

Evaluation of Hepatitis B Surface Antigen, Anti-HCV, and Anti-HIV Seroprevalence in Patients Operated in the Orthopedics and Traumatology Department

© Serkan Güler, © Hakan Yolaçan, © Erdem Aras Sezgin

Department of Orthopaedics and Traumatology, Aksaray Training and Research Hospital, Aksaray, Türkiye

Abstract

BACKGROUND/AIMS: Occupational exposure to blood-borne viruses is a major concern for surgeons, nurses, and operating room personnel. We aimed to determine the hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (anti-HCV), and human immunodeficiency virus (anti-HIV) seroprevalence of patients who were operated in the orthopedic service and to determine the prevalence of patients with positive serology, especially those in an orthopedics unit.

MATERIAL AND METHODS: In our study, patients who were operated in the orthopedic unit between January 1, 2021 and January 1, 2022 were retrospectively analyzed. HBsAg, anti-HCV, and anti-HIV serologies of the participants as well as age, gender, and case subgroups were recorded. The surgeries performed on the participants were analyzed in 9 subgroups: foot-ankle, general orthopedics, trauma, sports surgery-arthroscopy, pediatric orthopedics, hand-wrist, arthroplasty, spine, and oncological surgery.

RESULTS: We included 2006 patients in the study. According to the case grouping, 26 were foot-ankle, 202 general orthopedics, 642 trauma, 366 sports surgery-arthroscopy, 2 pediatric orthopedics, 145 hand-wrist, 582 arthroplasty, 12 spine, and 29 oncology. According to the ELISA results, 77 (3.8%) patients were seropositive, 64 (3.2%) were positive for HBsAg, and 13 (0.6%) were positive for anti-HCV. Anti-HIV positivity and co-infection were not detected in the participants. HBsAg ($p=0.025$) and anti-HCV ($p=0.031$) seropositivity were significantly higher in the group that underwent surgery due to trauma compared to other case subgroups.

CONCLUSION: HBsAg and anti-HCV seropositivity were higher in patients who underwent surgery for trauma than in those who underwent surgery for other reasons.

Keywords: Orthopedic surgery, seropositivity, seroprevalence

INTRODUCTION

Occupational exposure to blood-borne viruses is a major concern for surgeons, nurses, and operating room personnel. These include hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Contaminated sharp instruments increase the risk of transmission of these viruses. The World Health Organization stipulates that more than two million injuries occur in 35 million healthcare workers each year. Moreover, 66,000 HBV, 16,000 HCV, and 1,000 HIV

infections occurred due to these injuries.¹ Screening for HBV, HCV, and HIV is vital for healthcare professionals working in surgical centers and emergency departments.² The use of advanced protective measures to limit occupational exposure and the disposal of seropositive wastes generated during surgery is of utmost importance.³

The aim of our study was to determine the incidence of HBsAg, anti-HCV, and anti-HIV positivity in patients who were operated on in the

To cite this article: Güler S, Yolaçan H, Sezgin EA. Evaluation of Hepatitis B Surface Antigen, Anti-HCV, and Anti-HIV Seroprevalence in Patients Operated in the Orthopedics and Traumatology Department. Cyprus J Med Sci 2023;8(3):216-219

ORCID IDs of the authors: S.G. 0000-0002-3424-4244; H.Y. 0000-0002-2449-9745; E.A.S. 0000-0001-5869-6571.



Address for Correspondence: Serkan Güler

E-mail: drserkanguler@hotmail.com

ORCID ID: orcid.org/0000-0002-3424-4244

Received: 30.07.2022

Accepted: 28.02.2023



©Copyright 2023 by the Cyprus Turkish Medical Association / Cyprus Journal of Medical Sciences published by Galenos Publishing House.
Content of this journal is licensed under a Creative Commons Attribution 4.0 International License

orthopedic service and to determine which sub-branch of orthopedics is prevalent in patients who were found positive. After these determinations, it is aimed to create a new perspective on the concerns of surgeons and measures such as the dissemination of protective equipment to address these concerns.

The hypothesis of our study is that the incidence of HBsAg, anti-HCV, and anti-HIV positivity in patients who underwent orthopedic elective surgery is lower than in patients who underwent surgery due to trauma.

MATERIALS AND METHODS

Participants who were operated in the orthopedics and traumatology service between January 1, 2021 and January 1, 2022 were retrospectively analyzed. All patients operated during the study period were included in the study. Patients whose HBsAg, anti-HCV, and anti-HIV tests were not requested in the pre-operative period. We analyzed the surgeries in nine subgroups, including foot-ankle, general orthopedics, trauma, sports surgery-arthroscopy, pediatric orthopedics, hand-wrist, arthroplasty, spine, and oncological surgery. Amputation, implant removal, ingrown toenails, soft tissue infection surgeries, and foreign body removal surgeries were evaluated in the general orthopedics group. HBsAg, anti-HCV, and anti-HIV serologies as well as age, gender, and case subgroups of 2006 patients who met the criteria were recorded.

In our hospital, blood collection for serology is routine in the pre-operative period, and blood samples were studied in the microbiology laboratory with the macro-ELISA system (Architect-Abbott, USA).

This study was approved by the Ethics Committee of Aksaray University Training and Research Hospital (approval number: 2022/08-06, date: 21.04.2022). There is no information about the patient in the submitted manuscript.

Statistical Analysis

SPSS version 26 package program was used for statistical analysis of the data. Kolmogorov-Smirnov test was used to evaluate the homogeneity of the data. Chi-square test was used to compare categorical variables and statistical results were evaluated according to 0.05 significance level.

RESULTS

We evaluated 2006 patients in the study. Among these, 1,110 were female and 896 were male. The mean age of the patients was calculated as 50.03 (1-95) years. According to the case grouping, 26 were foot-ankle, 202 general orthopedics, 642 trauma, 366 sports surgery-arthroscopy, 2 pediatric orthopedics, 145 hand-wrist, 582 arthroplasty, 12 Two of them were spine and 29 of them were oncology group. According to the ELISA results, 77 (3.8%) of patients were seropositive, 64 of them (3.2%) were positive for HBsAg and 13 (0.6%) were positive for anti-HCV. Anti-HIV positivity and co-infection was not detected in any of the patients (Table 1).

HBsAg was positive in 38 female patients and 26 male patients (Table 2). No significant correlation was found between gender and HBsAg seropositivity ($p=0.509$). Anti-HCV positivity was detected in 7 females and 6 males (Table 2). No significant correlation was found between gender and anti-HCV seropositivity ($p=0.914$). Similarly, no significant correlation was found between age with HBsAg and anti-HCV seropositivity ($p=0.658$).

HBsAg seropositivity was detected in 4 general orthopedic cases, 35 trauma cases, 6 surgery-arthroscopy cases, 4 hand-wrist cases, and 15 arthroplasty cases (Table 3). The rate of detecting HBsAg seropositivity in the group that underwent surgery for trauma was significantly higher than that in the other groups that underwent surgery ($p=0.025$).

Anti-HCV seropositivity was detected in 11 trauma cases, 1 surgery-arthroscopy case, and 1 arthroplasty case (Table 3). Anti-HCV seropositivity rate was significantly higher in the group that underwent surgery due to trauma than in the other groups that underwent surgery ($p=0.031$).

DISCUSSION

The number of HBsAg, anti-HCV, and anti-HIV seropositive individuals detected during admission to the hospital was too high to be underestimated.⁴ Blood-borne viruses are a serious concern for surgeons and healthcare professionals. In this study, we evaluated the magnitude and distribution of HBsAg, anti-HCV, and anti-HIV seroprevalence according to case subgroups in patients operated upon in the orthopedics and traumatology units.

Table 1. Number and percentage of patients by serological marker type

Serological marker type	The number and percentage of patients (n=2006)
HBsAg	64 (3.2)
Anti-HCV	13 (0.6)
Anti-HIV	0 (0.0)
HBsAg and anti-HCV	0 (0.0)
HBsAg or anti-HCV	77 (3.8)

HBsAg: Hepatitis B surface antigen, HCV: Hepatitis C virus, HIV: Human immunodeficiency virus.

Table 2. HBsAg and anti-HCV seroprevalence by gender

	HBsAg		Anti-HCV	
	Negative	Positive	Negative	Positive
Female	1,072	38	1,103	7
Male	870	26	890	6
Total	1,942	64	1,993	13

HBsAg: Hepatitis B surface antigen, HCV: Hepatitis C virus.

Table 3. HBsAg and anti-HCV seroprevalence by case subgroups

	HBsAg		Anti-HCV	
	Negative	Positive	Negative	Positive
Foot-ankle	26	0	26	0
General orthopedics	198	4	202	0
Trauma	607	35	631	11
Sports surgery-arthroscopy	360	6	365	1
Pediatric orthopedics	2	0	2	0
Hand-wrist	141	4	145	0
Arthroplasty	567	15	581	1
Spine	12	0	12	0
Oncology	29	0	29	0
Total	1942	64	1993	13

HBsAg: Hepatitis B surface antigen, HCV: Hepatitis C virus.

According to survey data, injuries occur in approximately 7% of surgeries,^{5,6} and 87% of surgeons have a history of percutaneous injury throughout their careers.⁷

Routine screening for viral markers is recommended in developed countries.³ Having knowledge about seropositivity before surgery allows for timely implementation of precautions such as protective goggles and waterproof gowns. In addition, healthcare workers can start prophylaxis immediately after any exposure. The role of universal measures in prevention is at the highest level, and prevention is always better than cure.^{8,9} Surgical assistants have the highest risk in this regard that can be reduced with orientation training.¹⁰

In an epidemiological seroprevalence study conducted in Türkiye, HBsAg seropositivity was 2-7%.¹¹ In another study, seropositivity was 2.21% for HBsAg, 0.56% for anti-HCV, and 0.0008% for anti-HIV.¹² In a meta-analysis study, 34 European cities were evaluated and the prevalence of HBsAg was 0.1-5.6% and anti-HCV prevalence was 0.4-5.2% in this study.¹³ In the study conducted by Pneumatics et al.¹⁴, 1,628 patients who were operated on in the orthopedics and traumatology service were evaluated and seropositivity was found in 66 (4.0%) of them. HCV positivity was found in 34 (2.0%) of them, HBV positivity in 30 (1.8%), and HIV positivity in 2 (0.1%) of them. In addition, this study did not evaluate which case groups had higher seropositivity.¹⁴ In our study, we found 64 (3.2%) seropositivity for HBsAg and 13 (0.6%) for anti-HCV, and no patient was anti-HIV positive. In our study, while HBsAg seropositivity was higher, anti-HCV seropositivity was lower. In addition, anti-HIV seropositivity was not detected in our study. In addition to these, in our study, in addition to the seropositivity rates in all operated patients, the relationship between case groups and seropositivity was investigated.

According to the results, no significant relationship was found between gender and age with seropositivity ($p>0.05$). The seropositivity detected in patients who underwent surgery due to trauma was significantly higher than that detected in elective surgeries ($p<0.05$).

Study Limitations

The most important limitation of our study was its retrospective design and the relatively lower number of cases in some case subgroups. In addition, the lack of evaluation of demographic data such as socioeconomic status, education, ethnic identity, occupation, previous blood transfusion, and history of drugs is the shortcoming of our study. The most important advantage of our study is that the number of cases is higher than other studies in the literature, and it is the first study conducted in the field of orthopedics and traumatology by dividing case subgroups. Thus, we recommend that multicenter and meta-analysis studies be performed with more cases in the future.

CONCLUSION

In this study, HBsAg and anti-HCV seropositivity were higher in patients who underwent surgery for trauma than in those who underwent surgery for other reasons. It is thought that the reason for this is that the mobilization of trauma patients is more limited, surgical indications are clearer, and alternative treatment methods are more limited, making trauma patients more irrefutable for physicians. However, the physician is more flexible in deciding of surgery in case groups that underwent elective surgery, that is, in patients who underwent elective surgery. For this reason, if HBsAg, anti-HCV, or anti-HIV seropositivity is detected in elective surgeries left to the discretion of the physician, the physician

may abandon the decision to perform surgery. This explains why seropositivity is lower in these case groups. To prevent this situation, we think that it is crucial to provide and use protective materials such as glasses, liquid-proof surgical clothing, and barrier gloves in addition to orientation training.

MAIN POINTS

- HBsAg and anti-HCV seropositivity were higher in patients who underwent surgery for trauma than in those who underwent surgery for other reasons.
- In addition to orientation training, it is very important to provide and use protective materials such as glasses, liquid-proof surgical clothing, and barrier.
- Taking protective measures and providing protective equipment can help reduce the concerns of surgeons and operating room personnel about contamination.

ETHICS

Ethics Committee Approval: This study was approved by the Ethics Committee of Aksaray University Training and Research Hospital (approval number: 2022/08-06, date: 21.04.2022).

Informed Consent: There is no information about the patient in the submitted manuscript.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: S.G., H.Y., E.A.S., Design: S.G., H.Y., E.A.S., Data Collection and/or Processing: S.G., H.Y., E.A.S., Analysis and/ or Interpretation: S.G., H.Y., E.A.S., Literature Search: S.G., H.Y., E.A.S., Writing: S.G., H.Y., E.A.S.

DISCLOSURES

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

Financial Disclosure: The authors declared that this study had received no financial support.

REFERENCES

1. Prüss-Üstün A, Rapiti E, Hutin Y. Sharps Injuries: Global Burden of Disease from Sharps Injuries to Health-care Workers, WHO Environmental Burden of Disease Series. Geneva: World Health Organization; 2003.
2. Albrecht E, Frascarolo P, Meystre-Agustoni G, Farron A, Gilliard N, Darling K, et al. An analysis of patients' understanding of 'routine' preoperative blood tests and HIV screening. Is no news really good news? *HIV Med.* 2012; 13(7): 439-43.
3. Ahmed R, Bhattacharya S. Universal screening versus universal precautions in the context of preoperative screening for HIV, HBV, HCV in India. *Indian J Med Microbiol.* 2013; 31(3): 219-25.
4. U.S. Public Health Service. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. *MMWR Recomm Rep.* 2001; 50(RR-11): 1-52.
5. Tokars JJ, Chamberland ME, Schable CA, Culver DH, Jones M, McKibben PS, et al. A survey of occupational blood contact and HIV infection among

- orthopedic surgeons. The American Academy of Orthopaedic Surgeons Serosurvey Study Committee. *JAMA*. 1992; 268(4): 489-94.
6. Tokars JI, Bell DM, Culver DH, Marcus R, Mendelson MH, Sloan EP, et al. Percutaneous injuries during surgical procedures. *JAMA*. 1992; 267(21): 2899-904.
 7. Lowenfels AB, Wormser GP, Jain R. Frequency of puncture injuries in surgeons and estimated risk of HIV infection. *Arch Surg*. 1989; 124(11): 1284-6.
 8. Gounden YP, Moodley J. Exposure to human immunodeficiency virus among healthcare workers in South Africa. *Int J Gynaecol Obstet*. 2000; 69(3): 265-70.
 9. Chogle NL, Chogle MN, Divatia JV, Dasgupta D. Awareness of post-exposure prophylaxis guidelines against occupational exposure to HIV in a Mumbai hospital. *Natl Med J India*. 2002; 15(2): 69-72.
 10. Lee JJ, Kok SH, Cheng SJ, Lin LD, Lin CP. Needlestick and sharps injuries among dental healthcare workers at a university hospital. *J Formos Med Assoc*. 2014; 113(4): 227-33.
 11. Tozun N, Ozdogan O, Cakaloglu Y, Idilman R, Karasu Z, Akarca U, et al. Seroprevalence of hepatitis B and C virus infections and risk factors in Turkey: a fieldwork TURHEP study. *Clin Microbiol Infect*. 2015; 21(11): 1020-6.
 12. Avcıküçük H, Süzük S, Kavak M. HbsAg, Anti-Hepatitis C Virus and Anti-HIV Seroprevalence Among Patients Admitted to Our Hospital between 2005 and 2013. *Viral Hepat J*. 2014; 20(3): 125-30.
 13. Hahné SJ, Veldhuijzen IK, Wiessing L, Lim TA, Salminen M, Laar Mv. Infection with hepatitis B and C virus in Europe: a systematic review of prevalence and cost-effectiveness of screening. *BMC Infect Dis*. 2013; 13: 181.
 14. Pneumaticos SG, Savvidou C, Tsiakalos A, Sipsas NV. Seroprevalence of HIV, HBV and HCV in orthopaedic patients at a tertiary hospital in Greece. *European Journal of Orthopaedic Surgery & Traumatology*. 2012; 22(1): 57-60.