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Pediatrics Research International Journal

Vol. 2013 (2013), Article ID 589490, 26 minipages.
DOI:10.5171/2013.589490
www.ibimapublishing.com

Research Article

Value of Preoperative Laboratory Tests in Elective Pediatric Outpatient Surgery

Authors

Derya Erdoğan, Özlem Balcı, Ayşe Karaman, İbrahim Karaman and Hakan Çavuşoğlu

Dr Sami Ulus Maternity and Children's Research and Training Hospital – Pediatric Surgery Department, Ankara, Turkey

Received 30 May 2013; Accepted 23 June 2013; Published 30 November 2013

Academic Editor: Murat A. Çakmak

Cite this Article as: Derya Erdoğan, Özlem Balcı, Ayşe Karaman, İbrahim Karaman and Hakan Çavuşoğlu (2013), "Value of Preoperative Laboratory Tests in Elective Pediatric Outpatient Surgery," Pediatrics Research International Journal, Vol. 2013 (2013), Article ID 589490, DOI: 10.5171/2013.589490

Abstract

Preoperative laboratory tests are a component of the evaluation of the patient for the operation. The aim of this study is to evaluate the necessity of preoperative blood tests in outpatient surgery in children. This study was performed in the pediatric surgery clinic between January 2005 and June 2009 on 3,693 patients who underwent elective outpatient surgery. Results of the routine preoperative tests performed in all patients such as hemogram, liver enzymes, coagulation tests and anti-HCV antibody, hepatitis B antigen, and anti-HIV antibody were evaluated. Two thousand nine hundred of the patients were boys (78.5%) and 793 were girls (21.5%). Mean age was 33±38 months (median 19 months). One or more parameters were found to be abnormal in 194 patients (5.2%). Anemia was

detected in 3.1% of the patients (n:117), liver enzymes were found to be elevated in 1.1% (n:40) of the patients and coagulation tests were found to be increased in 0.8% (n:30) of the patients. Operations were postponed in 1.9% (n:70) of the patients for evaluation or treatment. This study demonstrates that routine preoperative blood tests though they might be valuable in a small number of patients; however, they are unnecessary in 94.8% of the patients.

Keywords: Child, pediatric surgery, preoperative test, elective operation.

Introduction

An important aim of the preoperative evaluation of the patients is, to decrease the possible morbidity and mortality rates to a minimum preoperatively or postoperatively. Preoperative evaluation of the patient gives opportunity to the anesthesiologist for detecting the patient's illness and limitations. Laboratory tests are performed in addition to physical examination during this evaluation. Patient's history from gestation age up to time and careful physical examination of especially cardiopulmonary system and congenital or acquired malformations of airway prevents nonessantial tests (1). Evaluation of the patients is suggested at least twenty four hours before the operation for the possibility of further tests (2). Optimization of the circumstances is provided to decrease the

probability of perioperative and postoperative complications. The aim of this study is to verify the necessity and benefits of the preoperative blood tests performed before pediatric outpatient surgery cases.

Materials and Methods

Three thousand six hundred ninety-three children underwent elective outpatient surgery who presented to the pediatric surgery outpatient clinics with the diagnosis of inguinal hernia, cord cyst, and hydrocele were included in this retrospective study performed after the approval of the hospital ethics committee. The medical records and laboratory data of the patients in the computer database were retrospectively analyzed. The laboratory tests ordered preoperatively in patients who

were planned to undergo elective outpatient surgery were whole blood count, liver enzymes (aspartate aminotransferase (AST), alanine aminotransferase (ALT)), HbsAg, anti-HIV antibody, anti-HCV antibody, prothrombin time (PT), INR and activated partial thromboplastin time (aPTT). Patients whose operations were postponed due to the need for further evaluation and/or treatment were identified. When abnormal test results were obtained, patients were directed for appropriate consultations. Patients with test results that were defined as abnormal and their further evaluations were recorded as well. Statistical analysis was performed using SPSS version 15.0.

Results

Boys and girls comprised 2,900 (78.5%) and 793 (21.5%) of the patients, respectively. The youngest patient during the preoperative evaluations was a three days old newborn, while the oldest of our patients was 17 years old. Mean age of the patients was 33 ±38 months (median 19 months).

One or more problems that required further evaluation were identified in 194 (5.2%) of the patients. More than one abnormal value was present in 10 (0.3%) patients. Low hemoglobin was identified in 117 (3.1%) patients and they were further evaluated and treated with the diagnosis of anemia. Urgent blood transfusions were performed in seven patients due to deep anemia (Hb range: 5.4-7.6 g) in the hematology department.

Three patients were diagnosed with thalassemia traits, two were diagnosed with hereditary spherocytosis, and one patient with folic acid deficiency. The other 104 (2.8%) patients were treated for iron deficiency anemia.

Elevation of liver enzymes was present in 40 (1.1%) patients. Among those patients, one patient was diagnosed as neonatal hepatitis, another was diagnosed as brucellosis, the third was diagnosed as hepatitis A, and the fourth was diagnosed as cytomegalovirus infection HbsAg positivity was identified in five patients and the test was repeated. The repeat test was HbsAg positive in two of the patients and they were diagnosed with chronic hepatitis; the repeat test was HbsAg negative in the other three patients. In addition, HCV positivity was identified in two patients.

Elevations in PT, INR and/or aPTT levels were detected in 30 (0.8%) of the patients. Consultations with hematology clinic were performed in those patients and 13 patients received vitamin K and one patient was diagnosed with factor 2 deficiency. The repeat test results of the rest of the patients (n:16) were in the normal range before any other movement was done. False positivity of the test in this group was 53% (16/30).

In 70 (1.9%) patients with abnormal test results, the planned operation was postponed to repeat the test with abnormal results or for treatment of the detected abnormality for a mean of 5±2.8 months (median 4 months). While 46 (66%) of the patients required long term treatment for iron deficiency anemia, 14 (20%) were evaluated for liver enzyme elevation and anesthesiologists required the test results of the patients to be

normal before operation. The operations of the patients who were diagnosed with brucellosis and cytomegalovirus infection were postponed until their treatments were completed. Five patients (7%) were evaluated by hematologists due to PT and aPTT elevation; their tests were repeated more than once and they awaited diagnosis. Another group of five patients (7%) were evaluated for hepatitis B antigen positivity and thus their operations were postponed.

Discussion

Elective outpatient surgery constitutes the majority of the cases of pediatric surgery. Preoperative evaluation of patients to undergo elective outpatient surgery includes obtaining medical history, physical examination, and laboratory tests. Laboratory

analyses are performed following obtaining medical history and physical examination in our clinic with the aim of preventing probable perioperative and postoperative preventable complications.

The aim of performing preoperative laboratory tests includes identifying unpredictable situations that may need to be treated and to be prepared for some perioperative situations as surgeons and anesthesiologists.

Trials in children and many studies in adults support the need for selectivity for the tests to be performed in elective and non-cardiac surgery.[3,4] Those studies concluded that many and unnecessary preoperative tests have been used that increased the costs of the procedures.[3,4]

Performing whole blood count preoperatively is a widely accepted opinion. Postoperative apnea was reported to be seen more frequently in anemic babies.[5,6] Hemoglobin levels should be known preoperatively especially in children with a tendency to bleed intraoperatively, who were diagnosed with a malignant disease, or were thought to have a malignant disease and who have malnutrition.[7] If the hematocrit level is less than 30% in preterm babies, it is suggested to wait before operation until the hematocrit is higher than this level.[8] White blood cell counts should be obtained in patients receiving chemotherapy and immunosuppressive therapy and who are suspected to have infection and who have hematological malignancy[7]. In one study it was found that 0.7-4.8% of the patients had abnormal hemoglobin levels; however, the test result was observed to make any change in the treatment only in 0.1-2.7%.[9]

Preoperative evaluation of hemoglobin level is required in pediatric patients and it is required to be at least 30% or more.[8] The most frequent laboratory abnormality detected in this study was decreased Hb, which was identified in 117 patients (3.1%). Deep anemia was found in seven patients and they were transfused. In addition, three patients were diagnosed to have thalassemia traits, two had hereditary spherocytosis and one had folic acid deficiency. The other 104 patients (2.8%) were treated for iron deficiency anemia.

The value and necessity of the preoperative tests of hemostasis have been reported to be controversial; however, some studies report that they should be used in patients who have diseases that cause a tendency for bleeding and before operations that might cause bleeding (such as liver resection).[9,10,11] The

predictive value of these tests for bleeding in patients with no clinical problem of bleeding is suggested to be low.[9] However, preoperative hemostatic assessment should be performed in patients with a clinical suspicion of bleeding disorders, who are bleeding or on anticoagulant drugs, who have malnutrition/malabsorption or a known liver disease. In this case, PT, aPTT, and platelet count are combined for this purpose. Platelet level should be monitored in hematological malignancies, known platelet disorders, and in the presence of bleeding, and purpura.[7] Detailed past medical history obtained from the family is important to learn prior episodes of bleeding. Abnormal PT and aPTT levels were detected in 0.8% of the cases in this study; however, no intervention was needed in 53% of the patients since the results of the repeat tests were normal. On the other hand, the test was repeated in 43% after administering vitamin K

and the results were normal. The patient who was detected to have factor 2 deficiency was transfused with fresh frozen plasma and then the operation was performed. This patient had no bleeding problems in the medical history, but had abnormal blood test results. Another subject of discussion is the laboratory errors that cause unnecessary tests and waste of time. Coagulation tests were deemed clinically unnecessary since the positive predictive value of them is very low in most cases of minor surgery other than the special situations stated above.[7,9,11,12]

Some 60% of the tests have been reported to be performed unnecessarily.[7] Repeat liver function tests performed in one to two days after the first tests were found to be normal in 45% (18/40) of the patients who were found to have elevated liver

enzymes, and thus no delay in the operations occurred. The other 18 patients consulted with pediatricians due to mild elevations in liver enzymes, which were found to be related to current infections that the children had at that time, and the blood tests returned to normal levels in two to four weeks. In one of the patients out of four with liver enzymes higher than 100 U/L was diagnosed with hepatitis A. Another case was diagnosed with cytomegalovirus infection; elevations in liver enzymes in other cases were found to be secondary to various infections and the operations of those cases were performed after the values returned to normal levels. One patient was diagnosed with brucellosis and another newborn with neonatal hepatitis. These patients presented with the complaint of inguinal swelling and the diagnoses were made in consideration of the present and

additional symptoms and physical examination findings after consulting with pediatric clinic.

Various studies performed in adults or children suggest that due to a very low number of abnormal results in the routine preoperative laboratory tests, most of those tests ordered are unnecessary.[3,4,7] The power of past medical history and physical examination are higher in defining the perioperative and postoperative risk of a patient. To determine good indications for laboratory tests to be performed will decrease both the costs and laboratory burden, and also will prevent traumatization of the children with unnecessary blood drawing. The rate of treatment change is found to be 2.7% or less and the laboratory tests are recommended to be performed in older patients and in patients with systemic diseases, not in every patient.[9]

In conclusion, the preoperative assessment of hemoglobin levels and a target level of hematocrit higher than 30% is a widely accepted approach. On the other hand, the need for preoperative detailed blood tests in outpatient surgery in the pediatric population is controversial unless performed in some special groups (such as malnutrition, liver disease, kidney disease, and others). Increased costs are inevitable due to repeat tests for false positive results or unnecessary tests. As a matter of fact, results of the preoperative hemostatic tests were found to be elevated in 16 patients at first, but were normal in the repeat tests. This study that included a remarkably high number of patients demonstrated that routine blood tests performed preoperatively in pediatric outpatient surgery were unnecessary in 94.8% of the cases, though they might be valuable in a small number of patients.

Conflict of Interest: None

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