

MICROBIOLOGICAL QUALITY OF SURGICAL AND CLEAN EXAMINATION GLOVES IN ORAL SURGERY

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Abstract

Background : Gloves are used during all patient-care activities that involve exposure to blood and all other body fluid, during contact precautions and outbreak situations.. The non sterile gloves are appropriate for examination and non surgical procedures and sterile gloves for surgical procedures. In developing countries like India where the money set aside for public health is less than 1% of the gross domestic product (GDP), routine use of disposable materials like gloves for examining patients as well as for minor surgical procedures can be a drain on the resources. The use of surgical gloves when not indicated represents a waste of resources and increases the treatment cost. Recently there have been studies indicating use of clean examination gloves while performing minor oral surgical procedures. So we decided to conduct study to ascertain microbiological quality of surgical and clean examination gloves in oral surgery to determine if there was a significant difference in bacterial colony forming count (CFUs) and evidence of post operative infection between two types of the gloves.

Material and method: A randomised comparative double-blind study was conducted on 100 patients requiring minor oral surgical procedures like extractions of multiple teeth using sterile or clean examination gloves. The microbiological specimens were collected from gloves by saline dilution method and incubated for 7 days on trypticase soy agar. The number of colonies were counted and expressed as total colony forming units. The patients

in both groups were examined for assessment of post operative complications like infection to compare the co relation between no of CFU s and infection rate.

Statistical analysis:All results were tabulated and statistically analyzed using SPSS version 20.

Results: The intergroup comparison of the pre- and postoperative bacterial counts (CFUs) with the t-test paired showed highly significant 1 percent significance difference ($P < 0.01$) . The patients in both groups were examined for assessment of post operative complications like infection to compare the co relation between no of CFU s and infection rate and was found that none of the patients were found to be infected at 7th day recall in both groups. .

Conclusion:It was concluded that minor oral surgical procedures can be carried out with clean examination gloves, without any increased the rate of infection

Keywords: Examination gloves, Infection prevention, Exodontia. Post extractiobn infection,

Sterilisation, Surgical gloves.

Introduction :

Medical gloves are defined as disposable gloves used during medical procedures; they include:Examination gloves (non sterile or sterile), Surgical gloves that have specific characteristics of thickness, elasticity and strength and are sterile and Chemotherapy gloves. World health organization recommends use of gloves during all patient-care activities that may involve exposure to blood and all other body fluid (including contact with mucous membrane and non-intact skin), during contact precautions and outbreak situations.. The non sterile gloves are appropriate for examination and non surgical procedures and sterile gloves for surgical procedures. In developing countries like India where the money set aside for public health is less than 1% of the gross domestic product (GDP). The routine use of disposable materials like gloves for examining patients as well as for minor surgical procedures can be a drain on the resources. Recently there have been studies indicating use of clean examination gloves while performing minor oral surgical procedures. So we decided to conduct a study to ascertain microbiological quality of surgical and clean examination gloves in oral surgery to determine if there was a significant difference in bacterial colony forming count (CFUs) and evidence of post operative infection in two types of the gloves

Materials and Methods

A randomised comparative double-blind study was conducted 100 patients between May 2012 and March 2013. Ethical clearance from institutional ethical committee was obtained . Patients of age group of 18-40 years of either gender requiring minor oral surgical procedure like non-operative extractions of multiple teeth willing to give written informed consent were included.

Whereas patients having history of seizures, cardiovascular metabolic, respiratory, renal disease or coagulation abnormalities; pregnant or lactating women, alcohol or any other drug abuser, hemorrhagic diseases, steroid therapy patients, and patients unwilling to take part in the study were excluded.

Patients were divided randomly into two equal groups based on computer generated randomization chart. In Group A ,extraction was performed after donning a pair of sterile

gloves and in Group B: extractions was performed after donning a pair of clean examination gloves . The samples were collected with the help of normal saline. The microbiologist and evaluator doing clinical examination for post operative complications also were blinded regarding the group.

All extractions were performed taking aseptic precautions under local anaesthesia 2 percent lignocaine with adrenaline 1:2,00,000) using forceps and dental elevators. According to the standard protocol, specimens of microbiology have been taken from glove surfaces: for collection of glove surface samples before and after extraction, 20 mL normal saline was used [Figure 1]. 1 ml sample had been diluted to 1/10,000 dilution in Trypticase Soy agar [Figure 2]. The colony-forming units (CFUs) were incubated at 36°C–24°C for both pre-and post-op samples [figures 3 and 4]. [Figures 3 and 4]. If the number of CFUs on plate were greater than 1000, then it was documented in result as TNTC (too numerous to count). The plate was divided into 4 sectors. The number of bacteria were counted in one sector and multiplied by four.

To calculate the number of bacteria per ml of diluted sample the following equation used:

$$\frac{\text{Number of CFU}}{\text{Volume plated (ml) x total dilution used}} = \frac{\text{Number of CFU}}{\text{ml}}$$

All patients received similar postoperative instructions, and no other drugs were prescribed except for the postoperative use of anti-inflammatory medications (Tab Ibuprofen 400 mg tid). In addition, patients were told not to seek any other medical assistance if needed, for postoperative problems.

Statistical analysis:.

Data were entered into Microsoft Excel sheet of these 100 patients and were analysed using SPSS Version 20 (IBM SPSS statistics 20 Core System, Chicago, USA). In the computation of scientific data and the association between variables, Paired t-test, Unpaired t- test and Karl Pearson's Coefficient test were used. The statistically significant was a P = 0.05, while P = 0.001, or less, was statistically considered highly significant.

Results

Sterile group shows mean preoperative colony forming units is 6.24±5.05 with standard error of mean of 0.71 and postoperative colony forming unit is 15.04±4.75 with standard error mean of 0.67 at the end of 24 hours. Non Sterile group shows mean preoperative colony forming unit is 6.16±4.51 with standard error of mean of 0.63 and postoperative colony forming unit is 15.76±6.38 with standard error of mean of 0.90 at the end of 24 hours. The Comparison of Preoperative and Postoperative Bacterial Counts (CFUs) after 24 Hours (Table I)

Non sterile gloves group gives a probability of paired “t” test is 0.00 which shows a high significant difference from preoperative to postoperative CFUs at 1% level of significance (P < 0.01). For sterile glove group gives a probability of paired “t” test is 0.00 which also shows a high significant difference from preoperative to postoperative CFUs at 1% level of significance (P < 0.01).

The preoperative CFUs using Un-paired “t” test is 0.93 and for post operative CFUs using Un-paired “t” test is 0.52 which is statistically non significant ($P > 0.01$).

Karl – Pearson’s correlation coefficients between sterile and non sterile glove groups revealed a Strong Positive and Significant correlation ($P < 0.01$) in Postoperative CFUs but Weak Positive correlation was present in Preoperative CFUs. The Intergroup Comparison for Bacterial Colonies (CFUs) Preoperative and Postoperative (Table II):

On post operative assessment none of the patient was found to be infected at 7th day recall in both groups.



Figure 1: Armamentarium

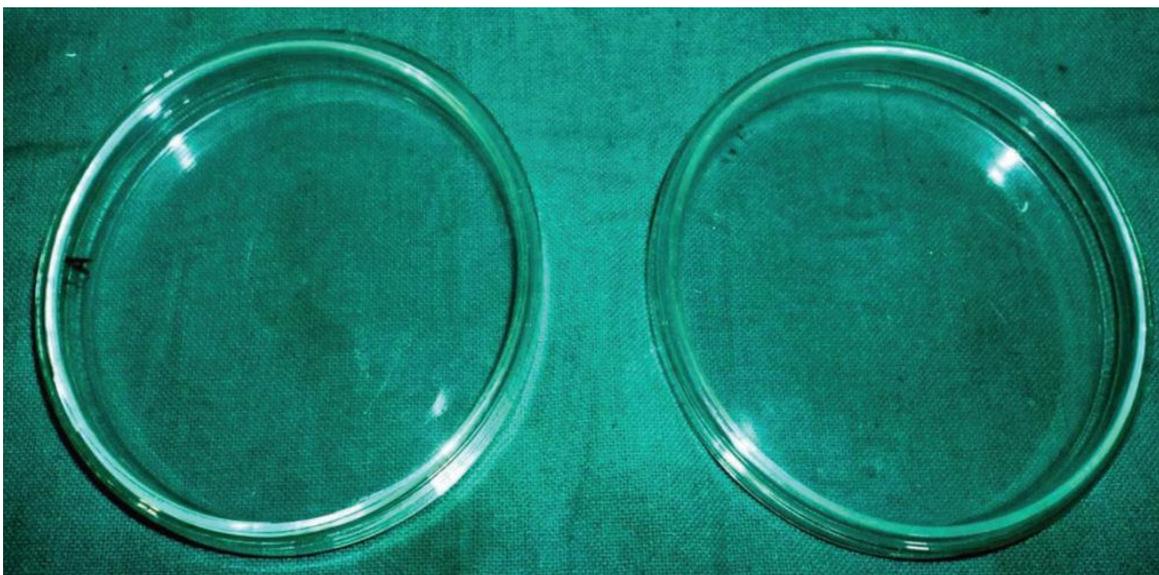


Figure 2: Preoperative samples before incubation with Trypticase Soy

Agar

Table 1: Distribution of mean and standard deviation of both groups (<i>t</i> -test)						
Groups	Types of stages	<i>n</i>	Mean±SD	SEM	<i>P</i>	Result
Surgical glove group	Preoperative CFU	50	6.24±5.05	0.715	<0.01	2.7638 (1.3-3)
	Postoperative CFU	50	15.04±4.75	0.671		
	OHI-S index	50	2.76±0.59	0.084		
	Russell's index	50	1.92±0.37	0.052		
Examination glove group	Preoperative CFU	50	6.16±4.51	0.638	<0.01	2.7144 (1.3-3)
	Postoperative CFU	50	15.76±6.38	0.902		
	OHI-S index	50	2.71±0.84	0.119		
	Russell's index	50	1.92±0.37	0.052		

CFU=Colony forming unit, OHI-S=Simplified oral hygiene index, SEM=Standard error of mean, SD=Standard deviation

Table 2: Intergroup comparison for colony forming units, simplified oral hygiene index, and Russell's index between two groups (unpaired <i>t</i> -test and Karl Pearson's coefficient)						
Types of stages	Mean		Unpaired <i>t</i> -test	<i>P</i>	Karl Pearson's coefficient	<i>P</i>
	Surgical glove group	Examination glove group				
Preoperative CFU	6.24	6.16	0.9337	>0.01	0.0126	>0.01
Postoperative CFU	15.04	15.76	0.5239	>0.01	0.5306	<0.01
OHI-S index	2.7638	2.7144	0.7358	>0.01	0.2973	>0.01
Russell's index	1.9294	1.9272	0.9766	>0.01	0.1654	>0.01

CFU=Colony forming unit, OHI-S=Simplified oral hygiene index

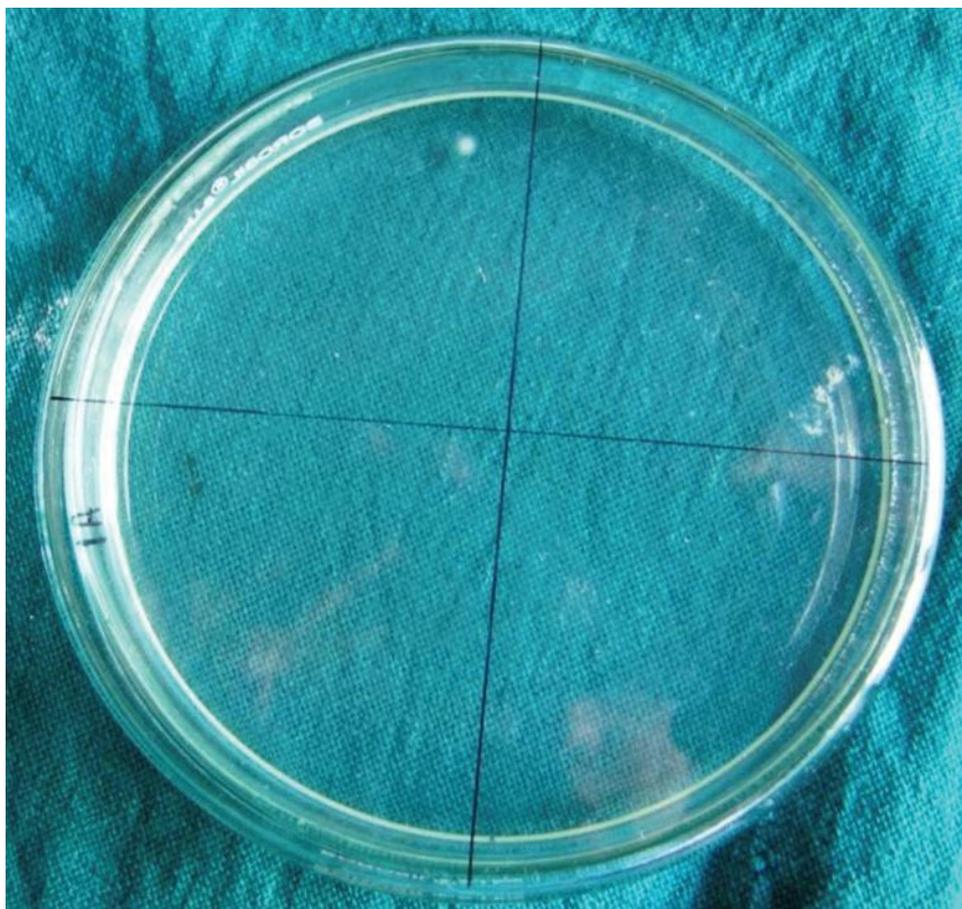


Figure 3: Preoperative sample after incubation



Figure 4: Postoperative sample after incubation

Discussion

More than a century earlier, gloves were added to a hygienic medical procedure and recommended for use in operations for over three decades. Minor oral surgical procedures like extractions are one of the most common procedures performed in clinical practice. The overwhelming majority of extraction wounds usually treat without negative accidents for 6 weeks[5]. There has not been a careful review of the degree of the cleanliness of the glove, which may impact the rate of postoperative infection during minor treatment. The author of an editorial in the International Journal on Oral and Maxillofacial Chirurgy released in 2001, addressed this topic and challenged the importance of wearing surgical gloves for tooth extractions. The routine use of disposable materials like gloves for examining patients as well as for minor surgical procedures can be a drain on the resources and increases the cost of treatment. Due to high cost of the dental services, patients are unable to seek the treatment. Budget control is a debatable topic, especially in teaching hospitals and developing country like India where private institution unable to get grant from government. It is expensive to deal with small surgical operations, such as exodontia, and surgical gloves can not be applied in all dental procedures. Budgetary restrictions also caused surgeons to challenge, even in the developing world, whether the usage of surgical gloves is desirable for all dental

procedures[8]. Nevertheless, if the test glove may not raise the infection risk after extraction, then a new thought might be needed for the definition of clinical practice. Giglio et al. challenged the necessity for surgical gloves on dental extractions many years ago[7]. In a group of patients who had undergone extraction, they contrasted the infection rate of surgeons wearing examination gloves with a group of surgeons wearing surgical gloves, and there was no evidence of any substantially elevated incidence of postoperative infection. It was also of concern that before treatment, a culture of palm swab with surgical gloves revealed that 50% of the samples had been infected before the actual initiation of the operation. Cheung et al. argued that safe use of exam gloves was not advantageous to the use of surgical gloves over exam gloves to minimise socket inflammation, infections and osteitis after dental extraction [2]. A different study conducted by Chiu WK et al [8]. assessed potential differences in postoperative complication rates following low dental extractions. Cheung et al. They were also testing the microbiological profile of the tooth sockets and glove surfaces and observed that inspection gloves did not raise the occurrence of postoperative clinical problems for the smaller third molar surgical treatment other than operative gloves. Overall, the possibility of postoperative health problems in both classes did not vary significantly in our sample, as did the gloves used in exodontics. In comparison, a double pair of gloves does not decrease the volume of pollution, but only decreases the quantity of perforations. Ritter et al. [1] also defined whether or not glove perforations led to glove contamination and find that glove contamination concentrations were about the same for all scrubbing workers. On the opening of boxes for bacterial species and re-examining the gloves left after boxing, McDaniel et al. [10] analysed a number of gloves of the exam instantly and concluded that fresh glove boxes of the test were remarkably clear from bacterial infection at the time of arrival at the dental clinic. The bacteriological contamination of the examination gloves was analysed by Berthelot et al. [11] prior to the opening of boxes and they observed that a broad number of bacteria may be removed from gloves. In the beginning, core and end of the opening of boxes containing glove cases, Ferreira et al. [12] quantified the CFUs on latex procedure gloves and assessed the microbial contamination of the gloves in terms of duration of environmental contact. It was stressed that no major exposure was induced when gloves were exposed. Consequently, the usage of research gloves was microbiologically secure. In our research, operative and examination gloves were contrasted with CFUs before and after treatment, and a substantial difference between the two classes was observed. Our analysis is the first prospective randomised controlled study to perform a preoperative assessment. Creamer et al. carried out an analysis to assess if surgical

versus examination gloves in outpatient hospital settings is varying in bacterial CFUs. They came to the conclusion that the bacterial load differential in the examination was statistically significant compared with the surgical gloves[13], although this statistically significant difference was clinically negligible in contrast with the bacterial contamination needed by the test gloves causing infection. Our research further endorses the study because there has been a substantial gap in all categories between pre-and postoperative CFUs. While the bacterial load on surgical and examination gloves was statistically significantly different, the statistically significant differential is thought to be clinically insignificant.

Conclusion

This study was conducted to compare the contamination levels on the exterior of gloves by saline dilution method. Results of the study shows that the contamination could not be associated with post operative infection . It was concluded that the minor oral surgical procedures can be carried out with clean examination gloves, without any increased the rate of infection

References

1. Ritter MA, French ML, Eitzen HE. Bacterial contamination of the surgical knife. Clin Orthop 1975;108:158-60.
2. Cheung LK, Chow LK, Tsang MH, Tung LK. An evaluation of complications following dental extractions using either sterile or clean gloves. Int J Oral Maxillofac Surg 2001;30:550- 4.
3. Burke FJ. Use of non- sterile gloves in clinical practice. J Dent 1990;18:79- 89.
4. Laskin DM. The selection of proper gloves for intraoral surgery. J Oral Maxillofac Surg 1999;57:887.
5. Amler MH. Disturbed healing of extraction wounds. J Oral Implantol 1999;25:179- 84.
6. Available from: <http://www.dnaindia.com/money/1797327/reportindia-s-economic-growth-rate-in-2012-13>. [Last accessed on 2013 Feb 07].
7. Available from: <http://www.indianexpress.com/news/healthcarespend-to-rise-to-2.5--of-gdp/918380>. [Last accessed on 2012 Mar 01].

8. Chiu WK, Cheung LK, Chan HC, Chow LK. A comparison of postoperative complications following wisdom tooth surgery performed with sterile or clean gloves. *Int J Oral Maxillofac Surg* 2006;35:174- 9.
9. Giglio JA, Rowland RW, Laskin DM, Grenevicki L, Roland RW. The use of sterile versus nonsterile gloves during out- patient exodontia. *Quintessence Int* 1993;24:543- 5.
10. McDaniel TF, Daugherty D, Wilson S. Bacterial contamination of clinical examination gloves. *Gen Dent* 2007;55:33- 5.
11. Berthelot P, Dietemann J, Fascia P, Ros A, Mallaval FO, Lucht F, et al. Bacterial contamination of nonsterile disposable gloves before use. *Am J Infect Control* 2006;34:128- 30.
12. Ferreira AM, Andrade DD, Haas VJ. Microbial contamination of procedure gloves after opening the container and during exposure in the environment. *Rev Esc Enferm USP* 2011;45:745- 50.
13. Creamer J, Davis K, Rice W. Sterile gloves: Do they make a difference? *Am J Surg* 2012;204:976- 9.