

Damage to the Gloves during Conservative and Endodontic Procedures

Uzma Desai¹, Annapurna Kini², I B Geeta³, Mohamed Idris⁴

¹Post graduate Student, Department of Conservative & Endodontics, Raja Rajeshwari Dental College and Hospital, Bengaluru, Karnataka, India, ²Reader, Department of Conservative & Endodontics, Raja Rajeshwari Dental College and Hospital, Bengaluru, Karnataka, India, ³Head & Professor, Department of Conservative & Endodontics, Raja Rajeshwari Dental College and Hospital, Bengaluru, Karnataka, India, ⁴Professor, Department of Conservative & Endodontics, Raja Rajeshwari Dental College and Hospital, Bengaluru, Karnataka, India

ABSTARCT

Introduction: The risk of infection is considered high in the dental office and dental practitioners are prone to high risk of infections such as hepatitis B, hepatitis C and human immunodeficiency virus and hence the dentist has to take effective protective measures by wearing intact double gloves, face masks and visors until the completion of the treatment. This study aimed to evaluate the integrity of gloves used during conservative and endodontic procedure.

Materials and Methods: A total of 20 conservative and endodontic dental specialists were selected for this study. The study group consisted of 400 unpaired disposable latex gloves to be used by conservative and endodontic dental specialists who received 10 pairs of intact gloves each. All intact gloves were marked for the left and right hands and placed in separate boxes. Gloves were observed for any tears during and after procedure. The puncture sites were separately recorded for the left and right hands and also for the fingers involved, for each group of treatment. Test of proportion was applied to find difference between the glove tear in the endodontic and conservative group.

Results: Of the 400 new intact unpaired gloves (200 pairs) were tested during and after the procedure distributed among dental practitioners of which 18 had pin hole punctures. Out of these, the highest number of punctures was observed in the group using endodontic files. The lowest number of punctures was observed in the group doing endodontic surgical procedure.

Conclusion: There was a high frequency of perforated gloves in the analyzed sample, and the perforations were most common in the fingers, especially while doing endodontic procedures.

Keywords: Gloves, Infection control, Sterilization

Corresponding Author: Dr. Uzma Desai, Post graduate student, Department of Conservative & Endodontics, Raja Rajeshwari Dental College and Hospital, Bengaluru, Karnataka, India. E-mail: umdendo@yahoo.com

INTRODUCTION

The emergence of hepatitis B, hepatitis C and human immunodeficiency virus infections has resulted in transmission of infection through dental settings, instruments posing a potential hazard to the operator and also cross infection to the patient considering dental office a hazardous environment regarding the risk of infections.¹ The common mode of transmission in the dental office is through saliva, gingival crevicular fluid, and aerosols. The breach in the protective barrier like gloves, personnel attire mask, gloves carry a high risk of infection. Hence, centers for disease control and prevention recommends to strictly adhering to the

universal precautions to prevent the infections in the dental settings and consider every patient as infected.² The effective use of quality gloves can remarkably reduce the infection in the dental office. In 1896, William Stewart Halstead introduced gloves to physicians and nurses for the first time.³ Gloves must be intact until the completion of the treatment for effective prevention. A study by Panlilio 1991, Jagger 1998 reported that hands and fingers remain a common area for contamination as a result of failure of glove protection, the glove failure as a result of perforations, frequently result from injuries due to sutures, sharp instruments, bone fragments or natural wear and tear. Studies conducted by Baggett *et al.* Patton *et al.* Schwimmer *et al.* have reported

about 4-7.5% of glove perforation rates during routine operative procedures, highest being during minor oral surgery procedures,^{4,6} perforation of the gloves varies with the duration of the procedure, the quality of the gloves used for the procedure and if a single use gloves being misused for several patients. Many a times glove perforation goes unnoticed, at the time of treatment. The risk of infection by blood borne pathogens has a changing characteristic over a period with respect to clinical procedures posing threat to the effectiveness of the barrier function. In addition, gloves continue to be used as an effective method for hand protection both in health care and non-health care settings, including the handling of patients, and in ancillary clinical facilities. Because gloves of differing characteristics are available, choosing the right glove for the right task is essential. In view of the protection against infectious agents the barrier function of gloves is an important aspect of glove quality. The term "barrier effectiveness" can be defined as the ability of the glove material to resist bacterial or viral penetration when subject to rigorous testing conditions. Glove barriers must provide an effective two-way barrier between the patient and the health care provider when used in a clinical setting. The efficacy of the glove barrier should not be compromised by the conditions experienced in the procedure being performed, especially when gloves are worn for a prolonged length of time.⁷ The present study aimed to evaluate the integrity of gloves used during conservative and endodontic procedure.

MATERIALS AND METHODS

The present study is a descriptive simple randomization study conducted in the Department of Conservative and Endodontics, Rajarajeshwari Dental College, and Hospital Bangalore, during the period June-November, 2014. Ethical clearance from the institutions ethical board was obtained prior to the study and patient consent was obtained in a prepared consent form prior to the inclusion in the study. 20 conservative and endodontic specialists from the institution were included in the study.

Inclusion Criteria

1. All the endodontic and conservative specialist actively involved in treating patients, Rajarajeshwari Dental College, and Hospital.
2. Specialist using paired, disposable latex glove during the procedure.
3. Gloves were collected only after completion of the procedure.

Exclusion Criteria

1. Gloves having manufacturing defect/damage.
2. Gloves other than latex material were not included.

The study consists of 400 unpaired gloves used by selected 20 conservative and endodontic dental specialists. For the study purpose, the practitioners were requested to use the latex standard sized disposable gloves from the same batch, which were preserved in separate boxes with markings done for the left and right hands. After the completion of the dental procedure, the gloves were collected from the specialists.

Gloves were observed for any tears during and after procedure. The puncture sites were separately recorded for the left and right hands and also for the fingers involved, for each group of procedure.

RESULTS

A total of 400 new unpaired gloves (200 pairs) were retrieved after the procedure and the results are presented separately for all of the groups, which show that out of the total 400 intact gloves, 25 (6.25%) glove were found to be damaged and the remaining 375 glove remained intact during and after the procedure. Statistical analysis was carried out were the specialist performing endodontic procedure and surgery were combined and compared with gloves damaged during conservative procedure. Highest number of (noticed and unnoticed) tear was observed in the endodontic procedure during biomechanical preparation was 17.5% and the lowest number of tear observed during obturation (1.25%). The total number of tears in the gloves during endodontic treatment was 20 (5%). The total number of tears in the gloves during conservative treatment was 5 (1.25%). On applying test of proportion, there was a statistically significant difference. Between the number of tears reported by the endodontic and conservative group ($P = 0.0007$, $Z = 3.207$) (Table 1).

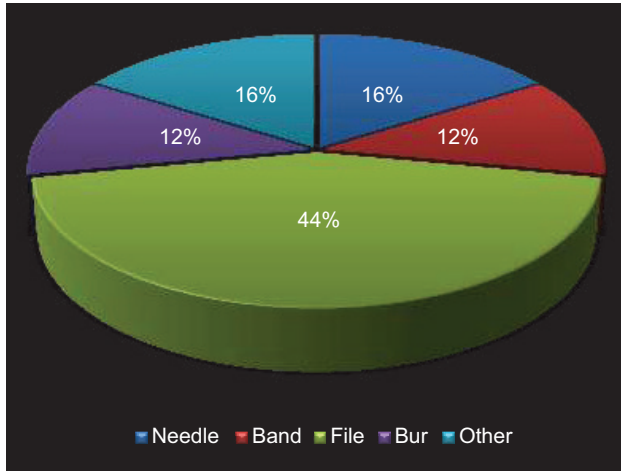
The total number of damaged gloves was 25 (6.25%) out of which most of the damage was seen because of endodontic files (44%), followed by damage because of needle (16%) and other reasons (16%) and least damage was seen because of band (12%) and burs (12%) (Graph 1).

Table 1: Details for the tears in the gloves in different group

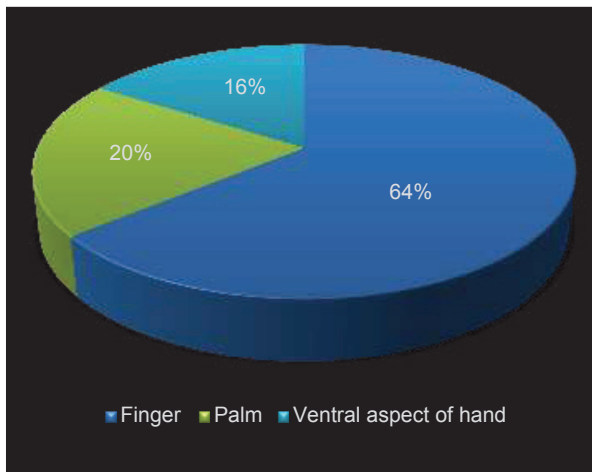
Variable group	Unnoticed during the procedure (%)	Noticeable tear after procedure (%)	Total (noticed and unnoticed) (%)	Total
Endodontic procedure				
Access opening	1 (1.25)	2 (2.5)	3 (3.75)	80
Biomechanical preparation	4 (5)	10 (12.5)	14 (17.5)	80
Obturation	0	1 (1.25)	1 (1.25)	80
Endodontic surgery	0	2 (2.5)	2 (2.5)	80
Conservative procedure	0	5 (6.25)	5 (6.25)	80
Total	12 (3)	13 (0.75)	25 (6.25)	400

$Z=3.207$, $P=0.0007$

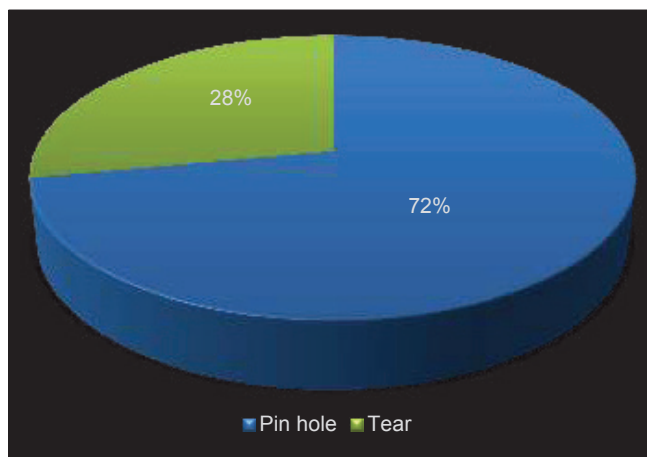
The maximum number of damage was seen at the fingers (64%), followed by palm (20%) and ventral aspect of hand (16%) (Graph 2) out of which mostly pin hole damage (72%) was there followed by tear (28%) (Graph 3).



Graph 1: Glove damage according to the type of instrument



Graph 2: Area of gloves damage



Graph 3: Type of gloves damage

DISCUSSION

In our study, the test of proportion is statistically significant with a $P = 0.0007$, with a total number of damage accounting to 6.25%. A similar study by Murrug,⁸ showed 1.9% latex gloves damage during dental procedures. This difference could be explained by the difference in the study design, gloves brand which includes differences in the manufacturing process and the strengths of the materials used, and the study included only general practitioner.

Hence many studies recommend for use of a system of two gloves with two different colors to reduce the risk of glove damage giving maximum protection to the operator.⁹ This double gloving helps the practitioner to notice the different color of the inner glove in case of damage to the outer gloves, and, therefore, replace it with a new one.¹⁰ However, some study did not demonstrate any differences between the use of two-glove system and single gloves.

Another study by Ali Taghavithe showed glove damage of 12.3% in the Prosthodontists' group, related to the sharp and cutting instruments such as disks, laboratory burs, etc., used by them. Glove tear in this regard can occur while handling a cast post in hand and being refined with a bur. The highest rate of unnoticed damage was also observed in this group (7%), due to ignoring safety precautions, improper glove wearing technique, etc., the lowest rate of glove damage was observed in the oral surgeons, but the difference was not significant when compared to others. As in this group the procedure involved is tooth extraction, which is of short duration and used sterile surgical gloves, for other surgical procedures, they which were not included in this study.

In the present study, glove damage during endodontic and conservative procedure was evaluated. It was observed that out of 400 gloves, 25 (6.25%) gloves were damaged of which highest rate was found in the group doing endodontic procedure using files in the biomechanical procedure (17.5%) which was mostly noted on fingertip (64%) area having pin hole damage (72%), and maximum damage was caused endodontic files (44%).

CONCLUSION

This observational study on a small sample size shows significant damage of gloves during endodontic procedure. The maximum damage in the form of pin hole perforation is observed during biomechanical preparation, and the maximum damage was found

in the fingertip area. Hence, glove damage during endodontic procedure may play a significant role in the transmission of infection during endodontic procedures.

REFERENCES

1. Al-Dwairi ZN. Infection control procedures in commercial dental laboratories in Jordan. *J Dent Educ* 2007;71:1223-7.
2. Kearns E. Guidelines for glove usage and handcare in general dental practice. *Br Dent J* 1998;185:87.
3. Kritsaneephaiboon A, Mahaisavariya B. Glove perforation in orthopedic trauma surgery. *Thai J Orthopedic Surg* 2006;31:15-20.
4. Baggett FJ, Burke FJ, Wilson NH. An assessment of the incidence of punctures in gloves when worn for routine operative procedures. *Br Dent J* 1993;174:412-6.
5. Patton LL, Campbell TL, Evers SP. Prevalence of glove perforations during double-gloving for dental procedures. *Gen Dent* 1995;43:22-6.
6. Schwimmer A, Massoumi M, Barr CE. Efficacy of double gloving to prevent inner glove perforation during outpatient oral surgical procedures. *J Am Dent Assoc* 1994;125:196-8.
7. Korniewicz DM, Rabussay DP. Surgical glove failures in clinical practice settings. *AORN J* 1997;66:660-8, 671, 673.
8. Murrage CA, Burk FJ, Hughs MC. For those of you allergic to latex, nitrile could be the glove material for you. *Br Dent J* 2001;190:377-81.
9. Tanner J, Parkinson H. Double gloving to reduce surgical cross-infection. *Cochrane Database Syst Rev.* 2006 Jul 19;(3):CD003087.
10. Avery CM, Gallagher P, Birnbaum W. Double gloving and a glove perforation indication system during the dental treatment of HIV-positive patients: Are they necessary? *Br Dent J* 1999;186:27-9.

How to cite this article: Desai U, Kini A, Geeta IB, Idris M. Damage to the Gloves during Conservative and Endodontic Procedures. *Int J Adv Health Sci* 2015;1(10):6-9.

Source of Support: Nil, **Conflict of Interest:** None declared.