

# Blood Splashes Risk During Otorhinolaryngology Surgery: A Tertiary Care Hospital Based Study

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## ABSTRACT

### Background

ENT (Ear, Nose and Throat) surgeons are particularly at high risk of exposure with blood and body fluid related infections both in Outpatient and during surgical procedures. They do take precaution to avoid the needle stick injuries but few pay attention on blood or body fluid splashes into eye.

### Objective

To find out the risk of blood splashes to both surgeon and assistant during otorhinolaryngology surgeries.

### Method

This was an descriptive study and data were collected prospectively in Department of Ear, Nose and Throat-Head and Neck Surgery of Dhulikhel Hospital, Kathmandu University Hospital in 1 year period from 1<sup>st</sup> January 2017 to 1<sup>st</sup> January 2018. All the surgical cases were included in the study. The surgeon and assistant wore the glass and mask during the surgery. At the end of the surgery, the glass, mask and gown were inspected for any blood splashes and information was recorded.

### Result

There were total 272 patients with male 119 and female 153. The amount of blood splatter in glass, mask and gown is most common in modified radical mastoidectomy surgery. Likewise, the blood splatter is most common in tonsillectomy in throat surgery and in head and neck surgery, the blood splatter is common in all head and neck surgery.

### Conclusion

The blood splashes is high in various Ear, Nose and Throat surgeries. So it is important to take precaution by surgeon and assistant, like protective mask and glass worn during surgeries to protect from various blood-borne infection transmissions.

## KEY WORDS

*Blood splashes, Glass, Gown, Mask, Surgery*

## INTRODUCTION

The blood borne infection transmits mainly through sharp injuries (needle-stick, scalpel or other sharp, contaminated objects) and mucocutaneous contact. The health workers working in surgical field is particularly at risk.<sup>1</sup>

Though the risk is significant, it is often underestimated by healthcare workers. A recent study estimates the transmission risk of HIV with mucocutaneous contact is 0.1% and culminative lifetime risk of transmission of hepatitis C is 6.9% whereas HIV is 0.15% with sharp injuries.<sup>2,3</sup>

All the surgeons are particularly at risk from blood borne pathogens like; hepatitis and HIV during interventions or surgeries. But ENT (Ear, Nose and Throat) surgeons are particularly at high risk of exposure with blood and body fluid related infections both in Outpatient and during surgical procedures. They do take precaution to avoid the needle stick injuries but few pay attention on blood or body fluid splashes into eye. There is the study performed by Hinton et al. which had divided ENT surgical procedure in high and low risk.<sup>4</sup> High risk surgeries includes tracheostomies, operations with air drill and requiring local anesthetic. However low risk categorized surgeries like tonsillectomy and adenoidectomy has also blood splashes significantly.

The study performed by Kelly et al. also showed the significant amount of blood splash during low risk categorized tonsillectomy surgeries with 46% splash.<sup>5</sup> So there is significant risk for ENT surgeons.

The main aim of our study is to find out the risk of blood splashes to both surgeon and assistant during otorhinolaryngology surgeries as this kind of study had not been done previously.

## METHODS

This was an descriptive study and data were collected prospectively in Department of Ear, Nose and Throat -Head and Neck Surgery of Dhulikhel Hospital, Kathmandu University Hospital in 1 year period from 1<sup>st</sup> January 2017 to 1<sup>st</sup> January 2018. The ethical clearance was taken from institutional review committee of our hospital.

All the surgical cases both under general and local anesthesia performed in Operation theatre were included in the study. The surgeon and assistant wore the glass and mask during the surgery and at the end of the surgery, the glass, mask and gown were inspected. The blood splashes were inspected by naked eye in operation theatre under the proper light. The counting of the blood splashes were performed and any kind of fresh blood stains were counted in terms of number. The information about the number of fresh blood stains were recorded in the proforma for statistical analysis.

For the statistical analysis Microsoft Office Excel 2007 was used. The results were described as frequency and percentage.

## RESULTS

There were total 272 patients included in the study. There were 119 male (43.8%) and 153 were female (56.2%) with female to male ratio of 1.3:1.

The blood splashes in various ENT surgeries are shown in table 1 with main splashes observed in head and neck surgeries in both surgeon and assistant.

The table 2 shows blood splashes in various ear surgeries with main splashes seen in mastoid surgery.

In nose and paranasal sinus surgeries blood splashes are mainly seen in septoplasty and septoturbinoplasty as shown in table 3.

The blood splashes are mainly seen in tonsillectomy in throat surgeries as shown in table 4.

In head and neck surgeries, the blood splashes is frequent in almost all the surgeries as shown in table 5.

## DISCUSSION

The main objective of our study is to find out the blood splashes during ENT surgeries. Since, the risk of splashes whether it is saliva, blood or body fluids are high during ENT surgical procedure and simultaneously, the risk of transmission of infective microorganisms is also there. So it is necessary to take precaution during the procedures.<sup>6,7</sup> For combating these problems it is advised to wear protective

**Table 1. Showing blood splashes in various ENT surgeries (n=272)**

Types of surgeries performed	Number (%)	Blood Splatter					
		Glass		Mask		Gown	
		Surgeon	Assistant	Surgeon	Assistant	Surgeon	Assistant
Ear	90(33.1)	25(27.8)	7(7.8)	24(26.7)	6(6.7)	12(13.3)	5(5.6)
Nose and paranasal sinuses	62(22.8)	13(20.9)	2(3.2)	11(17.7)	1(1.6)	3(4.8)	0(0)
Throat	85(31.2)	47(58.7)	10(12.5)	41(51.2)	1(1.2)	23(28.7)	0(0)
Head and Neck	35(12.9)	29(82.8)	21(60)	30(85.7)	20(57.1)	26(74.3)	20(57.1)
<b>Total</b>	<b>272(100)</b>	<b>114(41.9)</b>	<b>40(14.7)</b>	<b>106(38.9)</b>	<b>28(10.3)</b>	<b>64(23.5)</b>	<b>25(9.2)</b>

**Table 2.** Showing blood splashes in ear surgeries (n=90)

Types of Ear surgeries performed	Number (%)	Blood Splatter					
		Glass		Mask		Gown	
		Surgeon	Assistant	Surgeon	Assistant	Surgeon	Assistant
Endoscopic myringoplasty	50	7	1	8	1	2	0
Tympanoplasty	10	1	0	1	0	0	0
Cortical mastoidectomy	3	3	1	3	0	2	1
Modified radical mastoidectomy	16	13	5	12	5	8	4
Diagnostic tympanotomy	2	0	0	0	0	0	0
Intratympanic steroid injection	2	0	0	0	0	0	0
Ventilation tube insertion	4	0	0	0	0	0	0
Suturing of lacerated pinna	3	1	0	0	0	1	0
<b>Total</b>	<b>90(100%)</b>	<b>25(27.8%)</b>	<b>7(7.8%)</b>	<b>24(26.7%)</b>	<b>6(6.7%)</b>	<b>12(13.3)</b>	<b>5(5.6%)</b>

**Table 3.** Showing blood splashes in nose and paranasal sinus surgeries (n=62)

Types of nose and paranasal surgeries performed	Number (%)	Blood Splatter					
		Glass		Mask		Gown	
		Surgeon	Assistant	Surgeon	Assistant	Surgeon	Assistant
Septoplasty	20	7	1	5	1	2	0
Septoturbinoplasty	17	5	1	6	0	1	0
Functional endoscopic sinus surgery(FESS)	12	1	0	0	0	0	0
Nasal bone fracture reduction	8	0	0	0	0	0	0
Diagnostic nasal endoscopy	5	0	0	0	0	0	0
<b>Total</b>	<b>62(100%)</b>	<b>13(20.9%)</b>	<b>2(3.2%)</b>	<b>11(17.7%)</b>	<b>1(1.6%)</b>	<b>3(4.8%)</b>	<b>0(0%)</b>

**Table 4.** Showing blood splashes in throat surgeries (n=85)

Types of throat surgeries performed	Number (%)	Blood Splatter					
		Glass		Mask		Gown	
		Surgeon	Assistant	Surgeon	Assistant	Surgeon	Assistant
Tonsillectomy	65	45	10	39	1	22	0
Adenoidectomy	15	2	0	2	0	1	0
Uvulopalatopharyngoplasty	1	1	0	0	0	0	0
Direct laryngoscopic biopsy	2	0	0	0	0	0	0
Microlaryngeal surgery	2	0	0	0	0	0	0
<b>Total</b>	<b>85(100%)</b>	<b>47(58.7%)</b>	<b>10(12.5%)</b>	<b>41(51.2%)</b>	<b>1(1.2%)</b>	<b>23(28.7%)</b>	<b>0(0%)</b>

**Table 5.** Showing blood splashes in head and neck surgeries (n=35)

Types of head and neck surgeries performed	Number (%)	Blood Splatter					
		Glass		Mask		Gown	
		Surgeon	Assistant	Surgeon	Assistant	Surgeon	Assistant
Thyroidectomy	18	16	10	17	10	15	12
Parotidectomy	4	3	2	3	3	3	2
Sub mandibular gland excision	2	2	2	2	1	1	1
Sistrunk operation	3	2	2	2	1	2	2
Branchial cyst excision	1	1	1	1	1	1	1
Cervical lymph node excision	2	1	1	1	1	1	0
Sebaceous cyst excision	3	2	1	2	1	1	0
Tracheostomy	2	2	2	2	2	2	2
<b>Total</b>	<b>35(100%)</b>	<b>29(82.8%)</b>	<b>21(60%)</b>	<b>30(85.7%)</b>	<b>20(57.1%)</b>	<b>26(74.3%)</b>	<b>20(57.1%)</b>

measures like mask and glass as study showed that the risk of HIV infection transmission following exposure of eye, nose or mouth is 0.1%.<sup>2</sup>

Our study showed that an overall 41.9% risk of blood splashes on protective glass during surgery for surgeon and 14.7% risk for assistant. Whereas 38.9% risk in mask and 23.5% risk in gown for surgeon. However, for assistant the risk in mask and gown was 10.3% and 9.2% respectively. This is similar with previous studies where blood splash contamination recorded on glass and protective eye shields had varied from 25–51%.<sup>8-10</sup> Other similar study also showed that the risk of splash in glass was 40.3%, whereas in mask and gown was 58.1% and 54.8%.<sup>6</sup> It is somehow similar in glass splashes but more in gown and mask. The reason may be of large sample size in our study leads more ear cases rather than head and neck cases where there is maximum splashes. There were other studies showing blood splashes only in surgeons but our study also showed risk of blood splashes for assistant also.<sup>6,8-10</sup>

The ear surgery showed that Modified radical mastoidectomy (MRM) had more splashes on glass, gown and mask both in surgeon and assistant as compared to other ear surgeries and our findings are similar to other study.<sup>6</sup> The reason may be because use of drill in MRM causes blood splashes more than in any other ear surgeries.

In our study, in the nose and paranasal sinus surgeries, the blood splashes was around 20.9% in glass, 17.7% in mask and 4.8% in gown of surgeon whereas it was less in assistant. This is less than study performed by other authors which showed around 40-50% splash and 30-40% splash respectively.<sup>6,11</sup>

In septoplasty and septoturbino-plasty, there was more blood splashes than other nose surgeries, which is similar to study performed by Lakhani et al.<sup>11</sup> The reason is anesthesia infiltration which often leads to inadvertent spray. In nasal surgery, septoplasty has more blood splashes than other surgeries. It may be because in latter surgeries we use endoscope, so chance of blood splashes were less.

Likewise, in throat surgery tonsillectomy had 69.2% splashes in glass, whereas in mask and gown it was 60% and 33.8% blood splashes. In case of assistant, the splash in glass, mask and gown was very low. The blood splashes is comparable with other studies which showed around 70-80% and 77-90% splashes in glass.<sup>6,11</sup> But in gown and mask, it was 100% which was very high.<sup>6</sup> It may be because of small sample size for tonsillectomy surgery.

In head and neck surgery, the blood splashes was 82.8% in glass, 85.7% in mask and 74.3% in gown of the surgeon whereas it was 60% in glass, 57.1% in mask and 57.1%

in gown of the assistant. It is comparable to other study which was around 90%.<sup>6</sup> Such high range of splashes is due to spurting blood vessels during head and neck surgeries.

So this study reports significant number of blood splashes to both ENT surgeon and assistant during ENT procedures.

So it is advised to wear protective glasses and an operating mask, as it helps to avoid two potential routes of viral transmission from patient to surgeon. Even wearing regular spectacles helps in protection but in limited manner. It has been shown by the study that up to a 5% rate of contamination on the protective side of glasses and these side flaps are not present on regular, everyday spectacles.<sup>12</sup>

The surgeon is mainly at risk of blood and body fluid splash to their eyes. Although there is a considerably greater risk of transmission of infection from sharps injuries, there are also documented cases of seroconversion following mucocutaneous contact.

The prevalence of HIV and hepatitis B, C is increasing, so there is always risk of transmission of disease in health personals. It is therefore necessary to take preventive practices from operating surgeon side during handling of patients either during surgery or any other interventional procedure to avoid unnecessary contamination with blood or body fluids.

This study perhaps the first of its kind regarding risk of blood splashes being done in both surgeon and assistant. The best part was use of glass during the surgery as most of ENT surgeons do not use glass during surgery.

The main limitation of the study is use of gown which was not disposable, as there is chance of blood stain in non-disposable gown, another is quantification of blood splashes as per size, counting of blood splashes microscopically by blinded person and surgeries performed by all surgeons helps to reduce the bias.

Our recommendation is to wear the glass by both surgeon and assistant during the regular surgery as it prevents the blood splashes in eye which is a potential route of disease transmission.

## CONCLUSION

The risk of blood splashes is high for both surgeon and assistant in different kinds of ENT surgeries, so the operating surgeon and assistant both must take necessary precaution in a form of protective mask and glass worn during surgeries to protect themselves from various blood borne infection transmission.

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