

Outcomes of Routine Testing of Liver Enzymes in Institutionalized Geriatric Patients

Eric N. Steinberg, MD; Hyun M. Cho-Steinberg, MD; and Colin W. Howden, MD, FRCP, FACP, FACG, FCP

Abstract

This study sought to identify any benefit of routine liver function tests (LFTs) in chronically ill, geriatric patients and to assess which patients require evaluation for abnormal LFT levels. A retrospective chart review was carried out on 268 consecutive patients (M:F = 1:2, mean age 77 years, range 61-98 years) presenting for acute care from a long-term care facility. All were without jaundice, right upper quadrant pain, pruritus, bruising, or signs of chronic liver disease. The degree of LFT abnormality (aspartate aminotransferase, alanine aminotransferase, total bilirubin, or alkaline phosphatase) during admission was compared to the clinical diagnosis at the time of discharge. The most common diagnoses were pneumonia, urinary tract infection, and peripheral or coronary disease in 186 (60%). Thirty-seven patients (14%) had elevated LFT levels on admission. The levels normalized within 2 days in 26 of these patients, 25 of whom had a history of vascular disease (96%). Of the 11 remaining patients, 4 had coexistent vascular disease (36%), and 5 had LFT levels twice normal (none with vascular disease) and underwent abdominal ultrasound. One patient had a common bile duct stone successfully extracted. Enzyme abnormalities were due to hepatitis B or medication use in 10 of 11 patients. No patient had liver biopsy. All but one of the 268 patients were discharged without further evaluation. Over one year of follow up, no patient returned for a liver-related problem. Based on these findings, only those patients with LFT levels that are twice normal and which do not normalize within 2 days warrant further evaluation. Transient LFT abnormalities may be due to decreased liver perfusion.

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Physicians order laboratory screening panels, including serum liver enzyme measurements, for practically every patient who has a complete physical examination or who is admitted to the hospital. In an effort to provide cost-effective care, however, the utility of this practice has come into question.¹

In chronically ill elderly patients, in particular, several factors emphasize the need to evaluate the value of routine liver function tests (LFTs). First the number of chronically ill elderly has increased dramatically, producing a greater demand to provide comprehensive services. By the year 2000, 13% of the population is expected to be older than 65 years.² Second, while physicians who treat the elderly are often called upon to distinguish the effects of age from those of disease, such determinations remain unclear. Third, whether by capitated payment structures that discourage referral to specialist care, or practice guidelines that suggest preferred courses of treatment, the practicing physician now faces constraints in everyday decision making that were unimaginable in the past.³ Ordering and interpreting laboratory data in the elderly is further confounded by multiple medical problems, polypharmacy, and malnutrition.⁴ Finally, the cost is a factor for both society and the patient. A portion of the cost of testing is often paid directly by the patient. Many senior patients fear visiting the physician because of the expenses testing may incur, thus resulting in delayed treatment, anxiety, and potentially increased costs for treating a more severe illness that results.

The impact of any test should manifest in altered medical management of the patient; otherwise, the test should not be performed.⁵ Most studies evaluating preventive services use reduction of disease-specific mortality as an outcome. In our clinical experience, most results of liver enzyme tests ordered routinely are normal and provide little additional information regarding patient management. We sought to demonstrate the frequency of abnormal LFT levels in our population of chronically ill, institutionalized elderly patients and to assess the outcome of further evalua-

At the time of writing all authors were affiliated with the Division of Digestive Diseases and Nutrition, Department of Internal Medicine, University of South Carolina School of Medicine, and Byrnes Center for Geriatric Medicine, Education, and Research, Columbia, SC.

Address correspondence to: Colin W. Howden, MD, Two Medical Park, Suite 502, Columbia, SC 29203

... PATIENT OUTCOMES ...

tion in these patients. Extrapolating these findings to the general population may support the concept of symptom-directed testing.

... PATIENTS AND METHODS ...

The Byrnes Center for Geriatric Medicine, Education, and Research is supported by the state of South Carolina within the Department of Mental Health. It provides acute care to a heterogeneous population of chronically ill, elderly patients who reside in outlying facilities. The patients are sometimes non-communicative and need continuous skilled care. Of the 268 consecutive patients admitted to the medical service from September 1994 to March 1995, 186 (69%) had one of three discharge diagnoses: pneumonia (97 patients), urinary tract infection (65), and dehydration (24). Other diagnoses, including altered mental status, hyperglycemia, fecal impaction, congestive heart failure, chronic obstructive pulmonary disease exacerbation, and anemia, accounted for the other 82 patients. During evaluation in the emergency room, all patients had laboratory blood tests including LFTs, lactate dehydrogenase (LDH), and prothrombin times. No patients had documented jaundice, right upper quadrant pain, pruritus, bruising, or signs

of chronic liver disease. Concomitant vascular disease was defined as a history of coronary atherosclerotic heart disease, peripheral vascular disease, or stroke.

There were 89 men and 179 women, 149 whites and 119 blacks. The mean age was 77 years with a range of 61 to 98 years. Two hundred three patients had a history of tobacco use and 239 had a history of ethanol use. The mean hospital stay was 31 days (range 3-171 days). Patients with abnormal LFT levels were reviewed with one-year follow-up chart review.

... RESULTS ...

Of the 268 patients, 37 (14%) had abnormal LFT levels on admission. In 26 patients, LFT results normalized within 2 days, and no further LFTs were obtained on this set of patients after 2 days. All viral hepatitis serum test results for these 26 patients were negative for active or persistent disease (15 of 26 had hepatitis B surface antibody), and no further diagnostic liver tests were performed. Of these 26 patients, 13 had levels of aspartate aminotransferase (AST) greater than twice normal (range 161-2,100 U). All 3 of 13 with AST levels greater than 1,000 U had acetaminophen levels within the normal range. All 26 patients had LDH levels at least twice normal, and 12 of the 26 had minimally elevated alkaline phosphatase (less than 30 U above normal). Six of these patients had concomitant AST or alanine aminotransferase (ALT) abnormality, with 10 of 26 having ALT values at least 30 U above normal (range 82-170 U). In 3 patients, the ALT finding was the only abnormal LFT. Total bilirubin was above 17.1 mol/L in 2 of 26 patients and was the only abnormality found in these 2 patients. There was no documented evidence of hemolysis on any of the peripheral blood smears of all 26 patients. All but one of the 26 (96%) had coexisting vascular disease.

Table 1. Patients with Persistently Abnormal LFTs Levels

Patient	AST (Normal 0-45)	ALT (Normal 0-55)	Alkaline Phosphatase (Normal 0-107)	Total Bilirubin (Normal 0-1.2)	Etiology
1	48	42	138	0.4	phenobarbital
2	71	55	101	0.6	chlorpromazine
3	89	23	144	0.5	allopurinol
4	134	562	98	0.3	hepatitis B,C
5	458	444	86	0.5	hepatitis B
6	638	691	92	0.4	hepatitis B
7	241	270	131	0.6	hepatitis B,C
8	95	56	111	0.3	promazine
9	92	101	108	0.4	phenytoin
10	20	149	130	0.4	phenytoin
11	49	69	496	1.6	CBD stone

LFT=liver function test; AST=aspartate aminotransferase; ALT=alanine aminotransferase
CBD=common bile duct.

Of the remaining 11 patients with persistent elevations of LFT results beyond 2 days, 4 (36%) had coexisting vascular disease. Five had LFT results twice normal without vascular disease; each underwent abdominal ultrasound that was abnormal in one. Endoscopic retrograde cholangiopancreatography revealed a common bile duct stone that was successfully extracted.

The admission LFT results in the 11 patients with persistent abnormalities with their final assessment of the etiologies are summarized in Table 1.

One-year follow up of the 268 patients after discharge revealed no liver-related problems. In 47 (18%), no further acute care was documented. Readmission for non-liver-related problems occurred in 103 (38%). There were 56 (21%) deaths due to non-liver-related causes.

... DISCUSSION ...

The utility of extensive blood tests in the elderly has come into question as a means of cost containment. Reference ranges in the elderly are lacking. Most LFT results are not altered with age with the exception of alkaline phosphatase, which increases about 20% between the ages of 30 and 80 years because of extrahepatic sources.⁴ The effectiveness of routine LFTs is difficult to appraise for economic analysis because this practice has never been firmly established to be beneficial.⁶ The only questionably therapeutic intervention for our patients was the endoscopic removal of an asymptomatic common bile duct stone in one patient (0.3%).

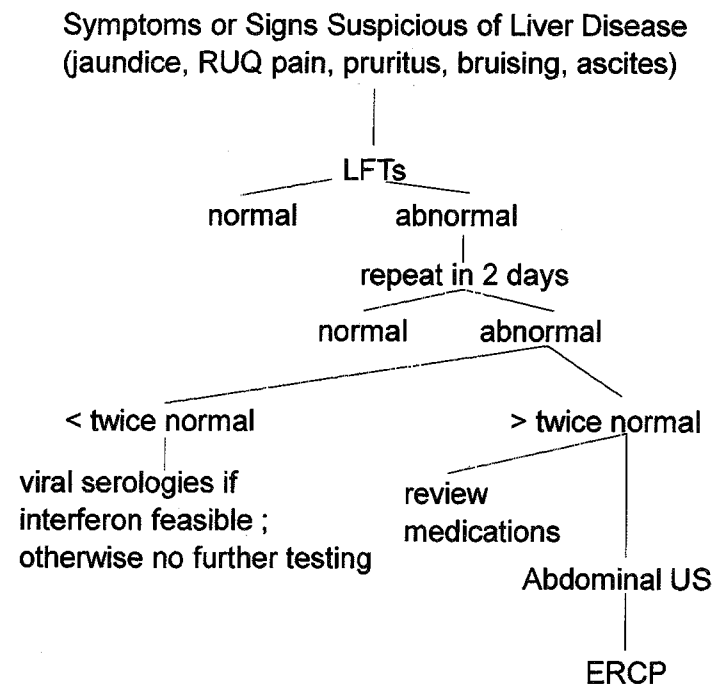
Methods of evaluating abnormal LFT results that will benefit patients remain poorly studied. In a recent prospective study of routine laboratory tests that included LFTs in ambulatory general medical patients, the therapeutic yield was 2.8%.⁷ However, our study of an elderly population did not yield even a fraction of this percentage. This suggests the elderly may require different standards than those used for the general population. Studies on the elderly are not easy to conduct because it is difficult to obtain sizable populations of "healthy" old people. It is also difficult to separate the effects of aging from those of disease.⁸ Our heterogeneous group comprised elderly patients distinct in their degree of debilitation. Patients who cannot voice complaints or who are difficult to examine adequately require other objective methods of determining disease processes. This may help to explain poorly directed labo-

ratory testing by clinicians. When applying these data to the general population, on the other hand, it seems even less appropriate to order undirected tests because these patients usually can describe symptoms and direct the clinician toward necessary laboratory evaluation.

While some screening tests are justifiable, others waste resources and do not influence patient management.⁹ The cost of routine testing in our patients was \$6,092 based on Medicaid estimates that each test panel cost \$22.73. The cost outside the Medicaid arena probably is much higher. It is estimated that 39 million Americans have more than one chronic condition with estimated cost expenditures of \$659 billion annually.¹⁰ If all these patients had routine LFTs, the estimated cost would be \$886 million. From a cost-effective standpoint, symptom-directed testing is mandatory. Figure 1 provides our strategy for evaluating LFTs in the elderly.

Most patients in our study had normal LFT results. In the 37 patients with abnormal findings, only 11 had persistent abnormalities warranting further diagnostic testing. The 26 patients whose LFT results had nor-

Figure 1. Evaluation of Liver Function Tests (LFTs) in the Elderly



RUQ=right upper quadrant; US=ultrasound; ERCP=endoscopic retrograde cholangiopancreatography

malized within 2 days without further testing had no liver-related illnesses at one-year follow up. Acute or chronic viral hepatitis had been excluded in all 26 patients. The etiology of those transient abnormalities may have been ischemia. Although the transaminase elevations of hepatic ischemia are usually dramatic, the duration of hypoperfusion and time course after hypoxia only produce mild elevations in animal models.¹¹ The frequency of ischemic hepatitis is unknown, but is probably underdiagnosed because of mild, subclinical features.¹² Poor hepatic perfusion is difficult to assess with standard laboratory blood tests. Hepatic ischemia may be differentiated clinically and biochemically from viral hepatitis, although histologic findings are confirmatory. Transaminases reach peak blood levels within 24 to 48 hours of an ischemic episode, with equally rapid resolution. A parallel increase in serum LDH is characteristic.¹³ Our 26 patients were often hypovolemic, and all had elevated LDH on admission. There was a higher prevalence of vascular disease in patients with transient LFT abnormalities than in those with persistent abnormalities, suggesting that ischemia may have been contributory.

In the 11 remaining patients with abnormal LFT results, the most common reason was medication (Table 1). Liver microsomal enzymes are responsible for the metabolism of most drugs. Reduction in enzyme activity impairs drug elimination, leading to drug accumulation and possible toxicity. There is some evidence of reduced enzyme activity with age.¹⁴ Some drugs stimulate microsomal activity, making determination of clinical status difficult.¹⁵

Abnormal LFT results with serologic evidence of active or persistent hepatitis were only seen in 1.5% of our patients. The previously held concept that viral hepatitis in the elderly is characterized by a more severe course has been redefined. Our patients had no sequelae of liver-related illness regardless of their viral hepatitis status. The more prolonged, indolent course of viral hepatitis in the elderly with associated lower transaminase elevations may reflect the overall senescence of the immune system.¹⁶ There was only one patient in whom LFTs had a significant impact on management.

In conclusion, routine LFTs in these sick elderly patients usually did not objectively alter patient outcome and should be abandoned. A cost-containing strategy of symptom-directed testing should reduce wasteful data collecting that does not improve the patients' quality or quantity of life.

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