



# Are Preoperatively Requested HBsAg Results Followed?

## Preoperatif İstenen HBsAg Sonuçları İzleniyor mu?

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### ABSTRACT

**Objectives:** Hepatitis B virus (HBV), hepatitis C virus, and human immunodeficiency virus are the leading blood-borne infections. In our country, these 3 viral serologies are screened in patients scheduled for surgery. Preoperative hepatitis B surface antigen (HBsAg) screening is performed for HBV infection. In this way, patients with this virus can be detected early and receive early treatment. In this study, we aimed to investigate the rate of diagnosis and follow-up of HBV infection in patients with HBsAg positivity during preoperative serologic screening.

**Materials and Methods:** The HBsAg test results of patients directed to the anesthesia polyclinic for preoperative preparation by surgical departments within 3 years were screened. Further examinations for HBV infection and the diagnostic status of patients found to be HBsAg-positive for the first time were analyzed.

**Results:** Of the 679 patients with HBsAg positivity during the 3 year study period, 412 (60.7%) had at least one previous HBsAg test in the hospital automation system. HBsAg positivity was detected for the first time in 267 (39.3%) patients. When the status of further examination was analyzed, 220 (82.4%) of 267 patients were classified as no further examination, 14 (5.2%) as incomplete further examination, and 33 (12.4%) as complete further examination.

**Conclusion:** The electronic patient files should be reviewed before HBsAg testing for preoperative serologic screening. HBsAg-positive patients should be directed to relevant specialty physicians for the diagnosis and treatment of HBV infection, and surgical medical science physicians should be made aware of this issue through training. In addition, it is anticipated that the "Electronic Screen Alert" application, which will guide physicians, will be useful.

**Keywords:** HBsAg, HBV, healthcare workers, hepatitis B virus, preoperative serologic screening, virus

### ÖZ

**Amaç:** Hepatit B virüsü (HBV), hepatit C virüsü ve insan immün yetmezlik virüsü kan yoluyla bulaşan enfeksiyonların başında gelmektedir. Ülkemizde cerrahi planlanan hastalarda bu 3 viral seroloji taranmaktadır. HBV enfeksiyonu için ameliyat öncesi hepatit B yüzey antijeni (HBsAg) taraması yapılmaktadır. Bu sayede bu virüsü taşıyan hastalar erken tespit edilebilmekte ve erken tedavi alabilmektedir. Bu çalışmada, preoperatif serolojik tarama sırasında HBsAg pozitifliği saptanan hastalarda HBV enfeksiyonu tanı ve takip oranını araştırmayı amaçladık.

**Gereç ve Yöntemler:** Anestezi polikliniğine 3 yıl içinde cerrahi bölümler tarafından preoperatif hazırlık için yönlendirilen hastaların HBsAg test sonuçları tarandı. HBV enfeksiyonu için yapılan ileri tetkikler ve ilk kez HBsAg pozitif bulunan hastaların tanı durumları analiz edildi.

**Bulgular:** Üç yıllık çalışma döneminde HBsAg pozitifliği saptanan 679 hastanın 412'sinde (%60,7) daha önce hastane otomasyon sisteminde en az bir HBsAg testi yapılmıştı. HBsAg pozitifliği 267 (%39,3) hastada ilk kez tespit edilmiştir. İleri tetkik durumu incelendiğinde, 267 hastanın 220'si (%82,4) ileri tetkik yok, 14'ü (%5,2) eksik ileri tetkik ve 33'ü (%12,4) tam ileri tetkik olarak sınıflandırıldı.

**Sonuç:** Ameliyat öncesi serolojik tarama için HBsAg testi yapılmadan önce elektronik hasta dosyaları gözden geçirilmelidir. HBsAg pozitif hastalar HBV enfeksiyonu tanı ve tedavisi için ilgili uzman hekimlere yönlendirilmeli ve cerrahi tıp bilimi hekimleri eğitimlerle bu konuda bilinçlendirilmelidir. Ayrıca hekimlere yol gösterecek olan "Elektronik Ekran Uyarısı" uygulamasının faydalı olacağı öngörülmektedir.

**Anahtar Kelimeler:** HBsAg, HBV, sağlık çalışanları, hepatit B virüsü, ameliyat öncesi serolojik tarama, virüs

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## Introduction

Hepatitis B virus (HBV) infection is the most common cause of chronic hepatitis and cirrhosis in our country. Healthcare workers are at risk of HBV infection due to occupational exposure (1). It is believed that approximately 66,000 healthcare workers develop HBV infection each year (2). Infection by healthcare workers occurs as a result of contact with blood, blood products, and body fluids infected with damaged skin and mucosa. It is also observed due to percutaneous injuries. The risk of occupational accidents leading to HBV infection transmission during surgical procedures is high. In our country, serologic screening for these three bloodborne viral infections in patients scheduled for surgical operations is performed to prevent HBV transmission to surgical personnel and detect asymptomatic HBV infection. However, there are no data on the benefits of this approach in patients with positive screening results.

In this study, we aimed to investigate the rate of diagnosis and follow-up of HBV infection in patients who were found to be hepatitis B surface antigen (HBsAg)-positive for the first time by examining patients in whom HBsAg was requested for preoperative serologic screening.

## Materials and Methods

Patients who were directed to the anesthesia polyclinic for preoperative preparation by surgical departments between August 2020 and August 2023 were retrospectively screened. The HBsAg test results of these patients were analyzed using the hospital automation system of the Firat University Central Microbiology Laboratory. Further examinations for HBV infection and the diagnostic status of patients who were found to be HBsAg-positive for the first time were conducted. Further examination status was referenced by detailed HBV serology [immunoglobulin G antibody to core antigen (anti-HBc IgG), antibody to hepatitis B e antigen (anti-HBe), hepatitis B e antigen (HBeAg)] and HBV-DNA testing, and entering "B18: Chronic viral hepatitis" and other relevant diagnosis codes into the Hospital Information System according to the International Classification of Diseases (ICD)-10 criteria. After HBsAg positivity was detected for the first time, those for whom no test was ordered and no diagnosis code was entered were classified as "No further examination", those for whom some tests were ordered but no diagnosis code was entered were classified as "Incomplete further examination", and those for whom all tests were ordered and diagnosis code was entered were classified as "Complete further examination".

Enzyme-Linked ImmunoSorbent Assay method and the Architect i2000 SR (Abbott, USA) device were used to evaluate the serologic markers of the patients. Data were analyzed using SPSS package program (version 22.0, SPSS Inc., Chicago, IL). Ethics committee approval was obtained from the Firat University Faculty of Medicine, Non-interventional Clinical Research Ethics Committee (decision number: 2023/14-19) on 14.12.2023.

## Results

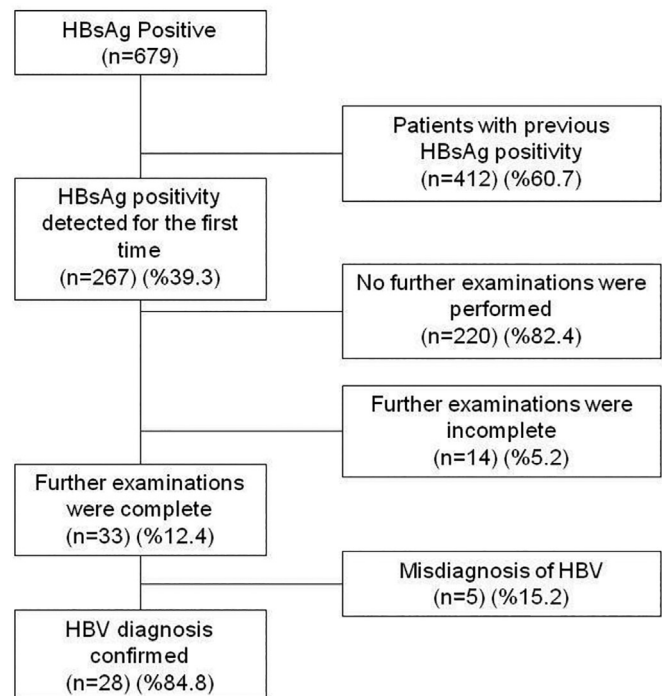
In the 3 year study period, 859 (2.8%) of 31,799 HBsAg test results requested before surgery were positive. Excluding

repeated requests from the same patient, 679 (2.6%) of 25,978 were HBsAg-positive. The mean age of HBsAg-positive patients was  $51.49 \pm 14.62$  years (minimum–maximum: 1-89) and 309 (45.5%) were female. Of the 679 patients with HBsAg positivity, 412 (60.7%) had at least one previous HBsAg positivity in the hospital automation system, whereas HBsAg positivity was detected for the first time in the remaining 267 (39.3%) patients. Of the 267 patients with HBsAg positivity for the first time, 220 (82.4%) were excluded from further examination because no other tests were ordered and no diagnosis code was entered in the hospital automation system. Thirty-three (12.4%) patients who underwent further examination were classified as having complete further examination. It was determined that 28 (84.9%) of these patients were diagnosed with HBV infection, and a diagnostic code was entered. Five (15.1%) of the cases were false positives. Fourteen (5.2%) patients in whom some tests were ordered but the diagnosis code was not entered were classified as having incomplete further examination (Figure 1).

In the group of patients with incomplete further examination, only HBsAg was requested in eight (57.1%), HBV-DNA was requested in four (12.1%), and HBsAg and HBV-DNA were requested in two (16.6%) patients. Table 1 shows the status of further examination for HBV infection in patients who were found to be HBsAg-positive for the first time according to the surgical department where the operation was to be performed.

## Discussion

These three viruses, which are also transmitted through the blood, pose a threat to human life and represent a public health problem. It is estimated that approximately three million exposures



**Figure 1.** HBsAg-positive patients in the three-year period and further investigation status of patients with HBsAg positivity for the first time  
HBV: Hepatitis B virus, HBsAg: Hepatitis B surface antigen

**Table 1.** Status of further examination for HBV infection in patients found to be HBsAg-positive for the first time according to the surgical department where the operation was to be performed

The surgical department	No further examination n (%)	Incomplete further examination n (%)	Complete examination n (%)	Total n (%)
General Surgery	50 (80.7)	3 (4.8)	9 (14.5)	62
Urology	42 (76.4)	8 (14.5)	5 (9.1)	55
Orthopedics and Traumatology	35 (94.6)	-	2 (5.4)	37
Otolaryngology	28 (80.7)	2 (4.8)	3 (14.5)	33
Obstetrics and Gynecology	26 (78.8)	-	7 (21.2)	33
Neurosurgery	16 (89)	1 (5.5)	1 (5.5)	18
Plastic Surgery	13 (76.5)	-	4 (23.5)	17
Ophthalmology	9 (100)	-	-	9
Thoracic Surgery	1 (33.3)	-	2 (66.7)	3
Total	220 (82.4)	14 (5.2)	33 (12.4)	267

HBV: Hepatitis B virus, HBsAg: Hepatitis B surface antigen

occur annually. During surgical operations, many precautions are taken to prevent the transmission of these infections to healthcare workers from the patient, as well as to healthcare workers from the patient. These measures include not using blunt suture needles, the use of reinforced gloves, changes in surgical technique, the application of less invasive alternative procedures, disinfection of the operating field after each patient, and healthcare worker training (3,4,5).

It is expected that 17 million deaths due to chronic HBV worldwide by 2030 (6). Immunization of healthcare workers and the community with an HBV vaccine is the most reliable, easy, and inexpensive method.

Learning that the patient has HBV infection before surgery will benefit both the healthcare worker and patient. From the perspective of healthcare workers, transmission from patients with high viral loads to healthcare workers will increase. If the viral load of the patient is reduced to a level that cannot be detected in the blood within the indication for treatment, the risk of transmission to healthcare workers will be significantly reduced.

From the point of view of the patient with HBV infection, the patient for whom treatment is indicated will have a chance to be treated before further liver damage develops.

It has been shown that HBV-DNA is elevated, especially in patients with HBV infection who undergo major surgical procedures, such as obesity surgery. As a result, there is a risk of severe liver damage (7,8). Again, liver function should be closely monitored in patients with HBV infection who undergo bone marrow, liver, kidney, or heart transplantation, especially during the first 6 months after surgery. In patients with elevated liver transaminases, HBV-DNA levels, liver cirrhosis characteristics, and hepatocellular carcinoma markers should be monitored (9,10,11).

The immune system is severely suppressed at various levels with intensive chemotherapy or the use of BAs, and previously silent HBV infection may lead to active hepatitis and fulminant hepatitis (12,13). In a center that implemented a warning system when an immunosuppressive agent was to be used, >90% of patients prescribed a BA underwent serologic screening to detect

HBV infection. The use of the alert system increased the screening rate for HBsAg from 50% to 94% and anti-HBc from 30% to 85% in patients prescribed BAs. Six patients received prophylactic antiviral therapy, and none experienced HBV reactivation was observed in any patient (13).

In a study including data from 19,623 people aged 18-101 years in İzmir, the western city of our country, HBsAg positivity was found in 409 (2.6%) of 15,512 people, while anti-HBs positivity was found in 988 (45.65%) of 2,165 people. HBV-DNA positivity was found in 18 (4.4%) of 409 HBsAg-positive patients (14). Our study was conducted in Elazığ, an eastern province of Turkey. HBsAg positivity was detected in 679 (2.6%) of 25,978 patients aged 1-89 years who were requested preoperatively over a 3 year period. Of the 267 patients with HBsAg positivity for the first time, 220 (82.4%) were excluded from further testing because no other tests were ordered and no diagnosis code was entered in the hospital automation system. It was determined that only HBsAg was ordered in eight (57.1%), only HBV-DNA was ordered in four (12.1%), and only HBsAg and HBV-DNA were ordered in two (16.6%) patients. When these results are compared, it is observed that HBsAg positivity is 2.6% in our country. In addition, although the HBsAg test for HBV is requested preoperatively, a small benefit is obtained, and most benefits are missed because follow-up and further tests are not performed. In the literature review, no similar study was found, except for our country.

A study conducted in our country showed that the computer alert program was significantly effective in improving HBV screening rates before starting cytotoxic immunosuppressive therapies, and it was reported that the consultation rates of patients with positive HBV serology increased from 52% to 75% after the introduction of the alert system in general (15).

Another study demonstrated an improvement after the introduction of an electronic warning system called HBVision2. The HBVision2 alert system identifies patients at risk of HBV reactivation when a predetermined ICD-10 code is entered into the hospital database or when immunosuppressive treatment is prescribed. The system evaluates HBsAg and anti-HBc IgG results

and sends a warning code to the clinician for screening if serology is not fully available or indicates that a specialist should be consulted in case of positive serology (15). After the implementation of this electronic alert system, both the HBsAg (from 55.1% to 93.1%) and anti-HBc IgG screening rates increased significantly (from 4.3% to 79.4%) ( $p < 0.001$  for both). It was also noted that HBV reactivation developed in 2 patients (2.6%) who were not screened and/or consulted after the warning system (16).

Of the HBsAg-positive individuals ( $n=679$ ), 60.7% ( $n=412$ ) had previous HBsAg positivity registered in the hospital system. In order to prevent recurrent and unnecessary HBsAg test requests in hospitals, the implementation of an "Electronic Screen Warning" by information technology when requesting the HBsAg test will provide significant financial and labor gains.

In our study, only 12.4% of the patients who were found to be HBsAg-positive for the first time during preoperative screening underwent complete further examination. In 82.4% of the patients, no further tests were performed and no diagnosis was made; in 5.2%, further tests were incomplete and no diagnosis was made. The awareness of all surgical medical science physicians in our hospital regarding HBV infection and directing patients to relevant departments is quite low. Due to the constant change in research assistants, the trainings provided thus far are not sufficient. "Nosocomial infections" and "blood-borne infections" should be included in the training of research assistants in all departments.

### Study Limitations

A limitation of our study is that only our hospital data were used for data analysis. Therefore, advanced tests and the diagnosis of HBV infection in foreign centers could not be performed. Another limitation was that we could not provide information about the prognosis of HBsAg-positive patients because the death/survival status of patients who did not undergo further examination was not analyzed.

### Conclusion

In conclusion, healthcare professionals should approach all patients as if they have bloodborne infections by taking appropriate precautions during contact. If preoperative serologic screening is to be performed, the electronic patient file should be examined to prevent unnecessary testing, and HBV infection and immune status should be assessed. Ideally, an electronic alert system should be established, and HBsAg-positive patients should be referred to the relevant specialty physicians for the necessary diagnosis and treatment.

### Ethics

**Ethics Committee Approval:** Ethics committee approval was obtained from the Firat University Faculty of Medicine, Non-interventional Clinical Research Ethics Committee (decision number: 2023/14-19) on 14.12.2023.

**Informed Consent:** Patients who were directed to the anesthesia polyclinic for preoperative preparation by surgical departments between August 2020 and August 2023 were retrospectively screened.

### Authorship Contributions

Surgical and Medical Practices: S.K., H.H.A., Concept: N.A., A.A., Design: S.K., A.A., H.H.A., Data Collection or Processing: S.K., N.A., Analysis or Interpretation: S.K., N.A., H.H.A., Literature Search: S.K., A.A., H.H.A., Writing: S.K., N.A., A.A.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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