suggestive of congenital disorder, including skeletal anomalies, auditory acuity</td>
</tr>
<tr>
<td>Specific Congenital Syndromes to Exclude</td>
<td>Specific Congenital Syndromes to Exclude</td>
</tr>
<tr>
<td>Fanconi syndrome</td>
<td>Fanconi syndrome</td>
</tr>
<tr>
<td>Thrombocytopenia-absent radius</td>
<td>Thrombocytopenia-absent radius</td>
</tr>
<tr>
<td>Wiskott-Aldrich syndrome</td>
<td>Wiskott-Aldrich syndrome</td>
</tr>
<tr>
<td>Alport syndrome (and its variants)</td>
<td>Alport syndrome (and its variants)</td>
</tr>
<tr>
<td>Bernard-Soulier syndrome</td>
<td>Bernard-Soulier syndrome</td>
</tr>
<tr>
<td>May-Hegglin anomaly</td>
<td>May-Hegglin anomaly</td>
</tr>
<tr>
<td>Gray platelet syndrome</td>
<td>Gray platelet syndrome</td>
</tr>
</tbody>
</table>

Table 5. The Peripheral Blood Smear in ITP

<table>
<thead>
<tr>
<th>Consistent with the diagnosis of ITP</th>
<th>1. Thrombocytopenia. Platelets are normal in size or may appear larger than normal, but consistently giant platelets (approaching the size of red blood cells) should be absent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not consistent with the diagnosis of ITP</td>
<td>1. Predominant giant platelets.</td>
</tr>
<tr>
<td></td>
<td>2. Red blood cell poikilocytosis, schistocytes, polychromatophilia (unless response to bleeding), macrocytes, nucleated red blood cells.</td>
</tr>
<tr>
<td></td>
<td>3. Leukocytosis or leukopenia, with immature or abnormal cells (although atypical lymphocytes and eosinophilia may occur in children with ITP).</td>
</tr>
</tbody>
</table>
To establish the diagnosis in all patients at presentation

- ANA (a), direct antiglobulin (a), HIV (a), bone marrow (a), platelet antigen-specific antibody, mean platelet volume, reticulocyte count

To establish the diagnosis before splenectomy

- ANA, direct antiglobulin, lupus anticoagulant/APLA, abdominal CT/ultrasound (a), serum immunoglobulins (a), platelet antigen-specific antibody

To establish the diagnosis in patients who fail to respond to primary treatment (eg, glucocorticoid) and splenectomy

- ANA, direct antiglobulin, lupus anticoagulant/APLA, abdominal CT/ultrasound (a), serum immunoglobulins, platelet-associated IgG, platelet antigen-specific antibody, platelet survival, thyroid function

Other tests of uncertain appropriateness: ANA, to establish the diagnosis in pregnant and nonpregnant women; lupus anticoagulant/APLA, to establish the diagnosis in women at presentation (a) and pregnant women; abdominal CT/ultrasound, for suspected splenomegaly on physical examination in children (n) and adults; HIV, in adult patients with no risk factors for HIV infection; thyroid function, to rule out thyroid disease in all patients at presentation (a) and before elective splenectomy (n).

Recommendations. In the absence of evidence, the opinion of the panel was that hospitalization is appropriate for a child with severe, life-threatening bleeding, regardless of the platelet count (<20,000), and for a child with a platelet count of <20,000 and mucous membrane bleeding that may require clinical intervention (8.2, C). Hospitalization is inappropriate for a child with a platelet count of 20,000 to 30,000 who is asymptomatic (2.8, D) or for a child with a platelet count >30,000 who is either asymptomatic or has only minor purpura (1.0 to 1.5, B) (Table 8). Indications for hospitalization under intermediate conditions are less clear. Hospitalization may also be appropriate for children with platelet counts <20,000 who may be inaccessible or noncompliant (8.2, B) or whose parents request hospitalization (7.0 to 7.4, B).

Emergency Treatment

Evidence. Although there are no published data on the efficacy of different treatments for the management of children with urgent, life-threatening bleeding, evidence regarding the morbidity and mortality associated with severe hemorrhage from thrombocytopenia is extensive.18,33,45

Recommendations. The opinion of the panel was that the serious consequences of severe, life-threatening bleeding justify the use of several regimens. Assuming that conventional critical care measures are already underway, there was strong agreement (9.0, A) among panel members that appropriate interventions include platelet transfusions, high-dose parenteral glucocorticoid (eg, 30 mg/kg methylprednisolone daily for 3 days), and IVIg, either alone or in combina-
Adulst  

Pregnant women  

Table 7. Tests That Are Unnecessary/Inappropriate to Establish the Diagnosis of ITP in All Patients at Presentation (Based on Opinion of Panel)  

<table>
<thead>
<tr>
<th>Unnecessary and Inappropriate (Mean Panel Score for Appropriateness, Consensus Code)</th>
<th>Unnecessary, But May be Appropriate (Mean Panel Score for Necessity, Consensus Code)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children</strong></td>
<td></td>
</tr>
<tr>
<td>Platelet antigen-specific antibody (1.3, B)</td>
<td>Platelet survival study (1.0, A)</td>
</tr>
<tr>
<td>Mean platelet volume (1.8, B)</td>
<td>Chest x-ray (1.0, A)</td>
</tr>
<tr>
<td>Bone marrow (2.0, B)</td>
<td>Abdominal CT or ultrasound (1.0, A)</td>
</tr>
<tr>
<td>HIV test (2.0, B)</td>
<td>Coagulation studies (1.2, A)</td>
</tr>
<tr>
<td>Antinuclear antibody (2.0, C)</td>
<td>Serum complement level (1.7, C)</td>
</tr>
<tr>
<td>Direct antiglobulin test (2.5, C)</td>
<td>Lupus anticoagulant/APLA (2.0, C)</td>
</tr>
<tr>
<td></td>
<td>Bleeding time (2.0, C)</td>
</tr>
<tr>
<td></td>
<td>Platelet-associated IgG assay (2.2, C)</td>
</tr>
<tr>
<td></td>
<td>Platelet survival study (2.4, C)</td>
</tr>
<tr>
<td></td>
<td>Abdominal CT/ultrasound (2.6, D)</td>
</tr>
<tr>
<td></td>
<td>Serum chemistry profile* (2.7, D)</td>
</tr>
<tr>
<td></td>
<td>Urinalysis (2.8, D)</td>
</tr>
<tr>
<td></td>
<td>Serum immunoglobulin level (3.0, D)</td>
</tr>
<tr>
<td><strong>Adults</strong></td>
<td></td>
</tr>
<tr>
<td>Lupus anticoagulant/APLA (1.8, B)</td>
<td>Bleeding time (1.7, C)</td>
</tr>
<tr>
<td>Platelet antigen-specific antibody (1.7, C)</td>
<td>Platelet survival study (2.4, C)</td>
</tr>
<tr>
<td>Direct antiglobulin test (2.1, B)</td>
<td>Serum complement (2.6, D)</td>
</tr>
<tr>
<td></td>
<td>Abdominal CT/ultrasound (2.6, D)</td>
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<tr>
<td></td>
<td>Platelet-associated IgG assay (2.3, D)</td>
</tr>
<tr>
<td></td>
<td>Serum chemistry profile* (2.7, D)</td>
</tr>
<tr>
<td></td>
<td>Urinalysis (2.8, D)</td>
</tr>
<tr>
<td></td>
<td>Serum immunoglobulin level (3.0, D)</td>
</tr>
<tr>
<td>Reticulocyte count (2.6, D)</td>
<td></td>
</tr>
<tr>
<td>Urinalysis (2.6, C)</td>
<td></td>
</tr>
<tr>
<td>Thyroid function tests (2.9, D)</td>
<td></td>
</tr>
<tr>
<td><strong>Pregnant women</strong></td>
<td>None</td>
</tr>
<tr>
<td>Platelet antibody (1.4, B)</td>
<td></td>
</tr>
<tr>
<td>Serum fibrin D-dimer (2.4, D)</td>
<td></td>
</tr>
<tr>
<td>PT/PTT (2.6, C)</td>
<td></td>
</tr>
<tr>
<td>Lupus anticoagulant/APLA (2.9, D)</td>
<td></td>
</tr>
<tr>
<td>Uric acid (2.9, D)</td>
<td></td>
</tr>
</tbody>
</table>

Tests of uncertain appropriateness/necessity are listed in Table 6.  
* Including LDH, BUN, creatinine, and liver function tests.
days then tapered\textsuperscript{22-28} (level I evidence); and (3) 10 to 30 mg/kg/d of oral or IV methylprednisolone for several days\textsuperscript{25-57} (level II, III, V evidence). Because ITP in children is typically self-limited, the duration of treatment was limited in many studies to 21 days. Initial reports used 2 mg/kg/d, comparable to the adult dose, but more recent studies have used 4 mg/kg/d, which is well-tolerated because the duration of treatment is short. In recent studies,\textsuperscript{32-46} the dose of 4 mg/kg/d was continued for only 7 days and the dose was then tapered and discontinued on day 21. Several studies using very high doses (10 to 50 mg/kg/d of methylprednisolone for 3 to 7 days) suggest that platelet count recovery is as rapid as that seen with IVIg,\textsuperscript{52,55-57} but similar findings have also been reported with a dose of 4 mg/kg/d for the first 7 days.\textsuperscript{32,46}

The potential adverse effects of glucocorticoid therapy include all of the signs and symptoms of hypercortisolism in Cushing syndrome, including facial swelling, weight gain, hyperglycemia, hypertension, cataracts, and behavioral abnormalities. The toxicities of glucocorticoids are dose and duration dependent. Glucocorticoid therapy may increase the risk of growth retardation in children.\textsuperscript{59}

Recommendations. There is level I evidence that children with acute ITP and severe thrombocytopenia experience more rapid recovery of platelets if given glucocorticoids, but it is unknown if this influences morbidity or mortality. There is also inadequate evidence of the efficacy of glucocorticoids in other patient categories (less severe thrombocytopenia, chronic ITP) to develop definitive recommendations based on the data. The opinion of the panel was that in patients with platelet counts <50,000 it is appropriate (7.0 to 8.4, B-D) to treat severe, life-threatening bleeding initially with high-dose oral (eg, prednisone, 4 to 8 mg/kg/d) or parenteral (eg, methylprednisolone, 30 mg/kg/d) glucocorticoid. High doses of oral glucocorticoid are also appropriate as initial therapy for children with mucous membrane bleeding and platelet counts <20,000 (7.6, C) and for those with minor purpura and platelet counts <10,000 (7.0, D). The panel considered glucocorticoids inappropriate (1.0 to 2.2, A-C) as initial therapy for children with platelet counts >30,000 and no symptoms or only minor purpura (Table 8). Treatment for the sole purpose of determining responsiveness or confirming the diagnosis was considered inappropriate for high-dose parenteral glucocorticoids in patients with platelet counts >10,000, for conventional-dose oral glucocorticoids in patients with platelet counts >20,000, and for high-dose oral glucocorticoids in patients with platelet counts >30,000 (1.0 to 2.8, A-D). When oral glucocorticoids are used, level I studies suggest that the regimens of 1.5 or 2 mg/kg/d for 14 to 21 days,\textsuperscript{30,46,47} 60 mg/m\textsuperscript{2}d for 21 days,\textsuperscript{31} or 4 mg/kg/d for 7 days, followed by a tapering dose until day 21,\textsuperscript{32,46} are more effective than no treatment. These regimens have not been compared with each other, and some may be more effective than others in rapidly reaching a platelet count that may reduce the risk of serious hemorrhage.

IVIg

Evidence. Clinical trials of IVIg therapy for ITP are summarized in Table 9. One level I study has shown that initial IVIg treatment of children with acute ITP increases the platelet count more rapidly than no specific treatment and than glucocorticoid therapy.\textsuperscript{32} Five level V studies\textsuperscript{34,60-62} suggest that IVIg will increase the platelet count substantially in a majority of patients, although some do not respond. Less than 10% of patients with chronic ITP have sustained, normal platelet counts without further treatment; in others thrombocytopenia recurs in several weeks to several months. No controlled data clarify whether these occasional prolonged responses without further treatment are different from those that would be observed in untreated children. Repeated treatments with IVIg may sustain platelet counts at a level of >20,000 to 30,000 and be useful to avoid splenectomy. For both acute and chronic ITP, there is no evidence that treatment with IVIg diminishes mortality or morbidity.

The first reported IVIg regimen was 0.4 g/kg daily for 5 consecutive days. Subsequent studies suggested that 1 g/kg for 1 day\textsuperscript{64} or 0.4 g/kg/d for 2 days\textsuperscript{69} may be sufficient in most responding patients. Recently, a randomized trial showed that a single dose of 0.8 g/kg achieves the same results as the former regimen with less cost and possibly fewer side effects.\textsuperscript{48}

Adverse effects of IVIg are common (15% to 75%) but generally mild, including headache, backache, nausea, and fever.\textsuperscript{72,65} Aseptic meningitis may occur.\textsuperscript{66} Rare reported complications include alloimmune hemolysis\textsuperscript{67} and hepatitis C infection.\textsuperscript{68-71} No hepatitis C has been reported with viral inactivated products. Other complications have been reported in adults (see below).

Recommendations. There is level I evidence that children with acute, previously untreated ITP experience more rapid recovery of platelets with IVIg than with glucocorticoids or no specific therapy, but it is unclear whether this enhancement of platelet recovery influences bleeding or mortality or if there are circumstances in which the disadvantages of IVIg might outweigh its benefits. There is inadequate evidence regarding the efficacy of IVIg in other patient categories to develop definitive recommendations based on data. The opinion of the panel was that, regardless of the platelet count, it is appropriate (7.3 to 8.8, A-D) to treat severe, life-threatening bleeding initially with IVIg. IVIg was also considered appropriate as initial therapy for children with platelet counts <10,000 and minor purpura (1 g/kg for 1 day, 7.2, D) and for children with platelet counts <20,000 and mucous membrane bleeding (7.8 to 8.3, B). In all categories, a dose of 1 g/kg administered on 1 day received higher panel ratings (7.2 to 8.8, A-D) than a total dose of 2.0 g administered over 2 to 5 days (6.4 to 8.2, B-D). IVIg was considered appropriate initial treatment in children with platelet counts below 20,000 in whom inaccessibility or noncompliance is a concern (7.6 to 8.7, B-C). The panel considered IVIg inappropriate (1.0 to 1.2, A) in children with platelet counts >30,000 who are asymptomatic or have only minor purpura (Table 8).

Anti-Rh(D)

Evidence. One level I trial\textsuperscript{48} (Table 9) compared anti-Rh(D) to IVIg and glucocorticoid as initial therapy in patients with acute ITP and platelet counts <20,000 at presen
### Table 8. Panel Opinion Regarding Initial Treatment Options in Children

<table>
<thead>
<tr>
<th>Treatment Options</th>
<th>Platelet Count &lt;20,000</th>
<th>Platelet Count 20-30 $\times 10^9$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appropriate (mean panel scores 7-9)</td>
<td>Appropriate (mean panel scores 7-9)</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>No treatment*, hospitalization, conventional-dose oral glucocorticoid, High-dose oral glucocorticoid, IVlg (1 g/kg $\times$ 1 d), IVlg (total dose of 2 g/kg given over 2-5 d), anti-D</td>
<td>No treatment (2.5 D)</td>
</tr>
<tr>
<td><strong>Minor purpura</strong></td>
<td>IVlg (1 g/kg $\times$ 1 d), (7.2, D)</td>
<td>Convention-dose oral glucocorticoid, high-dose parenteral glucocorticoid, anti-D</td>
</tr>
<tr>
<td>Mucous membrane bleeding that may require clinical intervention</td>
<td>IVlg (1 g/kg $\times$ 1 d) (8.3, B) Hospitalization, (8.2, C) IVlg (total dose of 2 g/kg given over 2-5 d), (7.8, B) High-dose oral glucocorticoid, (7.6, C)</td>
<td>No treatment (1.0 A)</td>
</tr>
<tr>
<td>Severe, life threatening bleeding</td>
<td>Hospitalization (9.0, A) IVlg (1 g/kg $\times$ 1 d) (6.8, A-B) High-dose parenteral glucocorticoid (8.0-8.4, B-C) IVlg (total dose of 2 g/kg given over 2-5 d), (7.8, C) High-dose oral glucocorticoid (7.0-7.4, C-D)</td>
<td>Convention-dose oral glucocorticoid therapy, anti-D</td>
</tr>
</tbody>
</table>
Table 8 (Cont’d). Panel Opinion Regarding Initial Treatment Options in Children

<table>
<thead>
<tr>
<th>Platelet count 30-50 × 10⁶</th>
<th>Appropriate (mean panel scores 7-9)</th>
<th>Appropriateness Uncertain (mean panel scores 3.1-6.0)</th>
<th>Inappropriate (mean panel scores 1-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>No treatment (9.0, A)</td>
<td>IVlg (total dose of 2 g/kg given over 2-5 d) (1.0, A)</td>
<td>IVlg (total dose of 2 g/kg given over 2-5 d) (1.0, A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IVlg (1 g/kg × 1 d) (1.2, A)</td>
<td>IVlg (1 g/kg × 1 d) (1.2, A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anti-D (1.2, A)</td>
<td>Anti-D (1.2, A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-dose parenteral glucocorticoid (1.2, B)</td>
<td>High-dose parenteral glucocorticoid (1.2, B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospitalization (1.5, B)</td>
<td>Hospitalization (1.5, B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-dose oral glucocorticoid (2.0, C)</td>
<td>High-dose oral glucocorticoid (2.0, C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conventional-dose oral glucocorticoid (2.0, C)</td>
<td>Conventional-dose oral glucocorticoid (2.0, C)</td>
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<td></td>
<td></td>
<td>IVlg (total dose of 2 g/kg given over 2-5 d) (1.0, A)</td>
<td>IVlg (total dose of 2 g/kg given over 2-5 d) (1.0, A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IVlg (1 g/kg × 1 d) (1.2, A)</td>
<td>IVlg (1 g/kg × 1 d) (1.2, A)</td>
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<tr>
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<td></td>
<td>Anti-D (1.2, A)</td>
<td>Anti-D (1.2, A)</td>
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<td></td>
<td></td>
<td>High-dose parenteral glucocorticoid (1.2, B)</td>
<td>High-dose parenteral glucocorticoid (1.2, B)</td>
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<td></td>
<td></td>
<td>Hospitalization (1.5, B)</td>
<td>Hospitalization (1.5, B)</td>
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<td>High-dose oral glucocorticoid (2.2, C)</td>
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<td>IVlg (1 g/kg × 1 d) (1.2, A)</td>
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<td>Anti-D (1.2, A)</td>
<td>Anti-D (1.2, A)</td>
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<td>High-dose parenteral glucocorticoid (1.2, B)</td>
<td>High-dose parenteral glucocorticoid (1.2, B)</td>
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<td></td>
<td></td>
<td>Hospitalization (1.5, B)</td>
<td>Hospitalization (1.5, B)</td>
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<tr>
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<td></td>
<td>High-dose oral glucocorticoid (2.2, C)</td>
<td>High-dose oral glucocorticoid (2.2, C)</td>
</tr>
<tr>
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<td></td>
<td>Conventional-dose oral glucocorticoid (2.2, C)</td>
<td>Conventional-dose oral glucocorticoid (2.2, C)</td>
</tr>
<tr>
<td>Mucous membrane bleeding</td>
<td>Hospitalization, conventional-dose</td>
<td>High-dose oral glucocorticoid, high-dose oral glucocorticoid, IVlg (1 g/kg x 1 d), IVlg (total dose of 2 g/kg given over 2-5 d)</td>
<td>No treatment (2.0, B)</td>
</tr>
<tr>
<td>that may require clinical</td>
<td>oral glucocorticoid, high-dose IVlg (1 g/kg x 1 d), IVlg (total dose of 2 g/kg given over 2-5 d)</td>
<td>High-dose parenteral glucocorticoid (2.8, D)</td>
<td>High-dose parenteral glucocorticoid (2.8, D)</td>
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<tr>
<td>intervention</td>
<td></td>
<td>Anti-D (3.0, D)</td>
<td>Anti-D (3.0, D)</td>
</tr>
<tr>
<td>Severe, life-threatening</td>
<td>Conventional-dose oral glucocorticoid</td>
<td>No treatment (1.0, A)</td>
<td>No treatment (1.0, A)</td>
</tr>
<tr>
<td>bleeding</td>
<td></td>
<td>Anti-D (3.0, D)</td>
<td>Anti-D (3.0, D)</td>
</tr>
</tbody>
</table>

“Appropriate” and “Not appropriate” = mean panel score of 7.0-9.0 or 1.0-3.0, respectively. “Appropriate” = treatment may or may not be necessary, but performing it is not wrong. “Inappropriate” = treatment should not be performed. Mean panel score is graded on a scale of “1” to “9” with “1” representing high appropriateness and “9” representing high appropriateness. Letter codes following panel scores reflect strength of agreement, the panel consensus (defined by standard deviation) around the mean panel score. “A” = complete or virtual unanimity, “B” = strong agreement, “C” = moderate agreement, “D” = moderate disagreement, “E” = strong disagreement (see Table 4).

* “No treatment” implies careful observation. In patients with major risk factors for bleeding (eg, elevated blood pressure, ulcer disease, vigorous lifestyle), not treating is considered inappropriate in all patients if the platelet count is 20-30 × 10⁶ (2.3 C), 10-20 × 10⁶ (1.3, B) or <10 × 10⁶ (1.0, A). Not treating patients less than 3 years of age is also considered inappropriate if the platelet count is 10-20 × 10⁶ (1.6, B) or less than 10 × 10⁶ (2.4, B).

† Eg, 1-2 mg/kg/d of prednisone.
‡ Eg, 4-8 mg/kg/d of prednisone.
§ Eq, 30 mg/kg/d of methylprednisolone.
|| Anti-D given intravenously.
† These recommendations were made only for patients with platelet counts <10,000.

The time required to increase platelet counts to >20,000 and >50,000 was slightly longer with anti-Rh(D) than with glucocorticoid or IVIg therapy. There are no level I or II data comparing anti-Rh(D) treatment to no treatment, nor is there evidence regarding the effectiveness of anti-Rh(D) in reducing mortality or morbidity from bleeding. Four level V studies²⁵-⁷⁵ suggest that anti-Rh(D) may increase the platelet count in about 80% of children with acute and chronic ITP, and that repeated treatments may postpone the need for splenectomy, but the responses are generally transient, lasting a median time of 5 weeks.

The only clinically important adverse effect of anti-Rh(D) appears to be alloimmune hemolysis. All Rh(D)+ patients develop a positive direct antiglobulin test after treatment,
<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Population</th>
<th>N</th>
<th>Age</th>
<th>Follow-up</th>
<th>Randomized Treatment Arms</th>
<th>Outcome Measure</th>
<th>Platelet Count</th>
<th>Bleeding Symptoms</th>
<th>Adverse Effects</th>
<th>Evidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>McWilliams and Maurer†54</td>
<td>27</td>
<td>6 y (mean)</td>
<td>NR</td>
<td>NR</td>
<td>Prednisone (2 mg/kg/d × 21 d)</td>
<td>No treatment</td>
<td>Median time to platelet count of 150K</td>
<td>NR*</td>
<td>NR*</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;6 mo</td>
<td>Prednisone (60 mg/m²/d × 21 d, then tapered) Placebo</td>
<td>No treatment</td>
<td>Proportion with platelet count &gt;90K and &gt;100K, and with negative Rumpel-Leede test (P &lt; 0.01)</td>
<td>Prednisone &gt; placebo (P &lt; 0.01)</td>
<td>Prednisone &lt; placebo (by Rumpel-Leede test (P &lt; 0.01)</td>
<td>NR*</td>
</tr>
<tr>
<td>Sartorius†7</td>
<td>93</td>
<td>6 mo-16 yr</td>
<td>&gt;6 mo</td>
<td>&gt;6 mo</td>
<td>Prednisone (2 mg/kg/d × 21 d, then tapered) Placebo</td>
<td>Platelet count, bleeding time, clinical bleeding score at d 0-28</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Buchanan and Holtkamp9</td>
<td>27</td>
<td>&lt;11 yr</td>
<td>28 d</td>
<td>Prednisone (2 mg/kg/d × 14 d, then taper to d 21) Placebo</td>
<td>Prednisone (60 mg/m²/d × 14 d, then taper to d 21) Placebo</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imbach et al*8</td>
<td>94</td>
<td>&lt;16 yr</td>
<td>1 yr</td>
<td>Prednisone (60 mg/m²/d × 21 d, follow-up protocol for poor response/ remissions)</td>
<td>Prednisone (60 mg/m²/d × 21 d, follow-up protocol for poor response/ remissions)</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mazuccconi et al77</td>
<td>61</td>
<td>2-12 yr</td>
<td>&gt;6 mo</td>
<td>Prednisone (0.5 mg/kg/d × 1 mo or until platelet normalization)</td>
<td>Prednisone (0.5 mg/kg/d × 1 mo or until platelet normalization)</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bellucci et al11</td>
<td>160</td>
<td>&lt;15 yr</td>
<td>&gt;12 mo</td>
<td>Prednisone (0.25 mg/kg/d × 3 wk)</td>
<td>Prednisone (0.25 mg/kg/d × 3 wk)</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khalifa et al66</td>
<td>30</td>
<td>2 mo-18 yr</td>
<td>&gt;6 mo</td>
<td>Methylprednisolone (IV, 10 mg/kg/d × 5 d)</td>
<td>Methylprednisolone (IV, 10 mg/kg/d × 5 d)</td>
<td>Methylprednisolone = IVmg &gt; prednisolone (P &lt; .001)</td>
<td>Methylprednisolone = IVmg &gt; prednisolone (P &lt; .001)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozsoyle et al37</td>
<td>20</td>
<td>2 mo-11 yr</td>
<td>&gt;6 mo</td>
<td>IVlg (0.4 g/kg/d × 5d)</td>
<td>IVlg (0.4 g/kg/d × 5d)</td>
<td>IVlg (0.4 g/kg/d × 5d)</td>
<td>IVlg (0.4 g/kg/d × 5d)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanchette et al12</td>
<td>53</td>
<td>7 mo-14 yr</td>
<td>180 d</td>
<td>Prednisone (4 mg/kg/d × 7 d, then tapered to d 21)</td>
<td>Prednisone (4 mg/kg/d × 7 d, then tapered to d 21)</td>
<td>Prednisone &gt; placebo (P &lt; 0.05) only at d 7 (bleeding time and clinical score)</td>
<td>Increased appetite, weight gain</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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accompanying a transient (1 to 2 weeks) decrease in hemoglobin concentration of about 0.5 to 2 g/dL. Although in two studies 4% to 24% of patients had a hemoglobin concentration of <10 g/dL after 7 to 14 days, red blood cell transfusion was not required.

Recommendations. There is level I evidence indicating that anti-Rh(D) increases the platelet count less rapidly than IVlg or glucocorticoids in children with acute, severe thrombocytopenia (platelet count <20,000). Based on opinion, the panel considered initial treatment with anti-Rh(D) inappropriate (1.0 to 3.0, A-D) for children presenting with platelet counts >30,000 (Table 8). The use of anti-Rh(D) in chronic ITP was not addressed in the panel survey.

Splenectomy

Evidence. Compared to adults, children with ITP are less likely to undergo splenectomy. Sixteen case series (level V evidence) describe outcomes from splenectomy over the past 40 years. In most instances, splenectomy was performed in children in whom thrombocytopenia had persisted for more than 1 year and who had clinically important bleeding. In some case series, children underwent splenectomy earlier in the course of their illness because of uncontrollable hemorrhage that was unresponsive to glucocorticoid therapy. Splenectomy is less frequent in more recent case series. These data consistently show that most children (72% of the 271 children undergoing elective splenectomy in the 16 case series) achieve a complete remission from ITP after splenectomy. An effect of splenectomy on morbidity or mortality has not been shown directly. There are few data on accessory splenectomy in children; it is discussed under Adult Treatment below.

The potential adverse effects of splenectomy include the operative and postoperative complications of bleeding and infection. An important concern for late morbidity and mortality after splenectomy is the long-term risk of fatal bacterial infection, particularly in children less than 5 years old, in whom the risk may be 1 death per 300 to 1,000 patient-years. However, most of these observations involved splenectomy for other diseases and predated the current practice of presplenectomy immunization and the administration of postsplenectomy prophylactic penicillin. Prophylactic penicillin has been shown to reduce the risk of infection in children with sickle cell anemia, and this observation may be generalizable to other asplenic children.

Recommendations. Although all available evidence is level V, the consistency of observations, the frequency of complete responses to splenectomy, and similar observations in larger samples of adult patients with chronic ITP suggest that splenectomy is an effective therapy. However, there are inadequate data to make evidence-based recommendations on the appropriate indications and timing for splenectomy, on when the harms of splenectomy might outweigh its potential benefits, or on appropriate preoperative management. Many of the case series predated the use of IVlg and anti-Rh(D) therapy, which can provide intermittent support for children with recurrent, symptomatic thrombocytopenia and thereby postpone or avoid the need for splenectomy. The occurrence of spontaneous complete remissions in some chil-
ITP in Adults

Clinical Course

An understanding of the clinical course of ITP in adults is essential to make informed management decisions, to know which patients require treatment either at the time of diagnosis or in the management of chronic disease, and to estimate morbidity and mortality, with and without treatment.

Evidence. ITP in adults is typically a chronic disease. However, the clinical course of untreated disease is uncertain, because, in contrast to children, patients with symptomatic thrombocytopenia are generally treated initially with glucocorticoids. Despite this bias, which would tend to underestimate the severity of untreated disease, the data suggest that the course of ITP is more serious in adults than in children, with an estimated rate of fatal hemorrhage of 5%, due mainly to intracranial hemorrhage (Table 10). Most data on fatal hemorrhages were collected in previous decades, when platelet transfusions and IVIg were unavailable and supportive care for critical complications was less effective. Thus, current mortality rates may be less than 5%. At equivalent platelet counts, hemorrhagic complications may be more common in older patients.

Other Treatments

Evidence. Only four level V case series have evaluated other treatment modalities (plasma infusion, azathioprine, danazol, and interferon) for ITP in children. The modalities are described in the subsequent section on treatment of adults.

Recommendations. There is insufficient evidence to make recommendations about alternative treatment modalities when ITP symptoms persist after primary treatment and splenectomy, or to assess when the benefits of such treatments outweigh their potential harms. Furthermore, the data on the clinical course of ITP in children do not clarify whether further treatment is even necessary under these circumstances. Based on opinion, the panel did not recommend further treatment of children with platelet counts >30,000 who have failed to respond to splenectomy and have no bleeding symptoms (2.0, B for platelet count of 30,000-50,000; 1.0, A for platelet count >50,000). Further treatment was recommended (9.0, A) for children with platelet counts <30,000 who have active bleeding. The panel considered many treatments (and no treatment) to be reasonable options, reflecting the lack of evidence that any single treatment is better than another.

Diagnosis

History and physical examination. The history and physical examination are aimed at detecting alternative causes of thrombocytopenia. The most important elements of the history and physical examination identified by the panel are presented in Table 11. The primary objective of the history is to assess the type of bleeding and to distinguish platelet-
Table 10. Clinical Course of ITP: Adults

<table>
<thead>
<tr>
<th>Author</th>
<th>Location</th>
<th>Years</th>
<th>Patients (no.)</th>
<th>Percent Complete Remission on No Therapy*</th>
<th>Hemorrhagic Complications†</th>
<th>Patients in Complete Remission at Last Follow-up</th>
<th>Patients With Persistent Thromboeytopenia$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watson-Williams et al††</td>
<td>Scotland</td>
<td>1928-1967</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpenter et al††</td>
<td>US</td>
<td>1945-1959</td>
<td>46</td>
<td>0/12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson et al††</td>
<td>US</td>
<td>1945-1970</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meyers‡‡</td>
<td>US</td>
<td>1950-1961</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jiji et al⁴⁹</td>
<td>US</td>
<td>1951-1972</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picozzi et al⁴⁹</td>
<td>US</td>
<td>1959-1969</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ikkala et al⁴⁷</td>
<td>Finland</td>
<td>1966-1973</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DiFino et al⁴⁷</td>
<td>US</td>
<td>1971-1979</td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>den Ottolander et al⁴⁷</td>
<td>Netherlands</td>
<td>1971</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pizzuto and Ambrelz⁵⁰</td>
<td>Central and South America#</td>
<td>934</td>
<td>27**</td>
<td>19**</td>
<td>577/887 (65)</td>
<td>364</td>
<td>14</td>
</tr>
<tr>
<td>Cortelazzo et al⁵¹</td>
<td>Italy</td>
<td>1982-1999</td>
<td>117</td>
<td>−††</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

Summary

1,761 | 27 | 36 | 7 | 35 | 1,027/1,606 (64%) | 465 | 22 | 5% | 25 | 5% |

Abbreviation: ICH, intracranial hemorrhage.

* Complete remission is defined as a normal platelet count on no therapy continuing to the time of the last observation. In almost all patients there was no opportunity to observe a spontaneous remission because steroids were begun at the time of diagnosis. In the first two series, a substantial number of patients were untreated when, before 1950, splenectomy was the only effective modality.

† Acute hemorrhagic deaths are arbitrarily defined as occurring within 6 mo of diagnosis. Other hemorrhagic deaths occurred after 6 mo, or the time was not specified—and it was unclear even if all of these were due to hemorrhage from ITP.

‡ The number of patients is less than the original series by deaths and patients lost to follow-up. This estimate is largely dependent on the duration of follow-up, which was variable.

§ Patients who failed to achieve a complete response to glucocorticoid, splenectomy, and subsequent therapy. In contrast to children, persistence is defined as lack of response to treatment rather than an arbitrary time.

† This group contained 3 children less than 12 years old, and it was not stated if they were among the patients whose ITP resolved.

¶ Numbers in parentheses are percentages.

# This study was a collaborative effort of 10 institutions.

** This report stated that 27 of the total of 46 hemorrhagic deaths were due to ICH, 9 due to gastrointestinal or pulmonary bleeding, and 10 due to “massive” purpura, but these etiologies were not distinguished according to time from diagnosis.

‡‡ 49 patients with platelet counts over 30,000/μl and no bleeding symptoms were not treated and apparently had no major hemorrhagic complications. Whether any complete remissions occurred is not stated. These patients are not included in the estimate of patients in complete remission at last follow-up.
related mucocutaneous bleeding from delayed visceral hematomas, which are characteristic of coagulation disorders.

Drug-induced thrombocytopenia must always be considered and may be difficult to exclude. Drugs most commonly associated with thrombocytopenia include quinidine and quinine-containing medications among nonhospitalized patients, and heparin among hospitalized patients. A case-control study also reported an association with sulfonamides, which may cause thrombocytopenia, and aspirin, which may exacerbate bleeding.

Transfusion history
Family history of thrombocytopenia, including bleeding symptoms and symptoms of autoimmune disorders
Comorbid conditions which may increase the risk of bleeding, such as gastrointestinal disease, central nervous system disease, urologic disease
Lifestyle, including vigorous and potentially traumatic activities

Physical Examination
Bleeding signs
Type of bleeding (including retinal hemorrhages)
Severity of bleeding
Liver, spleen, and lymph nodes; jaundice and other stigmata of liver disease
Evidence for infection, particularly bacteremia or HIV infection
Evidence for autoimmune disease, such as arthritis, goiter, nephritis, or cutaneous vasculitis
Evidence for thrombosis
Neurologic function
Skeletal anomalies

related mucocutaneous bleeding from delayed visceral hematomas, which are characteristic of coagulation disorders.

Drug-induced thrombocytopenia must always be considered and may be difficult to exclude. Drugs most commonly associated with thrombocytopenia include quinidine and quinine-containing medications among nonhospitalized patients, and heparin among hospitalized patients. A case-control study also reported an association with sulfonamides, sulfonyleureas, dipyridamole, and salicylates. Alcohol also causes thrombocytopenia, as well as chronic liver disease that can lead to congestive splenomegaly and increased platelet pooling. Finally, the history should consider the patient’s lifestyle, which may influence the goals of treatment.

A sedentary individual, for example, may tolerate a lower platelet count than a patient whose profession or hobbies involve a high level of exertion or potential trauma.

Physical examination is principally directed at assessing the type and severity of bleeding and at excluding other causes of thrombocytopenia. Splenomegaly, for example, provides evidence against ITP. A large study reported that less than 3% of ITP patients had splenomegaly. This corresponds with the observation that about 3% of healthy young adults have palpable spleens. Signs of liver disease or lymphadenopathy may suggest lymphoproliferative, autoimmune, or infectious diseases. Acute and severe thrombocytopenia may be a manifestation of bacteremia or viral infection; HIV infection is commonly associated with thrombocytopenia. Acute anemia, neurologic, or renal abnormalities may suggest thrombotic thrombocytopenic purpura. Neurologic function and funduscopic examination also provide a baseline in the event of subsequent central nervous system bleeding. Additionally, hearing impairment and skeletal anomalies may suggest disorders associated with congenital thrombocytopenia.

Complete blood count with examination of a peripheral blood smear. A complete blood count and examination of a peripheral blood smear are essential in diagnosing ITP. Incidentally detected thrombocytopenia on a routine blood count is often the first clue to the diagnosis. The evaluation of a low platelet count should distinguish between true thrombocytopenia and pseudothrombocytopenia, which occurs in about 0.1% of adults, most commonly due to innocent platelet agglutinins that cause platelet clumping in the presence of the anticoagulant EDTA. In each patient, thrombocytopenia must be confirmed by direct examination of the peripheral blood smear. The principal elements of the blood smear examination for ITP are described above for children and in Table 5. Particularly in older patients, evidence for myelodysplasia should be carefully evaluated, including the presence of the Pelger-Huet anomaly, nucleated red blood cells, schistocytes, and immature granulocytes. Other peripheral blood smear abnormalities may suggest the presence of a viral infection, megaloblastic hematopoiesis, or microangiopathic disorders.

Other laboratory data. Recommendations regarding other laboratory tests were derived from opinion by a questionnaire completed by 11 panel members. The recommendations assume that the history, physical examination, and initial blood counts and smear were compatible with the diagnosis of ITP and do not include atypical findings that are uncommon in ITP or suggest other disease etiologies. If atypical findings are present, then additional diagnostic evaluation may be necessary. Indications for which the panel could not reach consensus are not listed here but are summarized in Table 6.

The panel reached consensus that 8 tests were unnecessary as part of the routine evaluation of adults presenting with suspected ITP, and that an additional 5 tests were both unnecessary and inappropriate (Table 7). Testing for HIV antibody was considered necessary (8.6, B), as well as appropriate (8.8, B), in patients with risk factors for HIV infection. There was no consensus on the appropriateness or necessity of a bone marrow aspirate biopsy to establish the diagnosis in all adult patients at presentation (Fig 1). Bone marrow examination was considered appropriate to establish the diagnosis in patients over age 60 (7.8, C) and in patients considering splenectomy (7.5, D). The test was considered unnecessary (2.7, C) to establish the diagnosis for medicolegal protection. Thyroid function testing was considered appropriate (7.0, C) to rule out occult hyperthyroidism or hypothyroidism only before an elective splenectomy. The panel also reached consensus regarding testing in the following situations:

Table 11. Principal Elements of the History and Physical Examination in an Adult Suspected of Having ITP

<table>
<thead>
<tr>
<th>History</th>
<th>Physical Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding symptoms</td>
<td>Bleeding signs</td>
</tr>
<tr>
<td>Type of bleeding</td>
<td>Definition of bleeding</td>
</tr>
<tr>
<td>Severity of bleeding</td>
<td>Severity of bleeding</td>
</tr>
<tr>
<td>Duration of bleeding</td>
<td>Evidence for infection, particularly bacteremia or HIV infection</td>
</tr>
<tr>
<td>Hemostasis with prior surgeries, pregnancies</td>
<td>Evidence for autoimmune disease, such as arthritis, goiter, nephritis, or cutaneous vasculitis</td>
</tr>
<tr>
<td>Systemic symptoms, including weight loss, fever, headache, and symptoms of autoimmune disorders such as arthralgias, skin rash, alopecia, and venous thrombosis</td>
<td>Evidence for thrombosis</td>
</tr>
<tr>
<td>Risk factors for HIV infection</td>
<td>Neurologic function</td>
</tr>
<tr>
<td>Pregnancy status</td>
<td>Skeletal anomalies</td>
</tr>
</tbody>
</table>

From www.bloodjournal.org by guest on January 14, 2018. For personal use only.
(1) To establish the diagnosis before splenectomy: Tests that the panel considered unnecessary for this purpose included platelet antigen specific antibody assay (1.7, C), serum complement level (1.8, C), platelet survival study (1.9, C), and direct antiglobulin test (2.6, C). The panel considered platelet associated IgG assay both unnecessary and inappropriate (3.0, D).

(2) To establish the diagnosis in patients who have failed to respond to glucocorticoid therapy and splenectomy: Tests that the panel considered unnecessary for this purpose included platelet-associated IgG assay (1.7, B), platelet-antigen specific antibody assay (1.8, C), serum complement level (2.0, C), platelet survival study (2.4, D), and direct antiglobulin test (2.9, D).

Treatment

As with children, inferences regarding the effectiveness of treating ITP in adults were based on the surrogate outcome measure of the platelet count (see above).

Hospitalization

Evidence. There have been no studies to evaluate the effectiveness of hospitalizing adults with ITP.

Recommendations. The opinion of the panel was that hospitalization is appropriate for patients with severe, life-threatening bleeding, regardless of the platelet count (8.8, B), as well as for patients with platelet counts <20,000 who have significant mucous membrane bleeding (8.1, C) or who are inaccessible or noncompliant (8.2-8.6, B-C). Hospitalization was considered inappropriate (1.1 to 2.2, A-C) for patients with platelet counts >20,000 who are either asymptomatic or have only minor purpura. Indications for hospitalization under intermediate conditions are less clear (Table 12).

Emergency Treatment

Evidence. There have been no studies to evaluate the effectiveness of different regimens for the emergency treatment of severe bleeding.

Recommendations. Although evidence for the effectiveness of treatment regimens is lacking, the opinion of the panel is that the serious consequences of severe, life-threatening bleeding justify the use of several regimens. Assuming that conventional critical care measures are already underway, the opinion of the panel was that appropriate interventions include high-dose parenteral glucocorticoid therapy (1 g of methylprednisolone daily for 3 days) and IVIg, either alone or in combination (9.0, A), and platelet transfusions (7.5, D). See further discussion of individual treatments below.

Observation (No Specific Initial Treatment)

Evidence. The only evidence regarding the outcomes of not treating adults with ITP is a level V, prospective study of selected patients with platelet counts >30,000 and no symptomatic bleeding (49 of 117 total patients with ITP). No adverse events were reported among these 49 patients during a mean follow-up period of 30 months. Other data suggest that spontaneous, serious bleeding is rare (<5% of patients) with platelet counts >10,000, and is reported in about 40% of patients with platelet counts <10,000. Clinically important bleeding with trauma rarely occurs at platelet counts >50,000.

Recommendations. Current evidence is inadequate to state with certainty which groups of patients with ITP can be safely managed without therapy. The opinion of the panel was that not providing specific initial treatment was appropriate (7.0 to 7.8, C-D) in patients who have platelet counts >50,000 and are either asymptomatic or have only minor purpura. The panel believed that withholding treatment was inappropriate for patients with a platelet count <20,000, regardless of their symptoms (1.2 to 1.8, B), and for patients with a platelet count <50,000 who present with significant mucous membrane bleeding (1.0, A) or who have risk factors for bleeding, such as hypertension, peptic ulcer disease, or vigorous lifestyle (1.0 to 1.1, A) for platelet count <20,000; 1.6, B for platelet count of 20,000 to 30,000; 2.9, C for platelet count of 30,000 to 50,000). Not treating severe life-threatening bleeding was considered inappropriate (1.0, A for platelet count <50,000). The panel considered it inappropriate (1.6 to 1.9, B-C) to withhold treatment at the patient’s request if the platelet count was <20,000. Patient inaccessibility or noncompliance was considered an inappropriate reason not to treat patients with platelet counts of 20,000 to 30,000 (2.3, C) or <20,000 (1.2 to 1.3, B).

Glucocorticoid Therapy

Evidence. Glucocorticoids have been the standard initial treatment for adults with moderate to severe thrombocytopenia and symptomatic purpura since their introduction in 1950. Uncontrolled data regarding the efficacy of glucocorticoid treatment are summarized in the 12 case series in Table 10. Of these patients, 82% were treated initially with glucocorticoid preparations. The experience of these patients, which are all reported in level V studies, suggests that most increase their platelet count initially. Although it has been suggested that very high doses of glucocorticoid may result in a more rapid increase of the platelet count, two level II studies suggested equal efficacy in adults of different regimens of low-dose prednisone (0.5 mg/kg v 1.5 mg/kg and 0.25 mg/kg v 1.0 mg/kg). Fewer (3% to 50%) patients maintain normal platelet counts once therapy is discontinued, although there is an unexplained, extreme variation in reported remission rates among the level V studies. No randomized controlled studies have compared glucocorticoid with no treatment, and there is no evidence of an effect of glucocorticoid treatment on morbidity or mortality. A randomized trial involving 40 patients (level II) compared glucocorticoid therapy to IVIg and both in combination as initial treatment and demonstrated no difference in response, although this study is too small to make definitive conclusions.

The potential adverse effects of glucocorticoids include all of the signs and symptoms of hypercortisolism in Cushing syndrome, including facial swelling, weight gain, hypergly-
cemia, hypertension, weight gain, cataracts, and behavioral abnormalities. Perhaps the greatest risk is the development of osteoporosis; although there are no data in patients with ITP, an objective decrease in bone density has been documented in patients with rheumatoid arthritis after the equivalent of only 10 mg of prednisone daily for 20 weeks. The toxicities of glucocorticoids are dose and duration dependent.

**Recommendations.** There is consistent level V evidence that glucocorticoids can achieve early responses, most of which are transient. Although this suggests a role for initial glucocorticoid therapy in symptomatic patients, there are otherwise few data from which to develop evidence-based recommendations on specific indications. Based on opinion, the panel concluded that glucocorticoid therapy (prednisone, 1 to 2 mg/kg/d) was appropriate initial treatment in patients with platelet counts <30,000, including asymptomatic patients (6.8 to 8.6, C), patients with minor purpura (7.7 to 8.6, C), and those with significant mucous membrane or vaginal bleeding (8.5 to 8.6, B-C) (Table 12). Glucocorticoid therapy was also considered appropriate for patients with platelet counts of 30,000 to 50,000 if clinically important bleeding was present (7.3, C) and for patients with severe, life-threatening bleeding, regardless of the platelet count (7.1 to 7.8, C-D). The recommended duration of glucocorticoid treatment is addressed below. Glucocorticoid therapy was considered inappropriate initial treatment when the platelet count is >50,000 and the patient is either asymptomatic (2.2, C) or has only minor purpura (3.0, D).

**IVIg**

**Evidence.** IVIg has been studied more in children than in adults, in whom it is used primarily for patients who are unresponsive to glucocorticoids and other therapies. Relevant data come largely from case series. Level V evidence, most of which describe patients with severe, chronic thrombocytopenia who were observed for a short duration after IVIg treatment. Most, but not all, patients in these series experienced an increased platelet count with IVIg. Among patients with chronic ITP (usually defined in these series as >3 to 4 months), platelet counts increased in about 75% of patients and reached normal levels in about half of patients. In more than 75% of patients who initially responded, the platelet count returned to pretreatment levels, usually within 3 to 4 weeks. In one study, patients were given subsequent infusions of IVIg to maintain platelet counts above 20,000; about one third of the patients who required repeated infusions ultimately became refractory to IVIg but an equal number appeared to have long-term responses. No studies have compared IVIg to no treatment or measured the effects of IVIg on morbidity or mortality. As noted earlier, one randomized study did not detect a difference in outcomes among patients treated initially with IVIg, prednisone, or the combination of IVIg and prednisone.

The dose of IVIg has been the subject of several studies. As in children, the original dose of IVIg was 0.4 g/kg/d administered on 5 consecutive days. Subsequently, the same total dose was administered as 1 g/kg/d on 2 consecutive days. One randomized study showed no difference in the response of patients with chronic ITP to 1 g/kg given once or on 2 consecutive days (level II trial). For "maintenance therapy," a higher dose (1 g/kg vs 0.5 g/kg as a single infusion) was found to yield a greater platelet count response, but the same frequency of treatments was necessary to maintain a platelet count >20,000.

The adverse effects of IVIg are common (15% to 75%) but generally mild, including headache, backache, nausea, and fever. Aseptic meningitis may occur. Rare reported complications include alloimmune hemolysis and hepatitis C infection. No hepatitis C has been reported with viral inactivated products. Cases of renal failure, pulmonary insufficiency, and thrombosis, including stroke and myocardial infarction, have been reported as complications of IVIg treatment.

**Recommendations.** There is no evidence regarding the efficacy of IVIg as initial treatment and only level V evidence that it can achieve temporary improvements of platelet counts in patients who are refractory to initial treatment. Further, a benefit of IVIg in terms of morbidity or mortality remains uncertain. Therefore, evidence-based recommendations regarding appropriate indications are not possible at this time. Based on opinion, the panel concluded that IVIg was appropriate initial treatment only for patients with platelet counts <50,000 who have severe, life-threatening bleeding (7.0 to 8.5, C-D). The panel believed that IVIg was inappropriate initial treatment for patients with platelet counts of 30,000 to 100,000 who were asymptomatic (1.1 to 1.6, A-B) or who had only minor purpura (1.3 to 2.2, B-C). There was strong disagreement (category E) among the panel about the appropriateness of IVIg as initial therapy for patients with platelet counts <20,000 who are asymptomatic or have only minor purpura, or for patients with risk factors for bleeding, such as hypertension, peptic ulcer disease, or a vigorous lifestyle.

**Anti-(Rh) D**

**Evidence.** Five level V studies of anti Rh(D) in adults, suggest that it can transiently increase platelet counts, usually lasting for 2 to 3 weeks, in about half of unsplenectomized patients; response rates in splenectomized patients were less. Evidence regarding its effect on morbidity or mortality is lacking.

The only clinically important adverse effect of anti-Rh(D) appears to be alloimmune hemolysis. All Rh (D)+ patients develop a positive direct antiglobulin test after treatment, accompanied by a transient (1 to 2 weeks) decrease in hemoglobin concentration of about 0.5 to 2 g/dL. Although in two studies 4% to 24% of patients had a hemoglobin concentration of <10 g/dL after 7 to 14 days, red blood cell transfusion was not required.

**Recommendations.** There is insufficient evidence to make recommendations regarding anti-Rh (D) treatment in adults. The opinion of the panel on anti-Rh (D) treatment of adults was not assessed.

**Splenectomy**

**Evidence.** Splenectomy was the first effective treatment for ITP and was an established therapeutic modality long
### Table 12. Panel Opinion Regarding Initial Treatment Options in Adults

<table>
<thead>
<tr>
<th>Platelet Count</th>
<th>Treatment Options</th>
<th>Appropriateness Uncertain (mean panel scores, 3.1-6.9)</th>
<th>Inappropriate (mean panel scores, 1-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>Prednisone* (8.6, C)</td>
<td>Hospitalization, IVig† No treatment‡ (1.4-1.8, B) Splenectomy (2-5, D)</td>
<td></td>
</tr>
<tr>
<td>Minor purpura</td>
<td>Prednisone (8.6, C)</td>
<td>Hospitalization, IVig No treatment (1.2-1.5, B) Splenectomy (2.5, D)</td>
<td></td>
</tr>
<tr>
<td>Mucous membrane or vaginal bleeding that may require clinical intervention</td>
<td>Prednisone (8.5-8.6, B-C) Hospitalization (8.1, C)</td>
<td>IVig No treatment (1.0, A) Splenectomy (2.9, D)</td>
<td></td>
</tr>
<tr>
<td>Severe, life threatening bleeding</td>
<td>Hospitalization (8.8, B) IVig (8.5, C)</td>
<td>Prednisone (7.6, D)</td>
<td>No treatment (1.0, A)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platelet Count</th>
<th>20-30 × 10⁹</th>
<th>Treatment Options</th>
<th>Appropriateness Uncertain (mean panel scores, 3.1-6.9)</th>
<th>Inappropriate (mean panel scores, 1-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Prednisone, IVig</td>
<td>No treatment§ Hospitalization (1.8, B) Splenectomy (2.5, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor purpura</td>
<td>Prednisone (7.7, C) IVig</td>
<td>No treatment§ Hospitalization (2.2, C) Splenectomy (2.5, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucous membrane or vaginal bleeding that may require clinical intervention</td>
<td>Prednisone (8.5, B) Hospitalization, IVig</td>
<td>No treatment (1.2, B) Splenectomy (2.5, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe, life-threatening bleeding</td>
<td>Hospitalization (8.8, B) IVig (8.0, D)</td>
<td>Prednisone (1-2 mg/kg/d) (7.8, D)</td>
<td>No treatment (1.0, A)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platelet Count</th>
<th>30-50 × 10⁹</th>
<th>Treatment Options</th>
<th>Appropriateness Uncertain (mean panel scores, 3.1-6.9)</th>
<th>Inappropriate (mean panel scores, 1-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Prednisone</td>
<td>No treatment‖ Hospitalization (1.2, B) IVig (1.6, B) Splenectomy (2.1, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor purpura</td>
<td>Prednisone</td>
<td>No treatment‖ Hospitalization (1.3, B) IVig (2.2, C) Splenectomy (2.4, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucous membrane or vaginal bleeding that may require clinical intervention</td>
<td>Prednisone (7.3, C) Hospitalization, IVig</td>
<td>No treatment (2.0, B) Splenectomy (2.4, D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe, life-threatening bleeding</td>
<td>Hospitalization (8.8, B) Prednisone (7.8, C) IVig (7.0, D)</td>
<td>Splenectomy (2.7, D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* "Appropriate" and "Not appropriate" = mean panel score of 7.0-9.0 or 1.0-3.0, respectively, "Appropriate" = treatment may or may not be necessary, but performing is not wrong. "Inappropriate" = treatment should not be performed. Mean panel score is graded on a scale of "1" to "9", with "1" representing low appropriateness and "9" representing high appropriateness. Letter codes following panel scores reflects strength of agreement, the panel consensus (defined by standard deviation) around the mean panel score. "A" = complete or virtual unanimity, "B" = strong agreement, "C" = moderate agreement, "D" = moderate disagreement, "E" strong disagreement (see Table 4).

* Prednisone dose, 1-2 mg/kg/d.
† IVig regimen, 1-2 g/kg given over 1-5 days.
‡ "No treatment" implies careful observation.
§ Not treating patients with a platelet count of 20-30 × 10⁹ is inappropriate for patients age 60 or older (2.7, D) or for patients who have major risk factors for bleeding (eg, elevated blood pressure, ulcer disease, vigorous lifestyle) (1.6, B). For all other patients, appropriateness is uncertain.
‖ Not treating patients with a platelet count of 30-50 × 10⁹ is inappropriate for patients who have major risk factors for bleeding (eg, elevated blood pressure, ulcer disease, vigorous lifestyle) (2.9, C). For all other patients, appropriateness is uncertain.
before glucocorticoid therapy was introduced in 1950. Thirty-six case series describe the results of splenectomy, but all provide only level V evidence.26,30,50,100,102,138-151 Moreover, the relevance of early studies to current clinical practice may be limited, because splenectomy was often performed as initial therapy and because early series often combined the results of children and adults. Not surprisingly, therefore, early studies reported better long-term results. In most recent case series restricted to adults, splenectomy was performed in patients who were either unresponsive to initial glucocorticoid therapy or in those for whom continued glucocorticoid therapy was required to maintain a safe platelet count. Most studies suggest that approximately two thirds of patients achieve and sustain a normal platelet count after splenectomy and require no additional therapy. Most other patients experience a lesser increase or only transient normalization of platelet counts, with approximately half of the relapses occurring within 6 months of splenectomy.156 Over 80% of platelet responses occur within several days; responses may occur after 10 days but are uncommon.102,156 There is some evidence that the rate and magnitude of platelet recovery may have prognostic value. Durable platelet responses have been correlated with platelet counts > 150,000 on the first155 or third postoperative day158 or >500,000 on the 10th postoperative day.157 No preoperative clinical parameters appear to have similar prognostic value; studies of the predictive value of an initial response to glucocorticoid therapy have yielded conflicting results. As in other aspects of ITP, younger patients appear to respond better to splenectomy than older patients.155,157,158 No studies have specifically reported on morbidity or mortality after splenectomy.

Some evidence is available regarding the adverse effects of splenectomy in adults. Even in the face of severe thrombocytopenia, the immediate risks of clinically important intraoperative and postoperative hemorrhage appear small, approximately 1% in the 36 cited case series. Operative mortality rates were less than 1%, an impressive figure because these data include reports before the advent of platelet transfusions, IVlg, and effective antibiotics to manage postoperative infections. Most operative deaths occur in older patients with coexisting illnesses.45 Postoperative morbidity may be related to the extent of previous glucocorticoid therapy.102 Splenic or portal vein thrombosis may occur after splenectomy.162,163 Postsplenectomy patients have a small but significantly increased susceptibility to fatal bacterial infection, although this appears to be less important in adults than in children. The estimated risk of fatal bacterial infection in splenectomized adults is about 1 per 1,500 patient-years,162,82 but these estimates are from the era before immunization for Strep pneumoniae and were determined in patients splenectomized for other diseases.

Recommendations. Although all available evidence is level V, the efficacy of splenectomy is supported by the consistent incidence of sustained normalization of platelet counts in patients who had previously been refractory to glucocorticoid therapy for several weeks or years. However, there are inadequate data to make evidence-based recommendations on the appropriate indications and timing for splenectomy, on when the benefits of splenectomy outweigh its potential harms, and on appropriate preoperative management.

Based on opinion, the panel reached consensus on only selected indications for splenectomy. Assuming that primary treatment (glucocorticoid) has been unsuccessful and that there are no medical contraindications to the procedure, the panel considered splenectomy appropriate in the following hypothetical situations: (1) patients who have had the diagnosis for 6 weeks, have a platelet count <10,000, and have no bleeding symptoms. (7.5, C), and (2) patients who have had the diagnosis for 3 months, have experienced a transient or incomplete response to primary treatment, have a platelet count of <30,000, and are either bleeding (8.5, B) or not bleeding (7.4, C). The panel reached consensus that splenectomy is inappropriate in nonbleeding patients who have had the diagnosis for 6 months and have a platelet count >50,000 and low hemostatic risk (eg, not engaged in potentially traumatic activities) (1.9, C). The panel also considered splenectomy inappropriate (1.6 to 2.9, C-D) as initial therapy in patients who have no bleeding, minor purpura, or even significant mucous membrane bleeding. Further recommendations regarding the appropriate timing of splenectomy in patients who do not respond completely to initial glucocorticoid treatment are presented below.

If an elective splenectomy is planned, the panel considered it appropriate to provide preoperative prophylaxis with IVlg

### Table 13. Panel Opinion Regarding Preoperative Prophylaxis Against Bleeding Before Elective Splenectomy in Adults

<table>
<thead>
<tr>
<th>Preoperative Prophylaxis</th>
<th>Platelet Count</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVlg</td>
<td>&lt;10,000</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>10,000-20,000</td>
<td>7.5</td>
</tr>
<tr>
<td>Oral glucocorticoid</td>
<td>&lt;10,000</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>10,000-20,000</td>
<td>7.3</td>
</tr>
</tbody>
</table>

**Appropriateness Uncertain**

<table>
<thead>
<tr>
<th>Preoperative Prophylaxis</th>
<th>Platelet Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVlg</td>
<td>20,000-50,000</td>
</tr>
<tr>
<td>Platelet transfusion</td>
<td>&lt;10,000</td>
</tr>
<tr>
<td>Anti-D</td>
<td>&lt;50,000</td>
</tr>
<tr>
<td>Oral glucocorticoid</td>
<td>20,000-50,000</td>
</tr>
<tr>
<td>Parenteral glucocorticid</td>
<td>&lt;50,000</td>
</tr>
</tbody>
</table>

**Appropriate**

<table>
<thead>
<tr>
<th>Preoperative Prophylaxis</th>
<th>Platelet Count</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVlg</td>
<td>50,000-100,000</td>
<td>2.1</td>
</tr>
<tr>
<td>Platelet transfusion</td>
<td>10,000-20,000</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>20,000-30,000</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>30,000-50,000</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>50,000-100,000</td>
<td>1.1</td>
</tr>
<tr>
<td>Anti-D</td>
<td>50,000-100,000</td>
<td>1.8</td>
</tr>
<tr>
<td>Oral glucocorticoid</td>
<td>50,000-100,000</td>
<td>2.7</td>
</tr>
<tr>
<td>Parenteral glucocorticid</td>
<td>50,000-100,000</td>
<td>2.1</td>
</tr>
</tbody>
</table>

"Appropriateness" and scores are defined in text and Table 2. Doses and regimens were not specified in the questions to the panel.
(7.5 to 7.9, D) or oral glucocorticoid therapy (7.3 to 7.7, C) in patients with platelet counts <20,000 to reduce the risk of intraoperative and postoperative bleeding (Table 13). Preoperative prophylaxis that the panel considered inappropriate included treatment for platelet counts >50,000, using IV Ig (2.1, C), oral or parental glucocorticoid therapy (2.1 to 2.7, C-D), or anti-D (1.8, C). Platelet transfusions were considered inappropriate as preoperative prophylaxis for platelet counts >10,000 (1.1 to 2.3, A-D).

The panel endorsed the recommendations of the Advisory Committee on Immunization Practices that, at least 2 weeks before elective splenectomy, patients should be immunized with polyvalent pneumococcal vaccine, Hemophilus influenzae b vaccine, and quadrivalent meningococcal polysaccharide vaccine.154

Other Treatments

Evidence. The treatment options discussed in this section have not been compared with other treatments (or to no treatment) in controlled trials and have not been shown to reduce clinically important bleeding or mortality. The order of discussion does not reflect their relative effectiveness or appropriateness.

Splenectomy. Two level V studies of 18 patients who had not responded to at least 1 month of glucocorticoid therapy and in whom splenectomy was contraindicated reported that four patients achieved sustained (>3 to 12 months) platelet counts >100,000.164,165 A potential adverse effect of splenic radiation is the production of adhesions surrounding the spleen, which may complicate subsequent splenectomy.

Partial splenic embolization. One level V study described 26 patients who had not completely responded to glucocorticoid therapy who then underwent angiographically directed gelfoam embolization; seven maintained platelet counts >100,000 for 9 to 67 months with no additional therapy.166 In this report the adverse effects of partial splenic embolization included fever, pain, and nausea in 81% to 100% of patients and perisplenic fluid or pleural effusion in 10% to 19% of patients. Another potential adverse effect is splenic abscess or rupture.

Accessory splenectomy. Eight case series (level V evidence)152,167-173 suggest that platelet counts are increased in about half of patients, and 10% to 30% of patients may have sustained, normal platelet counts. During primary splenectomy, the abdomen is generally inspected for accessory spleens; in the 11 case series of splenectomy in which the observation and removal of accessory spleens was mentioned,156,158,160,164,165,150,152,153,155,156,161,174 accessory spleens were observed in 15% of patients. In a study175 of 65 patients who either failed splenectomy or relapsed after splenectomy, 12% of patients were found to have an accessory spleen by radionuclide imaging. No studies have shown that accessory splenectomy reduces morbidity or mortality. The potential adverse effects of accessory splenectomy are similar to those of splenectomy.

Azathioprine. Four case series (level V evidence)100,175-178 suggest that about 20% of patients may achieve a normal platelet count, sustained for several months to years without treatment. An additional one half of patients may improve their platelet counts but require continuous azathioprine treatment. Continuous treatment for at least four months appears to be necessary before a patient is considered unresponsive.179 The potential adverse effects of azathioprine include reversible leukopenia and a small, but possibly significant, increase of developing a malignancy179 and in the risk of developing fetal malformations during pregnancy.180 One study181 of 53 patients with persistent thrombocytopenia reported that five died from hemorrhage with severe thrombocytopenia. It is uncertain if the high mortality was caused by preferential selection of severely affected patients, lack of efficacy, or worsened thrombocytopenia caused by azathioprine-induced marrow suppression.

Cyclophosphamide. Five case series (level V evidence)180,181,185 suggest that cyclophosphamide increases platelet counts in 60% to 80% of patients, and 20% to 40% of patients maintain normal platelet counts for 2 to 3 years after discontinuing treatment. The primary toxicity of cyclophosphamide is reversible leukopenia. More serious adverse effects have been reported, including alopecia, teratogenicity, infertility, and urinary bladder hemorrhage and fibrosis.179 Carcinogenicity, including increased risk of myelodysplasia and acute leukemia, has been suggested in case reports.186,187

Vinca alkaloids. Twelve case series (level V evidence)186,188-198 and a level II study that compared two methods of vinblastine administration199 suggest that vinca alkaloids may produce a transient increase in platelet counts lasting 1 to 3 weeks in two-thirds of patients, but a sustained normal platelet count (requiring no further treatment for at least 3 months) occurs in less than 10% of patients. The populations in these studies were heterogeneous, including untreated patients and patients with ITP of short duration, chronic refractory ITP, and with mild to severe thrombocytopenia. Potential adverse effects of vinca alkaloids include neutropenia (vinblastine), fever, and inflammation/thrombophlebitis at the infusion site; neuropathy was reported in 10 of the 13 reports. One death from sepsis during a leukopenic episode was reported after vinblastine infusion.199 In one study of the infusion of “vinblastine-loaded” platelets (platelets incubated with vinblastine), 3 of 16 patients had a 30% to 80% decrease in their platelet count within 24 hours of treatment.192

Danazol. Fourteen case series (level V evidence)200-213 in which about half of the patients were from a single institution, reported variable rates of response to danazol, ranging from 10% to 80%. The potential adverse effects of danazol include weight gain, headaches, hair loss, myalgia, amenorrhea, and liver dysfunction. Danazol has been a suspected cause of acute thrombocytopenia in seven patients.213,214 Danazol may contraindicate in patients with preexisting liver disease; one case series reported abnormal liver function tests in 41% of patients.211

Ascorbic acid (vitamin C). Eight case series (level V evidence)217,224 reported that 15% of patients had increased platelet counts, but other medications were being taken concurrently. The potential adverse effects of ascorbic acid include occasional epigastric pain or dyspepsia.
Colchicine. Two case series report conflicting level V evidence regarding the effectiveness of colchicine. The principal adverse effect of colchicine is dose-dependent diarrhea.

Protein A-immunoadsorption. One case series (level V evidence) reported that 18 of 72 patients achieved a platelet count >100,000, which was sustained in 16 patients. Earlier publications included segments of this same patient population (Guthrie TH, personal communication, August 1995). The potential adverse effects include fever, chills, nausea, vomiting, and urticaria, which occur in most patients. Hypotension, serum sickness, and leukocytoclastic vasculitis with thrombosis have also been reported.

Plasma exchange. Three case series (level V evidence) reported that platelet counts increased to normal for 1 to 4 weeks in 5 of 18 patients with chronic ITP; no sustained responses were described. Potential adverse effects include allergic reactions to plasma proteins and a risk for transmissible viral infections.

2-Chlorodeoxyadenosine. One case series (level V evidence) of seven patients reported no favorable responses.

Combination chemotherapy. One case series (level V evidence) of 10 patients reported that five patients achieved normal platelet counts that were sustained for 11 to 126 months. Four patients died, 3 from intracerebral hemorrhage and 1 from a stroke when the platelet count was normal. The potential adverse effects of combination chemotherapy include marrow suppression with leukopenia and worsening of thrombocytopenia, and the risks cited above for individual agents, cyclophosphamide and vinca alkaloids.

Interferon-α (IFN-α). Four case series (level V evidence) reported that 25% of patients achieved platelet counts greater than 100,000 for 1 week to 7 months. The major adverse effects include fever, fatigue, and myalgias.

Some reports suggest that IFN-α may worsen thrombocytopenia.

Cyclosporine A. No published evidence that met panel criteria is available.

Aminocaproic acid. In contrast to other modalities discussed in this section, aminocaproic acid has not been used to increase the platelet count but rather to diminish bleeding symptoms. One case series (level V evidence) of seven patients suggested that it helped control bleeding. Its potential adverse effects include an increased risk of thromboembolism.

Recommendations

To assess opinion on the management of patients who do not respond, or respond incompletely, to initial treatment with prednisone, the panel ranked selected treatment options for a hypothetical 30-year-old woman who presents with a platelet count <10,000 and bleeding symptoms consisting of purpura, menorrhagia, and epistaxis and who is treated initially with prednisone (1 mg/kg/d). Depending on the platelet count, most panel members would alter the treatment plan after 2 to 4 weeks if the patient did not respond (or responded incompletely) to this dose of prednisone (Fig 3). Most panel members would recommend elective splenectomy after 4 to 6 weeks of unsuccessful medical therapy (Fig 4). However, the range of opinions on the panel included one panel member who recommended splenectomy as early as 2 weeks and another who did not recommend splenectomy after 10 weeks with no response. Most panel members would use IV Ig at some time during the course of treatment for persistent platelet counts <30,000. Other preferred options were increased doses of prednisone, dexamethasone, anti-D,
and danazol. If this hypothetical patient responded with a normal platelet count at 3 weeks, but then relapsed to a platelet count of 10,000 when prednisone was tapered over the following 5 weeks, most panel members recommended prompt splenectomy, though the range of time was 1 to 10 weeks after the occurrence of the relapse. Three of 11 panel members did not recommend splenectomy in this situation, but favored a repeat trial of prednisone or the use of danazol.

The indications for further treatment in patients who are refractory to primary treatment with glucocorticoids and splenectomy are unclear. There are insufficient data to develop evidence-based recommendations for when different treatments should be used, for comparing one treatment with another, or for assessing which treatments result in more good than harm. Based on opinion, the panel recommended against further treatment of patients with platelet counts >30,000 who have failed to respond to splenectomy and have no bleeding symptoms (2.7, C for platelet count of 30,000 to 50,000; 1.3, B for platelet count >50,000). Further treatment was recommended (8.9, A) for patients with platelet counts <30,000 who have active bleeding. In patients who have responded incompletely to treatment with both prednisone and splenectomy, the preferred treatment options recommended by the panel are listed in Table 14. Reflecting the lack of evidence that any single treatment is more effective than another, there was little panel consensus regarding preferred regimens.

ITP in Pregnant Women and Newborns

Diagnosis

Evidence. The diagnosis of ITP is more difficult during pregnancy because the presentation may closely resemble that of gestational thrombocytopenia (also termed incidental thrombocytopenia of pregnancy). Gestational thrombocytopenia is the most common cause of thrombocytopenia during pregnancy, occurring in as many as 5% of pregnant women at term and accounting for about 75% of cases of thrombocytopenia at term. Thrombocytopenia associated with pregnancy-induced hypertension and the HELLP syndrome (an acronym used to describe hemolysis, elevated liver function tests, and a low platelet count) accounted for most of the remaining 25% of cases. Pregnancy-induced hypertension, or preeclampsia, occurs in about 10% of pregnancies, principally after 20 weeks of gestation, and thrombocytopenia may occur in up to 25% of these patients. ITP is therefore a relatively uncommon cause of thrombocytopenia in pregnancy. Gestational thrombocytopenia is characterized by (1) asymptomatic, mild thrombocytopenia (2) with no past history of thrombocytopenia (except possibly during a previous pregnancy) (3) that occurs during late gestation, (4) that is not associated with fetal thrombocytopenia, and (5) that resolves spontaneously after delivery. Platelet counts are typically greater than 70,000, with about two thirds being between 130,000 and 150,000. ITP cannot be distinguished from gestational thrombocytopenia with certainty because the diagnosis of both conditions is based on the observation of thrombocytopenia with no other apparent cause. Although ITP may compose a higher percentage of cases when the platelet count is <70,000, or when thrombocytopenia is discovered earlier in pregnancy, gestational thrombocytopenia may still be the appropriate diagnosis if the thrombocytopenia resolves spontaneously after delivery. However, severe, refractory thrombocytopenia presumably due to ITP may also prompt a relapse after delivery.

The differential diagnosis between ITP and gestational thrombocytopenia is generally of little clinical importance with regard to the mother, because most cases in which the diagnosis is unclear involve mild thrombocytopenia that does not threaten maternal health. However, the presence of mild thrombocytopenia may influence the decision for regional anesthesia at vaginal delivery, though spinal or epidural hematomas have not been reported in thrombocytopenic women at delivery. The differential diagnosis between ITP and gestational thrombocytopenia is clinically important with regard to the fetus, because ITP with even mild thrombocytopenia may harm the fetus, whereas gestational thrombocytopenia does not.

Recommendations

Current evidence does not provide a scientific basis for distinguishing ITP from gestational thrombocytopenia. A thorough history is important because evidence of previous thrombocytopenia at a time when the patient was not pregnant suggests the diagnosis of ITP. When no prior platelet counts are available and other causes of thrombocytopenia are excluded, the diagnosis rests largely on the severity of thrombocytopenia and the time during gestation when thrombocytopenia is first discovered.

For example, the panel was given the hypothetical case of a healthy primiparous woman with no history of thrombocytopenia, no bleeding symptoms or pregnancy complications and whose history, physical examination, and initial blood counts and smear are compatible with the diagnosis of ITP. In such a case, the panel would consider ITP the likely diagnosis if the platelet count was below 50,000 (7.3 to 8.5, B-C for platelet count of 30,000 to 50,000; 8.8 to 9.0, A-B, for <30,000) at any time during pregnancy. ITP would be considered an unlikely diagnosis if the platelet count was more than 70,000 in the third trimester or at term (1.3 to 2.1, B).

The diagnosis of ITP during pregnancy does not require special laboratory testing. Blood pressure measurement was considered necessary (7.6, D), and appropriate (8.9, A), to rule out preeclampsia in the evaluation for ITP. Liver function tests were also considered appropriate (7.5, C). In patients with risk factors for HIV infection, testing for HIV antibody was considered necessary (7.5, D) and appropriate (8.9, A). The panel reached consensus that five tests in particular were unnecessary as part of the routine evaluation of pregnant women presenting with suspected ITP (Table 7).

Treatment During Pregnancy

Evidence. There are few data to distinguish management of ITP in pregnant women from that of nonpregnant patients. However, management in the antepartum period is distinctive because of concerns about the teratogenicity of certain
### Table 14. Panel Opinion Regarding Preference for Various Treatment Modalities in an Adult Patient Who Has Responded Incompletely to Prednisone and Splenectomy

<table>
<thead>
<tr>
<th>Platelet Count</th>
<th>Bleeding Symptoms</th>
<th>Treatment Options†</th>
<th>Higher Preference‡</th>
<th>Intermediate Preference</th>
<th>Lower Preference†</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10,000</td>
<td>Yes</td>
<td>IVlg</td>
<td>Low-dose glucocorticoid</td>
<td>Anti-D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessory splenectomy</td>
<td>Vinca alkaloids</td>
<td>Ascorbic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-dose glucocorticoid</td>
<td>Cyclophosphamide</td>
<td>Cyclosporine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Danazol</td>
<td>Combination chemotherapy</td>
<td>Colchicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Azathioprine</td>
<td>Protein A column</td>
<td>Interferon</td>
<td></td>
</tr>
<tr>
<td>15-25,000</td>
<td>Yes</td>
<td>IVlg</td>
<td>Low-dose glucocorticoid</td>
<td>Anti-D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessory splenectomy</td>
<td>Danazol</td>
<td>Ascorbic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-dose glucocorticoid</td>
<td>Vinca alkaloids</td>
<td>Cyclophosphorine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Azathioprine</td>
<td>Combination chemotherapy</td>
<td>Colchicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protein A column</td>
<td>Interferon</td>
<td></td>
</tr>
<tr>
<td>&lt;10,000</td>
<td>No</td>
<td>IVlg</td>
<td>Low-dose glucocorticoid</td>
<td>Anti-D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessory splenectomy</td>
<td>High-dose glucocorticoid</td>
<td>Ascorbic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Danazol</td>
<td>Vinca alkaloids</td>
<td>Cyclophosphorine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Azathioprine</td>
<td>Combination chemotherapy</td>
<td>Colchicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protein A column</td>
<td>Interferon</td>
<td></td>
</tr>
<tr>
<td>15-25,000</td>
<td>No</td>
<td>(None)</td>
<td>High-dose glucocorticoid</td>
<td>Ascorbic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessory splenectomy</td>
<td>Vinca alkaloids</td>
<td>Cyclophosphorine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Colchicine</td>
<td>Anti-D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protein A column</td>
<td>Combination chemotherapy</td>
<td></td>
</tr>
<tr>
<td>30-50,000</td>
<td>No</td>
<td>(None)</td>
<td>(None)</td>
<td>High-dose glucocorticoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessory splenectomy</td>
<td></td>
<td>Ascorbic acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Danazol</td>
<td></td>
<td>Colchicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Azathioprine</td>
<td></td>
<td>Low-dose glucocorticoid</td>
<td>Anti-D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is assumed that the patient is a 30-year-old otherwise healthy woman who has responded incompletely to initial therapy consisting of prednisone, 1 mg/kg/d, and splenectomy. For each clinical situation, the panel was asked to rank in order their preference among the treatment options listed below. If it was believed that more than one treatment option should be used concurrently, they were ranked with the same number. If any treatment options were believed to be not indicated or inappropriate, they were not selected. This question was completed by 11 panel members.

* Bleeding symptoms, when indicated, consist only of purpura, intermittent spontaneous epistaxis, and gingival bleeding.
† Treatment options are defined as follows: “Low-dose glucocorticoid” would begin with 1 mg/kg/d of prednisone and would taper to the lowest dose supporting an acceptable platelet count, with the goal of establishing an effective dose at which side effects would be tolerable. “High-dose glucocorticoid” would be dexamethasone, 40 mg/d for 4 days, repeated every 4 weeks for 6 cycles. “IVlg” would be given as needed at a dose of 1 g/kg, or repeated intermittently at a lower dose, to maintain an acceptable platelet count. “Anti-D” would be given as needed. “Accessory spleectomy” assumes radioisotope scanning studies demonstrate a probable accessory spleen. “Vinca alkaloids” includes vincristine and vinblastine. “Cyclophosphamide” would be given daily orally or as intermittent intravenous doses. “Combination chemotherapy” would include cyclophosphamide-vincristine-prednisone (CVP), CVP-procarbazine, or cyclophosphamide-etoposide-prednisone. Modalities not selected by any panel members included dapsone, plasma exchange, 6-mercaptopurine, methotrexate, and 2-chlorodeoxyadenosine.
‡ Options ranked as higher preferences received votes from 8-11 panel members, intermediate preference 4-7 panel members, and lower preference 0-3 panel members. Within each preference list, the order was determined using a score derived by the mean ranking of the treatment option divided by the number of votes that option received.

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bocytopenic infants had bleeding complications; however, these data are difficult to evaluate because of inconsistencies in the reported severity of bleeding. Of the 28 infants with bleeding complications, 4 had intracranial hemorrhage and 2 of these infants died; 2 were premature. Whether any infants had permanent sequelae is unknown. A review of studies from 1980 to 1990 concluded that 10% of infants born to women with ITP have a fetal platelet count <50,000 and 4% have a fetal platelet count <20,000 (Table 15). In this analysis, studies describing fetal platelet counts obtained before or at birth were distinguished from studies describing only neonatal platelet counts (see Table 15), which may have been obtained some time after delivery and may therefore have been lower than the platelet count at birth. Further review of studies of an additional 552 pregnancies (557 live births) for which only neonatal platelet counts were reported documented seven infants (1.3%) with intracranial hemorrhage or death.

Maternal or fetal platelet counts have limited utility in predicting the risk of hemorrhage or in informing decisions about whether cesarean section is indicated. Cesarean section is often recommended over vaginal delivery on the assumption that it is less traumatic to the newborn, but there is no direct evidence of this benefit (Table 15). The maternal platelet count does not correlate with the fetal platelet count. Fetal platelet count specimens can only be obtained through percutaneous umbilical blood sampling (PUBS) or fetal scalp vein sampling after cervical dilation; newborn samples can be obtained at birth by umbilical cord sampling or capillary blood specimens obtained by heel prick. Each test has its limitations. Although platelet counts obtained by PUBS within 5 days before delivery appear to correlate with platelet counts at birth, the procedure should be performed only by experienced physicians at referral centers, with patients prepared for immediate cesarean section in the event of fetal complications. PUBS can induce fetal distress, bleeding, and death; bradycardia is noted in 2% to 14% of fetuses. Fetal scalp vein specimens can only be obtained after cervical dilation, and accurate platelet counts are obtained in only one half to two thirds of attempts because of inadequate samples and platelet clumping. Fetal scalp vein sampling may cause a cephalohematoma. Platelet levels in fetal scalp vein samples may be more accurately assessed by examining a stained blood smear.

An important difference between the treatment of ITP in pregnant women and nonpregnant adults is the potential adverse effects of treatment on the course of pregnancy and fetal development. Glucocorticoids, for example, are considered safe in terms of potential teratogenicity but may have other fetal toxicities. In the mother they may exacerbate gestational diabetes mellitus and postpartum psychiatric disorders. IV Ig is considered to be safe for the fetus, having only adverse effects for the mother as described above. Cytoxic agents such as cyclophosphamide, vinca alkaloids, and azathioprine are avoided during pregnancy because of an assumed risk of teratogenicity, although there are few data regarding the magnitude of the risk. Splenectomy may increase the risk of preterm labor during the first trimester and can be technically difficult because of the size of the uterus in the third trimester, but data regarding the magnitude of risk are lacking.


Recommendations

The special issues in caring for pregnant women with ITP cannot be addressed through evidence-based recommendations, because there is no evidence that current testing and treatment options produce a better outcome for the mother or newborn. Recommendations based on opinion were derived from a questionnaire completed by nine panel members with expertise in obstetrical and neonatal care of ITP. In the panel’s opinion, women with ITP should not be discouraged from becoming pregnant if they have platelet counts >50,000 (1.7 to 2.4, B-D), but they should be discouraged if they have a platelet count <10,000 after splenectomy and other treatments (8.0, B).

Prenatal care. The panel’s opinion was that it is appropriate (but not necessary) for prenatal care of women with ITP to be managed by an obstetrician who specializes in high-risk pregnancies (7.4, D) or for such a specialist to act as a consultant (8.3, C). The panel reached consensus about the following treatment options during the prenatal period (options for which the panel could not reach consensus are listed in Table 6).

1. No treatment. Observation (no specific treatment) was considered appropriate for women with platelet counts >50,000 (8.3-9.0, A-C) and those with platelet counts of 30,000 to 50,000 in the first and second trimesters (7.5 B) but inappropriate in women with platelet counts <10,000 (1.0 to 1.3, A-B) or in women with platelet counts of 10,000 to 30,000 who are in their second or third trimester (1.8 to 2.9, B-C) or are bleeding (1.0 to 1.3, A-B).

2. Glucocorticoids. There was strong disagreement about the appropriateness of treating pregnant women initially with glucocorticoids (eg, prednisone) when platelet counts are <10,000. However, the panel agreed that glucocorticoid therapy is inappropriate when platelet counts exceed 50,000 (1.0, A for first-second trimester, 2.0, C for third trimester) or when platelet counts of 30,000 to 50,000 occur in the first-second trimester (2.3 to 2.6, D).

3. IVIg. The panel considered IVIg appropriate initial treatment in the third trimester for pregnant women with platelet counts <10,000 (7.0 to 7.4, D) or for women with platelet counts of 10,000 to 30,000 who are bleeding (7.4, D). After failure of initial glucocorticoid treatment, IVIg was considered appropriate in any trimester in women with platelet counts <10,000 (8.8 to 9.0, A-B), in women with platelet counts of 10,000 to 30,000 who are bleeding (8.5 to 8.8, B), and in asymptomatic women with counts of 10,000 to 30,000 in the third trimester (8.5, B). However, like glucocorticoids, IVIg was considered inappropriate when platelet counts exceed 50,000 (1.0 to 1.3, A-B) or when counts of 30,000 to 50,000 occur in the first-second trimester (1.6 to 1.8, B-C).

4. Splenectomy. Splenectomy was considered appropriate in women in the second trimester who have failed glucocorticoid and IVIg therapy, have platelet counts <10,000, and are bleeding (7.3, C), but it was considered inappropriate in asymptomatic patients with counts >10,000 (1.3 to 2.9, B-D) for counts of 10,000 to 50,000; 1.0, A for counts >50,000).

In summary, there was a difference in the panel’s approach to treating ITP in pregnant women and nonpregnant adults (Table 12). The panel agreed that glucocorticoids were appropriate initial therapy in nonpregnant adults but could not reach consensus about whether they were more or less appropriate than IVIg in pregnant women. The wide variation of opinion regarding prednisone and IVIg as initial treatment reflected a difference in the panel’s choice for one agent or the other. In nonpregnant adults, IVIg was considered appropriate initial treatment only for severe, life-threatening bleeding, whereas in pregnant women it was also recommended as initial treatment for women with platelet counts <10,000 or counts of 10 to 30,000 accompanied by bleeding. The panel also set a higher threshold for the indications for splenectomy in pregnant women than in nonpregnant adults, reflecting its concern about the risks to the mother and fetus.

Antepartum care. Current data provide an inadequate basis for making evidence-based recommendations on whether and how to predict the risk of neonatal thrombocytopenia and on the preferred route of delivery as term approaches. The panel’s opinion was that a history of a previous infant with a platelet count <50,000 at birth (and no evidence of alloimmune thrombocytopenia) was important information in estimating the risk of fetal thrombocytopenia (8.1, B). Beyond the history, however, the panel had little enthusiasm for laboratory testing to predict risks. It considered testing for maternal platelet antibodies unnecessary (2.3, B). The panel also lacked enthusiasm for performing PUBS (2.0, B) in women with known ITP and normal platelet counts (and no prior history of splenectomy), or fetal scalp vein sampling when such women have had prior splenectomy (2.7, D) (Table 16). In pregnant women without known

<table>
<thead>
<tr>
<th>Maternal Clinical Features</th>
<th>Platelet Count History</th>
<th>Prior History of ITP</th>
<th>Prior Splenectomy</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>75,000 at term, normal in 1st trimester</td>
<td>No</td>
<td>No</td>
<td>Not recommended PUBS (1.3, B) FPC (1.7, C)</td>
<td></td>
</tr>
<tr>
<td>75,000 in 1st trimester, which remains unchanged on no treatment throughout pregnancy</td>
<td>No</td>
<td>No</td>
<td>Not recommended PUBS (2.1, C) FPC (2.4, D)</td>
<td></td>
</tr>
<tr>
<td>40,000 in 3rd trimester, normal in 1st trimester</td>
<td>No</td>
<td>No</td>
<td>Not recommended PUBS (2.9, C) FPC (3.0 D)</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Yes</td>
<td>No</td>
<td>Not recommended PUBS (2.0, B) FPC (no consensus)</td>
<td></td>
</tr>
<tr>
<td>Normal, but previous infant with count of 20,000 at birth</td>
<td>Yes</td>
<td>Yes</td>
<td>Not recommended FPC (2.7, D) PUBS, no consensus</td>
<td></td>
</tr>
</tbody>
</table>

Assumes pregnancy is otherwise uncomplicated and that PUBS procedures are commonly performed at the hospital. "Recommended" = mean panel score of 7.0-9.0 or 1.0-3.0, respectively, for necessity/appropriateness. Scores are defined in text and Table 2. Abbreviations: PUBS, percutaneous umbilical blood sampling; FPC, fetal scalp vein platelet count.

Table 16. Panel Opinion Regarding the Role of Percutaneous Umbilical Blood Sampling and Fetal Scalp Vein Platelet Count
ITP, the panel also did not support performing PUBS (1.3 to 2.9, B-C) or fetal scalp vein sampling (1.7 to 3.0, C-D), even with maternal platelet counts of 40,000 to 75,000 at term. Nonetheless, the panel acknowledged that information obtained from these tests would influence the preferred route of delivery (see below). The panel reached consensus about the following potential interventions to reduce newborn complications (options for which consensus was not reached are listed in Table 6).

1. **Maternal treatment.** Given the hypothetical case of a pregnant woman who had ITP and a previous infant with a platelet count of 20,000 at birth, glucocorticoid therapy to increase the fetal platelet count before delivery was considered unnecessary (2.1, B) and inappropriate (3.0, C). In this case, IVIg was also considered unnecessary (2.9, C).

2. **Prophylactic platelet transfusions.** Platelet transfusions to prevent maternal bleeding during labor and delivery were considered unnecessary for women with platelet counts >30,000 and no bleeding symptoms for either vaginal delivery (1.0, A) or cesarean section (1.0, A for >50,000; 2.9, D for 30 to 50,000). Platelet transfusions were considered to be indicated in women with platelet counts <10,000 who have minor purpura and who require cesarean section (7.9, D) and in women with platelet counts <10,000 who have epistaxis or other mucous membrane bleeding (7.1, D for vaginal delivery; 8.4, B for cesarean section).

3. **Route of delivery.** When asked to define the minimum platelet count required for vaginal delivery with no anticipated maternal bleeding complications, the panel’s voting range was 10,000 to 50,000, with a mean of 27,000. When asked to define the minimum platelet count required for cesarean section with no anticipated maternal bleeding complications, the panel’s voting range of 30,000 to 50,000 with a mean of 44,000. Tables 17 and 18 present panel opinions about the probability of neonatal thrombocytopenia and the appropriateness of vaginal delivery/cesarean section in a hypothetical primiparous woman and in a multiparous woman in her second pregnancy, respectively, both with known ITP. In both instances, cesarean section was considered appropriate 7.9 to 8.1, B) if the fetal platelet count, as determined by PUBS, is <20,000, but inappropriate in other circumstances. For example, assuming the fetal platelet count (and the platelet count of previous babies) is unknown, cesarean section is not indicated when the maternal platelet count is: (1) >100,000 (1.0 to 2.1, A-B), (2) 50,000 to 100,000 (1.6 to 2.9, B), and (3) <50,000 (in primiparous women, only if splenectomy has not been performed) (2.6, B).

4. **Neonatology consultation.** The panel also addressed the necessity and appropriateness of having a neonatologist in the labor or delivery room. The consultation was considered appropriate (7.0, C-D) if there is a history of a previous infant with a platelet count <20,000 at birth, as well as in a hypothetical case in which a PUBS platelet count of 40,000 was obtained at 37 weeks. The panel agreed that the consultation was unnecessary (2.5, C) in the case of a multiparous woman with known ITP, no prior splenectomy, and a normal platelet count throughout pregnancy (assuming that unfavorable PUBS data or history on previous infants were unavailable).

### Table 17. Panel Opinion Regarding the Management of Delivery in a Primiparous Woman With Known ITP

<table>
<thead>
<tr>
<th>Maternal Platelet Count</th>
<th>Prior Splenectomy</th>
<th>Fetal Platelet Count</th>
<th>Cesarean Section</th>
<th>Vaginal Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>No</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Normal</td>
<td>Yes</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>100-150,000</td>
<td>No</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>50-100,000</td>
<td>No</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>&lt;50,000</td>
<td>Yes</td>
<td>NA</td>
<td>No consensus</td>
<td>No consensus</td>
</tr>
<tr>
<td>&lt;50,000</td>
<td>No</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>50-100,000</td>
<td>Yes</td>
<td>50,000 (scalp vein)</td>
<td>No consensus</td>
<td>Recommended</td>
</tr>
<tr>
<td>50-100,000</td>
<td>No</td>
<td>50,000 (scalp vein)</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Normal</td>
<td>Yes</td>
<td>&lt;50,000 (PUBS)</td>
<td>No consensus</td>
<td>No consensus</td>
</tr>
<tr>
<td>Normal</td>
<td>Yes</td>
<td>&lt;20,000 (PUBS)</td>
<td>Recommended</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

Assumes no current treatment and an otherwise uncomplicated pregnancy. "Recommended" and "Not recommended" = mean panel score of 7.0-9.0 or 1.0-3.0, respectively. Scores are defined in text and Table 2.

Abbreviation: NA, not applicable or not known.

There is evidence that neonates born to mothers with ITP can, during the first week of life, either develop thrombocytopenia or experience further deterioration of thrombocytopenia noted at birth. A study of 61 neonates born to 50...
women with ITP reported that platelet counts decreased in two-thirds of infants, with most (83%) infants reaching their nadir by day 1 or 2 and 100% reaching their nadir by day 6. Platelet counts stabilized or began to rise by day 7 in all infants. There is little direct evidence of an association between these transient decreases in platelet counts and the risk of adverse health outcomes (eg, ICH), nor is there evidence that treating such infants reduces neonatal morbidity or mortality. However, neonatal morbidities are reviewed above.

Table 18. Panel Opinion Regarding the Management of Delivery in a Woman in Her Second Pregnancy With Known ITP

<table>
<thead>
<tr>
<th>Maternal Platelet Count</th>
<th>Prior Splenectomy</th>
<th>Platelet Count of Prior Baby</th>
<th>Fetal Platelet Count</th>
<th>Cesarean Section</th>
<th>Vaginal Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>100-150,000</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>50-100,000</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>&lt;50,000</td>
<td>Yes</td>
<td>Normal</td>
<td>NA</td>
<td>Not recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>50-100,000</td>
<td>Yes</td>
<td>&lt;50,000</td>
<td>NA</td>
<td>No consensus</td>
<td>No consensus</td>
</tr>
<tr>
<td>Normal</td>
<td>No</td>
<td>NA</td>
<td>50,000 (PUBS)</td>
<td>No consensus</td>
<td>No consensus</td>
</tr>
<tr>
<td>Normal</td>
<td>Yes</td>
<td>NA</td>
<td>20,000 (PUBS)</td>
<td>Recommended</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

Assumes no current treatment, an otherwise uncomplicated pregnancy, and that the prior baby was delivered by an uncomplicated vaginal delivery. “Recommended” and “Not recommended” = mean panel scores of 7.0-9.0 or 1.0-3.0, respectively. Scores are defined in text and Table 2.

Abbreviation: NA, not applicable or not known.

PRIORITIES FOR FUTURE RESEARCH

The evidence-based literature review of ITP provided the opportunity to identify priorities for research. An important finding of our literature review was the lack of rigorous clinical trial data on which to base recommendations for the care of patients with ITP, affecting virtually every decision a clinician commonly encounters. The panel identified the following research priorities.

1. There is a need for rigorous prospective studies of the clinical course of untreated ITP in patients presenting with mild or moderate thrombocytopenia and no clinically important bleeding. These studies should include long-term follow-up and should emphasize the clinical outcomes of bleeding and mortality.

2. There is a need to define clinical features of children presenting with ITP that may predict which children can be followed without treatment and what features can reliably predict the risk of intracranial hemorrhage and the occurrence of chronic ITP.

3. There is a need to obtain more methodologically rigorous data on the clinical course of chronic refractory ITP, especially the course of untreated disease in patients without clinically important bleeding. These natural history data are...
especially important for evaluating the efficacy of treatment of chronic refractory ITP. As noted above, current evidence consists largely of level V evidence (uncontrolled case series), making it difficult to prove that treatment is beneficial or to exclude the possibility that some treatments are more harmful than no treatment.

(4) There is a need for studies to assess the prognostic relation of the platelet count, at initial presentation and subsequently, to the clinical outcomes of bleeding and mortality. In practice, the platelet count plays an important role in decision making despite the lack of definitive data on its prognostic importance in patients with ITP.

(5) There is a need for randomized clinical trials to evaluate many of the therapies currently used in ITP. These trials should focus on measuring the benefits of therapy in terms of the clinical outcomes of bleeding and mortality, as well as the adverse effects of treatment.

(6) There is a need for data on the costs of treatment regimens.

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