

Seroprevalence of HBV, HCV, and HIV positivity in patients undergoing tonsillectomy

Tonsillektomi yapılan hastalarda HBV, HCV ve HIV pozitifliğinin seroprevalansı

Tolga Kirgezen^{ID}, Nihal Seden^{ID}, Okan Övünç^{ID}, Özgür Yiğit^{ID}

Department of Otolaryngology, University of Health Sciences, Istanbul Training and Research Hospital, Istanbul, Turkey

ABSTRACT

Objectives: This study aims to investigate the seroprevalence of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) in patients undergoing tonsillectomy.

Patients and Methods: Between January 2012 and December 2018, a total of 751 patients (389 males, 362 females; mean age 27 years; range, 12 to 58 years) who underwent bilateral tonsillectomy under general anesthesia in our clinic were retrospectively analyzed. The seropositivity of hepatitis B surface antigen (HBsAg), anti-HCV, and anti-HIV was investigated in all patients.

Results: Positive serology for HBsAg was detected in 12 patients (1.5%) including eight males (1%) and four females (0.5%). Two male patients (0.2%) and two male patients (0.2%) had anti-HCV positivity and anti-HIV positivity, respectively. According to the age groups (≤ 18 vs. >18 years), all serology-positive patients were >18 years of age.

Conclusion: Testing of the HBV, HCV, and HIV serology is necessary for tonsillectomy patients preoperatively, particularly those who are older than 18 years and males. All otolaryngologists should be aware of transmission via occupational exposure and must take necessary precautions to protect themselves against contamination by wearing a mask or goggles, particularly while performing such operations.

Keywords: Hepatitis B virus, hepatitis C virus, human immunodeficiency virus, seroprevalence, tonsillectomy.

ÖZ

Amaç: Bu çalışmada tonsillektomi yapılan hastalarda hepatit B virüsü (HBV), hepatit C virüsü (HCV) ve insan immün yetmezlik virüsü (HIV) seroprevalansı araştırıldı.

Hastalar ve Yöntemler: Ocak 2012 - Aralık 2018 tarihleri arasında kliniğimizde genel anestezi altında iki taraflı tonsillektomi yapılan toplam 751 hasta (389 erkek, 362 kadın; ort. yaş 27 yıl; dağılım, 12-58 yıl) retrospektif olarak incelendi. Tüm hastalarda hepatit B yüzey antijeni (HBsAg), anti-HCV ve anti-HIV seropozitifliği araştırıldı.

Bulgular: Sekizi erkek (%1) ve dördü kadın (%0.5) olmak üzere 12 hastada HBsAg seroloji pozitifliği tespit edildi. İki erkek hastada (%0.2) anti-HCV pozitifliği ve iki erkek hastada (%0.2) anti-HIV pozitifliği izlendi. Yaş gruplarına göre (≤ 18 yaşla >18 yaş), seroloji pozitifliği olan hastaların tümü >18 yaşında idi.

Sonuç: Tonsillektomi öncesi, özellikle 18 yaş üzerindeki ve erkek hastalarda, ameliyat öncesi HBV, HCV ve HIV seroloji testi gereklidir. Kulak, burun, boğaz hekimleri mesleki maruziyet ile bulaş riski açısından dikkatli olmalı ve özellikle bu tür ameliyatları yaparken maske veya gözlük takarak bulaşa karşı kendilerini korumak amacıyla gerekli tedbirleri almalıdır.

Anahtar sözcükler: Hepatit B virüsü, hepatit C virüsü, insan immün yetmezlik virüsü, seroprevalans, tonsillektomi.

Received: May 28, 2019 Accepted: June 18, 2019 Published online: September 03, 2019

Correspondence: Tolga Kirgezen, MD. Kireçocağı Sok., Osmaniye Mah., No: 14, D: 15, Gelincik Sitesi, C Blok, 34146 Bakırköy, İstanbul, Turkey.
e-mail: tolgakirgezen@gmail.com

Citation:

Kirgezen T, Seden N, Övünç O, Yiğit Ö. Seroprevalence of HBV, HCV, and HIV positivity in patients undergoing tonsillectomy. KBB Uygulamaları 2019;7(3):151-156.

The seroprevalence of blood-borne infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) has been increasing in recent years.^[1] Hepatic HBV and HCV infection causes a broad spectrum of disease outcomes. In about 15 to 40% of chronic infections, these viruses end with cirrhosis and/or hepatocellular cancer.^[2,3] Approximately 350 to 400 million individuals are infected with HBV and about 130 to 170 million individuals are infected with HCV worldwide, accounting for one million death per year due to HBV and for over 350,000 deaths per year due to HCV.^[4-6] Joint United Nations Programme on HIV/AIDS (UNAIDS) reported that in 2019, 37.9 million people globally were living with HIV and 770,000 people died from AIDS-related illnesses.^[7] Chronic HBV and HCV infection prevalence in general population varies widely across the Europe. The Southeastern Europe and Turkey have a higher prevalence than the Northwestern Europe.^[8]

Occupational exposure to blood and other fluids of patient's body poses a risk for transmission of blood-borne viruses such as HBV, HCV, and HIV. Healthcare professionals (HCPs), particularly, surgeons face this potential risk via sharp and penetrating object (such as scalpel blades and needle-sticks)-related injuries and mucocutaneous and transconjunctival contact. These sources of infection have been well documented in the literature.^[9,10]

Occupational exposure for HCPs brings about a concern which poses a higher risk during surgical procedures. This results in an increased awareness

on all potential blood-borne agents, as occupational risks.

In the practice of otolaryngology, surgeons are also at a high risk for contact with blood, mucus, saliva, secretions, and bone dust. In the present study, we aimed to investigate the seroprevalence of HBV, HCV, and HIV in patients undergoing tonsillectomy.

PATIENTS AND METHODS

Between January 2012 and December 2018, a total of 751 patients (389 males, 362 females; mean age 27 years; range, 12 to 58 years) who underwent bilateral tonsillectomy under general anesthesia in Istanbul Training and Research Hospital were retrospectively analyzed. Those who underwent additional procedures were excluded from the study. Indications for tonsillectomy were as follows: chronic tonsillitis, recurrent tonsillitis, and high-grade tonsillar hypertrophy with obstructive sleep apnea syndrome. All tonsillectomies were performed through the extracapsular cold-instrument dissection method and bleeding control was achieved. For hemostasis, we used gauzes, ties, and bipolar diathermy.

The seropositivity of hepatitis B surface antigen (HBsAg), anti-HCV, and anti-HIV was investigated in all patients. Preoperative blood samples were analyzed at the Department of Microbiology in our institution for serological analysis.

In our routine practice, we perform serology tests for HBV, HCV, and HIV as well as other laboratory tests for patients undergoing tonsillectomy.

	n	%	Mean±SD	Median	Min-Max
Age (year)			26.9±9.3	26.0	12-58
Age					
≤18 years	157	20.9			
>18 years	594	79.1			
Gender					
Male	389	51.8			
Female	362	48.2			
ELISA					
-	735	97.9			
+	16	2.1			
HbsAg	12	1.6			
Anti-HCV	2	0.3			
Anti-HIV	2	0.3			

ELISA: Enzyme-linked immunosorbent assay; SD: Standard deviation; Min: Minimum; Max: Maximum; HBsAg: Hepatitis B surface antigen; HCV: Hepatitis C virus; HIV: Human immunodeficiency virus.

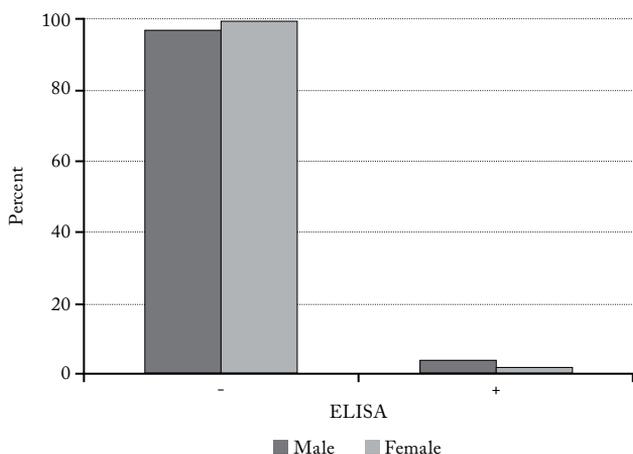


Figure 1. ELISA positivity in genders.

ELISA: Enzyme-linked immunosorbent assay

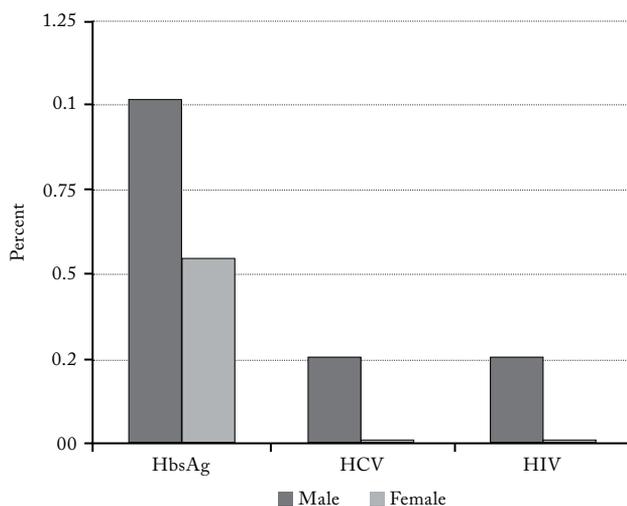


Figure 2. Distribution of seroprevalence positivity in patients.

HbsAg: Hepatitis B surface antigen; HCV: Hepatitis C virus; HIV: Human immunodeficiency virus.

A written informed consent was obtained from each patient or his/her legal representatives. The study protocol was approved by Istanbul Training and Research Hospital Ethics Committee (No. 1560 and Date: December 7; 2018). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical analysis

Statistical analysis was performed using the IBM SPSS version 22.0 software (IBM Corp., Armonk, NY, USA). Descriptive data were expressed in mean ± standard deviation (SD), median (min-max), or number and frequency. The distribution of variables was examined using the Kolmogorov-Smirnov test. Independent samples t-test and Mann-Whitney U test were used to compare quantitative data. The chi-square test was used to compare qualitative data. The Kaplan-Meier method was used for the survival analysis. A *p* value of <0.05 was considered statistically significant.

RESULTS

Positive serology for HBsAg was detected in 12 patients (1.5%) including eight males (1%) and four females (0.5%). Two male patients (0.2%) and two male patients (0.2%) had anti-HCV positivity and anti-HIV positivity, respectively (Table 1; Figures 1 and 2). The patients were divided into two categories according to the age group: ≤18 years of age (n=157, 20.9%) (67 males, 90 females) and >18 years of age (n=594, 79%) (322 male, 272 female). All serology-positive patients were >18 years of age (n=1, male, ≤18 years, positive for HBsAg and the others were >18 years of age). All seropositive patients were positive for only one of these viruses.

In 389 male patients, 12 were seropositive (3%) and the HBsAg positivity was 2%. (0.05% for anti-HCV and 0.05% for anti-HIV). In 362 female patients, four were

	Male				Female				<i>p</i>
	n	%	Mean±SD	Median	n	%	Mean±SD	Median	
Age (year)			25.2±8.8	23.0			28.5±9.5	28.0	0.000*
ELISA									0.102†
-	376	96.7			359	99.2			
+	12	3.1			4	1.1			
HbsAg	8	2.1			4	1.1			0.448†
Anti-HCV	2	0.5			0	0.0			0.499†
Anti-HIV	2	0.5			0	0.0			0.499†

ELISA: Enzyme-linked immunosorbent assay; SD: Standard deviation; * Mann-whitney U test; † Chi-square test (Fischer Exact).

seropositive (1.1% and all for HBsAg). All seropositive patients for anti-HCV or anti-HIV were male. There was no significant difference in the positivity rate of HbsAg, anti-HCV, and anti-HIV through the enzyme-linked immunosorbent assay (ELISA) between male and female patients (Table 2; Figure 2).

DISCUSSION

Otolaryngologists have certainly a high risk for exposure to saliva, mucus, blood, other body fluids, and bone fragments. In a study, Hinton et al.^[9] reported risk levels of otolaryngology procedures and put tracheostomy, air drill requiring procedures, and those requiring local anesthetic into the high-risk category. However, lower risk-bearing procedures such as adenoidectomy and tonsillectomy can be also the source of significant degree of splash.^[10]

Inoculation of the conjunctiva by the patient's blood may cause transmission of HBV, HCV, and HIV infections^[11,12] and this may occur while performing tonsillectomy procedure.^[13-15] Lakhani et al.^[10] examined the degree and incidence of blood splashes in otolaryngology procedures performed in their unit for 12 weeks. They wore a mask with a visor and examined the masks for blood splash. They found mask contamination in 54% of the procedures and found a splash rate of tonsillectomy of 76.9%. Kelly et al.^[15] reported this ratio as 46% in their study.

Grade of the surgeon, technique used, duration of surgical procedure, blood loss during the operation, bleeding disorders of patients and additional procedures are all important for such a contact with an infection.^[16]

In their study, Lakhani et al.^[10] found no significant correlation between the splash rate and blood loss or duration of the operation or grade of the surgeon and they reported that the rate of splash with bipolar diathermy was higher than that of cold steel technique (12.33% and 6.5%, respectively). Endo et al.^[17] showed that the incidence of splatters was significantly higher for lead surgeons (85.5%) (first assistant [68.5%] and scrub nurse [46.0%]). They also found a splatter incidence of 66.0% and that, up to one h of surgery and 500 mL of blood loss, there was an increasing incidence of blood splatter.

Tonsils have an increased vascularity and exposure to infection sustains in the postoperative period due to possible bleeding. Even if surgeons and other HCPs attempt to prevent contact, exposures may still occur. Surgical masks for tonsillectomy are not a routine precaution for most of the otolaryngology clinics. Sharp injuries cause potentially a higher risk than mucocutaneous spreads, although seroconversion after

mucocutaneous spread has been also reported in the literature.^[18]

Facial exposure during surgery has been shown to be a risk for transmission of these blood-borne agents.^[15] Contact with infective particles through the HCPs' mucous membranes may cause transmission of HCV and HIV-1.^[18,19] The risk for HIV infection via such a contact ranges between 0.09 and 0.25%.^[20]

In this retrospective study, we evaluated tonsillectomy operations which were performed in our clinic. Tonsillectomy, under general or local anesthesia, is a commonly performed operation in departments of otolaryngology worldwide. Local anesthesia seems having a higher risk and, with some additional causes, it has been nearly abandoned by ear, nose and throat (ENT) surgeons in recent years.

The incidences of HBV, HCV, and HIV have been increasing every year. Among our patient population, positive serology for HBsAg was detected in 12 (1.5%) and two patients (0.2%) had anti-HIV positivity, while two other patients (0.2%) had anti-HCV positivity. According to the age groups, >18 years of age was associated with a higher possibility for such an occupational spread. In addition, the HBV positivity using the ELISA was higher in males.

It is still unclear that possible transmission risk may decrease with preoperative tests done for HBV, HCV, and HIV. In particular in countries having a high rate of these infections, preoperative test is strongly recommended.^[21] Developing countries have higher rates for transmission of these viral diseases, particularly for occupational exposure.^[22] In the study of Onerci et al.,^[23] the seroprevalence positivity rates were found to be 3.6% for HBsAg, 0.3% for anti-HCV, and 0.2% for anti-HIV in patients undergoing septoplasty. As a developing country, the seropositivity rates of Turkey were previously reported as 0.52 to 4.19% for HBsAg, 0.1 to 1% for anti-HCV, and 0 to 0.1% for anti-HIV.^[24,25] Our seroprevalence results are also consistent with these findings. Turkey is an intermediate-endemic region for HBV and a low endemic region for HCV.^[26,27] In addition, HIV/acquired immunodeficiency syndrome (AIDS) is considered as an emerging disease in Turkey.^[28] Preoperative testing alerts surgeons and entire surgical team to search additional caution during surgery and also provides early diagnosis in non-diagnosed patients, thereby, decreasing the spread. In our study, none of two HIV seropositive patients, one of two HCV-positive patient, and six of 12 HBV-positive patients were not diagnosed until the time of preoperative testing which we did before tonsillectomy.

Mucocutaneous contact, conjunctival spread, and percutaneous injury are all possible for tonsillectomy during surgery and postoperative care. Surgeons must protect themselves against this transmission risk, even in postoperative control visits against cough or sneezing and during the postoperative examination against bleeding control.

Most ENT surgeons routinely wear mask for risky and complicated cases, although most of them do not prefer using such a device while performing a low-risk procedure such as tonsillectomy due to the discomfort and fogging by the mask. The HCPs often underestimate the risk. A study estimated a surgeon's cumulative lifetime risk to be infected as 6.9% for HCV and 0.15% for HIV.^[29] An estimated infection risk for HIV with mucocutaneous spread was 0.1% in the study of Saltzman et al.^[30]

Vaccination against HBV, preoperative tests for seropositivity, and protective equipment for surgery team can prevent spread. Double gloving also reduces contact with blood and other body fluids. Face masks and glasses prevent splash contacts. The operating room team must have the highest awareness for this risk.

In conclusion, testing of the HBV, HCV, and HIV serology is necessary for tonsillectomy patients preoperatively, particularly those who are older than 18 years and males. All otolaryngologists should be aware of the transmission risk via occupational exposure and must take necessary precautions to protect themselves against contamination by wearing a mask or goggles, particularly while performing such operations.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

- World Health Organization global AIDS statistics. *AIDS Care* 1997;9:625-32.
- Lok AS. Chronic hepatitis B. *N Engl J Med* 2002;346:1682-3.
- Seeff LB. Natural history of chronic hepatitis C. *Hepatology* 2002;36:35-46.
- Dienstag JL. Hepatitis B virus infection. *N Engl J Med* 2008;359:1486-500.
- World Health Organization: Hepatitis B. Available at: <http://www.who.int/mediacentre/factsheets/fs204/en/>. [Access: October, 2008]
- World Health Organization: Hepatitis C. 2011. Available at: http://ecdc.europa.eu/en/publications/Publications/TER_100914_Hep_B_C%20_EU_neighbourhood.pdf [Access: September, 2010]
- Available at: <https://www.unaids.org/en/resources/fact-sheet>.
- 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.
- Hinton AE, Herdman RC, Timms MS. Incidence and prevention of conjunctival contamination with blood during hazardous surgical procedures. *Ann R Coll Surg Engl* 1991;73:239-41.
- Lakhani R, Loh Y, Zhang TT, Kothari P. A prospective study of blood splatter in ENT. *Eur Arch Otorhinolaryngol* 2015;272:1809-12.
- Cobo JC, Harley DP. The eyes as a portal of entry for hepatitis and other infectious diseases. *Surg Gynecol Obstet* 1985;161:71.
- Ippolito G, Puro V, Petrosillo N, De Carli G, Micheloni G, Magliano E. Simultaneous infection with HIV and hepatitis C virus following occupational conjunctival blood exposure. *JAMA* 1998;280:28.
- Prior AJ, Montgomery PQ, Srinivasan V. Eye protection in ear, nose and throat surgery. *J Laryngol Otol* 1993;107:618-9.
- Keogh IJ, Hone SW, Colreavey M, Walsh M. Blood splash and tonsillectomy: an underestimated hazard to the otolaryngologist. *J Laryngol Otol* 2001;115:455-6.
- Kelly G, Gana P, Nielsen T, MacGregor F. The incidence of potential conjunctival contamination in tonsillectomy. *J R Coll Surg Edinb* 2000;45:288-90.
- Marasco S, Woods S. The risk of eye splash injuries in surgery. *Aust N Z J Surg* 1998;68:785-7.
- Endo S, Kanemitsu K, Ishii H, Narita M, Nemoto T, Yaginuma G, et al. Risk of facial splashes in four major surgical specialties in a multicentre study. *J Hosp Infect* 2007;67:56-61.
- Eberle J, Habermann J, Gürtler LG. HIV-1 infection transmitted by serum droplets into the eye: a case report. *AIDS* 2000;14:206-7.
- Rosen HR. Acquisition of hepatitis C by a conjunctival splash. *Am J Infect Control* 1997;25:242-7.
- Greene DL, Akelman E. A technique for reducing splash exposure during pulsatile lavage. *J Orthop Trauma* 2004;18:41-2.
- Weber P, Eberle J, Bogner JR, Schrimpf F, Jansson V, Huber-Wagner S. Is there a benefit to a routine preoperative screening of infectivity for HIV, hepatitis B and C virus before elective orthopaedic operations? *Infection* 2013;41:479-83.
- Deuffic-Burban S, Delarocque-Astagneau E, Abiteboul D, Bouvet E, Yazdanpanah Y. Blood-borne viruses in health care workers: prevention and management. *J Clin Virol* 2011;52:4-10.
- Onerci Celebi O, Araz Server E, Hamit B, Yiğit Ö. The seroprevalence of hepatitis B, hepatitis C, and human immunodeficiency virus in patients undergoing septoplasty. *Braz J Otorhinolaryngol* 2016 Nov 17.

24. 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;21:1020-6.
25. Uzun B, Güngör S, Demirci M. Seroprevalence of transfusion transmissible infections among blood donors in western part of Turkey: a six-year study. *Transfus Apher Sci* 2013;49:511-5.
26. Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. *Lancet Infect Dis* 2005;5:558-67.
27. Franco E, Bagnato B, Marino MG, Meleleo C, Serino L, Zaratti L. Hepatitis B: Epidemiology and prevention in developing countries. *World J Hepatol* 2012;4:74-80.
28. Agacfidan A, Kaiser R, Akgül B. HIV in Turkey, a country bridging the Islamic world and Europe. *J Infect Public Health* 2014;7:249-50.
29. Caillot JL, Voigloi EJ, Gilly FN, Fabry J. The occupational viral risk run by French surgeons: a disturbing perspective. *AIDS* 2000;14:2061-2.
30. Saltzman DJ, Williams RA, Gelfand DV, Wilson SE. The surgeon and AIDS: twenty years later. *Arch Surg* 2005;140:961-7.