Both guidelines list leukotriene inhibitors as a potential adjunct to corticosteroids for moderate persistent asthma, as an alternative to corticosteroids plus long-acting beta$_2$-agonist. The guidelines also list leukotriene inhibitors as an alternative treatment to inhaled corticosteroids for mild persistent asthma in patients aged >5 years. Montelukast (Singulair) is approved for use in children aged ≥12 months, zafirlukast (Accolate) is approved for children aged ≥5 years, and zileuton (Zyflo) is approved only for children aged >12 years.

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CLINICAL COMMENTARY

An inhaled corticosteroid controller should be the first step

Until evidence supports a different conclusion, I think we should continue to follow current national and global guidelines. The most important concept in both is that once a child is diagnosed with persistent asthma, starting an inhaled corticosteroid controller should be the first step.

Leukotriene inhibitors should be considered as second or third choice as a controller. The main indications for using a leukotriene inhibitor are aspirin-sensitive, exercise-induced, and nocturnal asthma. I would use a leukotriene inhibitor as a controller only if a patient could not comply with inhaled corticosteroids.

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Which blood tests are most helpful in evaluating pelvic inflammatory disease?

EVIDENCE-BASED ANSWER

No individual or combination of blood tests can reliably diagnose pelvic inflammatory disease (PID) (strength of recommendation [SOR]: **A**, meta-analysis). The combination of white blood cell count, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and vaginal white blood cells can reliably exclude PID if results for all 4 tests are normal (sensitivity=100%) (SOR: **B**, cohort study, reference standard not uniformly applied).

The combination of CRP and ESR is helpful in excluding PID (sensitivity=91%) and may be especially useful in distinguishing mild from complicated cases (SOR: **B**, small cohort study). Individual tests do not appear to significantly improve diagnostic accuracy, although the CRP and ESR are somewhat useful to rule out PID (SOR: **B**, small cohort study).

EVIDENCE SUMMARY

Because of the significant inflammatory sequelae of PID, it is the standard of care to treat women with suggestive signs and symptoms. Clinical

CONTINUED

TABLE

Diagnostic performance of blood tests for pelvic inflammatory disease

	Sn (%)	Sp (%)	PPV (%)*	NPV (%)*
WBC (>10,000/mm^3)[2]	57	88	88	58
ESR (>15 mm/hr)[2]	70	52	69	54
CRP (>5 mg/dL)[2]	71	66	76	60
Vaginal WBCs[2]	78	39	66	54
0 of 4 of the above positive[2]	100	18	100	65
4 of 4 of the above positive[2]	29	95	90	47
CRP >20 or ESR >15[3]	91	50	N/A	N/A
CRP >60 or ESR >40[4]	97	61	70	96
CRP (metaanalysis)[5]	74%–93%	50%–90%		
ESR (metaanalysis)[5]	64%–81%	43%–69%		

*Prevalence=60%. SN, sensitivity; Sp, specificity; PPV, positive predictive value; NPV, negative predictive value; WBC, white blood cells; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein.

diagnosis has a positive predictive value of 65% to 90% compared with laparoscopy.[1] While no single test is both sensitive and specific, a combination of biochemical tests for inflammation may improve the ability to rule out PID.

A prospective cohort study of 120 women presenting to an ambulatory center with symptoms of PID evaluated the tests commonly used to support the clinical diagnosis of PID.[2] The objective criteria used for diagnosis included histologic evidence of acute endometritis via endometrial biopsy, purulent exudates in the pelvis on laparoscopy, or microbiologic evidence of *Neisseris gonorrhea* or *Chlamydia trachomatis* from the upper genital tract. The **Table** shows the sensitivities, specificities, and predictive values for an elevated white blood cells (>10,000/mm), ESR (>15 mm/hr), CRP (>5 mg/dL), and increased vaginal white blood cells (>3 white blood cells/high-power field) for detection of PID. If all 4 test results are negative, PID is reliably ruled out with a sensitivity of 100%. These results may be an overestimate, as the gold standard was not uniformly applied.

The role of CRP and ESR in the diagnosis of acute PID was studied in 41 women with clinically suspected acute PID who presented to a university department of obstetrics and gynecology.[3] Women underwent laparoscopy, endometrial sampling, and cultures of the upper genital tract to confirm the diagnosis. When considered together, a positive value in either the ESR (cutoff level of 15 mm/hr) or CRP (cutoff >20 mg/dL) had a sensitivity of 91% and a specificity of 50%.

Another report looked at the ability of ESR and CRP to differentiate between mild, moderate, and severe PID in 72 women undergoing laparoscopy at a university department of gynecology.[4] The cutoff levels were ESR >40 mm/hr and CRP >60

mg/dL. If either test was abnormal, the sensitivity and the negative predictive value for severe disease were 97% and 96%, respectively (**Table**). All patients with tuboovarian abscess or perihepatitis and 6 of 7 patients who had anaerobic bacteria isolated from the fallopian tubes tested positive with these cutoff levels.

A meta-analysis from 1991 found 12 studies, not including any of the above studies, and assessed the laboratory criteria for the diagnosis of PID. No single or combination diagnostic indicator was found to reliably predict PID. However, the CRP and the ESR were useful in ruling out PID, with good sensitivities for CRP in 4 of 4 studies analyzed (74%–93%) and for the ESR in 4 of 6 studies (64%–81%). Ten of 12 studies used laparoscopy as the gold standard.[5]

RECOMMENDATIONS FROM OTHERS

The Centers for Disease Control and Prevention makes no specific recommendation for the use of specific blood tests in the diagnosis of PID.[1] The Association for Genitourinary Medicine states that an elevated ESR or CRP supports the diagnosis of PID.[6]

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CLINICAL COMMENTARY

When diagnosing PID, a clinician must have a high index of suspicion

PID is a difficult diagnosis to make, without clear-cut diagnostic guideposts. The sequelae of PID can be so serious that clinicians must not miss this diagnosis. If results of all 4 tests described above are negative, this can reliably rule out the diagnosis.

Unfortunately, no set of tests can reliably confirm the diagnosis in all cases. The traditional triad of lower abdominal pain, cervical motion tenderness, and adnexal pain are still taught as the classic findings for diagnosing PID. The clinician must also have a high index of suspicion, particularly with teen-agers with abdominal pain, and when the pain is indolent and lingering.

Nonetheless, a recent study concludes there is insufficient evidence to support existing clinical diagnostic criteria and recommends that the clinical criteria for PID be redefined. In a group of patients with laparoscopically confirmed PID, no variable (abnormal vaginal discharge, fever >38°C, vomiting, menstrual irregularity, ongoing bleeding, symptoms of urethritis, rectal temperature >38°C, marked tenderness of pelvic organs on bimanual examination, adnexal mass, and ESR >15 mm) reliably predicted the disease, and found, rather, that most had low specificity and sensitivity. The chance of having PID based on the presence of lower abdominal pain was 79%. Three variables predicted 65% of the cases of PID: elevated ESR, fever, and adnexal tenderness. When evaluating patients for admission, some authors add "the desire to bear children" to the standard admission criteria, which include severity of sickness, pregnancy, possible need for surgical intervention, lack of response to oral medications, or immunosuppression.

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