

Are Sterile Gloves Necessary in Nonsurgical Dental Extractions?

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Purpose: The aim of the study was to compare the incidence of healing complications of extraction socket with the use of sterile or clean nonsterile gloves during nonsurgical dental extractions.

Material and Methods: This was a randomized prospective study conducted at the exodontia clinic of the Department of Oral and Maxillofacial Surgery of the Lagos University Teaching Hospital (Nigeria), between October 2002 and January 2003. Patients who were referred for nonsurgical extractions of permanent teeth and who satisfied the inclusion criteria into the study were randomly allocated into 2 groups. One group had their extractions performed with the surgeon wearing a pair of sterile gloves and the second group had their extractions performed with the surgeon wearing a pair of clean nonsterile gloves. Two hundred sixty-nine patients who had 301 teeth extracted and satisfied the inclusion criteria for socket healing assessment were assessed for postoperative socket healing.

Results: Three different types of socket healing complications were identified (dry socket, acutely inflamed socket, and acutely infected socket). A total of 32 patients (11.9%) developed socket healing complications. Nineteen of 122 patients in the sterile glove group and 13 of 147 patients in the clean nonsterile glove group developed socket healing complications ($P = .09$).

Conclusion: The study confirmed that the use of sterile surgical gloves offers no advantage over clean nonsterile gloves in minimizing extraction socket healing complications following dental extraction. Therefore, nonsurgical dental extraction can be safely performed with the surgeon wearing clean nonsterile gloves.

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In 1987, the American Dental Association recommended that all dentists wear gloves during examination and intraoral surgical procedures.¹ The American Centers for Disease Control (CDC) guidelines also stipulate that nonsterile gloves are appropriate for examinations and nonsurgical procedures, and that sterile gloves should be used for surgical procedures.² Dental extraction, although a surgical procedure, is

carried out in a surgically clean but nonsterile environment. This has led to the dilemma faced by dental surgeons on the necessity to use either clean nonsterile or sterile gloves when performing intraoral surgical procedures, especially routine dental extractions.²

In our environment, routine nonsurgical dental extractions are usually performed with the surgeons wearing clean nonsterile gloves. Because of increasing health awareness in our environment, patients are often encountered who insist that sterile surgical gloves instead of clean nonsterile gloves be worn by the surgeon when extracting their teeth. Sterile gloves are more expensive than clean nonsterile gloves, but the use of clean nonsterile gloves have been speculated to carry the possibility of increased postextraction socket healing complications.³ The concern that contamination of a box of clean nonsterile gloves may increase the occurrence of infection may be reasonable, but there is the need to verify this speculation by sound clinical evidence.

Therefore, this study sought to compare the incidence of healing complications of extraction socket

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with the use of sterile and clean nonsterile gloves during nonsurgical dental extractions.

Material and Methods

This study was carried out in the Department of Oral and Maxillofacial Surgery of the Lagos University Teaching Hospital, Lagos, Nigeria between October 2002 and January 2003, after approval from the research and ethics committee of the hospital. Patients who required nonsurgical extraction of 1 or 2 adjacent teeth were included in this study; they were randomly allocated to 2 surgeons wearing either sterile or clean nonsterile latex gloves. The following groups of patients were excluded from the study: patients who were taking antibiotics for an existing infection; those with underlying medical conditions such as diabetes mellitus, severe nutritional deficiencies, or endocrine disturbances; those with social habits such as cigarette smoking and alcohol consumption; patients on oral contraceptives and steroid therapy; and those with history of radiotherapy for the treatment of head and neck malignancies. Patients with preoperative Gingival Index of Löe and Silness⁴ greater than 1 were also excluded.

Informed consent was obtained from each patient willing to participate in the study. Extractions were performed with dental forceps, elevators, or both under local anesthesia (2% xylocaine with adrenaline 1:80,000). No postoperative antibiotics were prescribed. Paracetamol tablets (1 gm 2 hours postoperatively, and then 1 gm every 8 hours) was used by all patients. The same postextraction instructions were given to all the patients, and they were reviewed on the third and seventh day after extraction for assessment of socket healing. They were also instructed to report in the clinic should there be any increased or persistent pain in the extraction socket within 7 days following the extraction or beyond. Sockets healing assessment was carried out by 1 of the authors who was blinded to the patients' chart. Patients (8 and 5 patients in the sterile and clean nonsterile groups, respectively) who did not comply with the postextraction instructions were excluded from socket healing assessment analysis.

The diagnosis of socket healing complications was based on the following criteria:

Dry socket: Persistent or increased postoperative pain in and around the extraction site accompanied by a partially or totally disintegrated blood clot or an empty socket with or without halitosis. The diagnosis is confirmed when extremely sensitive bare bone is encountered by passing a small curette into the extraction wound.

Table 1. DISTRIBUTION AND TYPES OF TEETH EXTRACTED IN STERILE AND CLEAN NONSTERILE GLOVE GROUPS

Types of Teeth Extracted	No. of Teeth Extracted		Total
	Sterile Group	Clean Nonsterile Group	
Upper posterior teeth	67	73	140
Upper anterior teeth	7	15	22
Lower posterior teeth	62	63	125
Lower anterior teeth	4	10	14
Total	140	161	301

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Acutely inflamed socket: Painful socket with exuberant inflamed tissue, but without pus or systemic fever.⁵

Acutely infected socket: Painful socket with suppuration, erythema, and oedema with or without systemic fever.

Statistical Analysis

Data was analyzed using the SPSS for window (version 11.5; SPSS Inc, Chicago, IL) statistical software package. Descriptive statistics and χ^2 test were used as appropriate. The critical level of significance was set at $P < .05$.

Results

A total of 269 patients who had 301 extractions were obtained at the end of the study. One hundred forty-seven patients were in the clean glove group, while 122 patients were in the sterile glove group. Table 1 shows the distribution and types of teeth extracted in the sterile and clean nonsterile glove groups. Age range of participants in the sterile and clean nonsterile groups was 13 to 57 years with a mean age (\pm SD) of 32.1 ± 13.2 years, and 15 to 57 years with a mean age (\pm SD) of 32.4 ± 10.9 years, respectively. The male to female ratio in the sterile group was 1:1.4 (50 males, 72 females) and that of the clean nonsterile group was 1:1.6 (56 males, 91 females). Two hundred thirty-seven patients (88%) had uneventful socket healing. A total of 32 patients (12%) with 35 sockets developed socket healing complications (Table 2).

STERILE GLOVE GROUP

One hundred three patients (84.4%) presented with uneventful wound healing, while 19 patients (15.6%) developed socket healing complications. Fifteen pa-

Table 2. POSTOPERATIVE SOCKET HEALING

	Complicated Healing Socket (%)			Uncomplicated Healing Socket (%)	Total (%)
	Dry Socket	Inflamed Socket	Infected Socket		
No. of Patients	23 (8.6)	4 (1.5)	5 (1.9)	237 (88)	269 (100)
No. of Sockets	26 (8.6)	4 (1.3)	5 (1.7)	266 (88.4)	301 (100)

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tients (12.3%) with socket healing complications were found to have dry socket, 4 (3.3%) developed inflamed socket, while none of the patients in the group developed infected socket.

CLEAN NONSTERILE GLOVE GROUP

One hundred thirty-four patients (91.2%) presented with uneventful wound healing, while 13 patients (8.8%) developed socket healing complications. Eight patients (5.4%) with socket healing complications were found to have dry socket, 5 patients (3.4%) developed infected sockets, while none of the patients in this group developed inflamed socket.

There was no statistically significant difference in the incidence of socket healing complications between the 2 groups ($P = .09$) (Table 3).

Discussion

In the dynamic environment in which they are used, gloves function as a bidirectional barrier only when they remain intact. Through the years, researchers have shown that latex gloves serve as an effective barrier to most pathogens.⁵ Whether or not gloves are sterile should have no influence on their ability to prevent transmission of hepatitis B or the HIV from patients to the health care workers and vice versa. This is determined solely by the integrity of the gloves.² One of the reasons for the CDC recommendation for the use of sterile gloves for surgical procedure includes decreased likelihood of perforation because they are formulated to meet the highest possible tensile strength requirements.⁵ However,

some clean nonsterile gloves are of similar quality and therefore should provide comparable protection.^{2,5}

The choice between sterile and clean nonsterile gloves in routine dental extractions has been a subject of debate,² which was generated by the CDC recommendation. Dental extraction, although a surgical procedure, is carried out in a surgically clean but nonsterile environment. Laskin² made a case for the use of clean gloves in intraoral surgery. He was of the opinion that as long as there is no evidence to show that clean gloves are inferior to sterile gloves when operating in the mouth, and other suitable precautions are taken, those practitioners who make this choice should continue to feel confident that they are providing an appropriate service.

Dry socket is a well known complication of extraction wound.^{3,6-10} Other conditions that have been reported to complicate extraction socket wound healing are acute socket infection^{7,8} and acutely inflamed socket.⁶ The role of bacteria in the etiopathogenesis of the extraction socket healing complications is also well known.^{6-8,10}

Few reports^{3,6} are found in the literature comparing the incidence of postoperative wound healing complications following dental extraction with the surgeon wearing either sterile or clean nonsterile gloves. The first study to compare the effect of clean nonsterile and sterile gloves on the incidence of extraction socket healing complications was reported by Giglio et al.³ In their prospective study, none of the extractions developed postoperative infections in either group; however, dry socket occurred in 4 patients in the sterile group and in 3 patients in the clean nonsterile glove group. The second study⁶ was a prospective randomized study, with incorporation of more parameters of socket healing, such as acutely inflamed socket as performed in the present series. No significant difference was also found in socket healing complications between the 2 groups. The present study, in agreement with the 2 previous ones, found no significant difference in the incidence of socket healing complications between the 2 groups of patients.

There are some fundamental differences and similarities between the present study and the 2 previous

Table 3. SOCKET HEALING STATUS IN BOTH STERILE AND CLEAN NONSTERILE GROUPS

Gloves Used	Uncomplicated Healing (%)	Complicated Healing (%)	Total
Sterile	103 (84.4)	19 (15.6)	122
Clean	134 (91.2)	13 (8.8)	147
Total	237	32	269

$P = .09$ ($\chi^2 = 2.88$).

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ones. The 3 studies are similar in being prospective in nature. Giglio et al³ alternately assigned patients arbitrarily into clean and sterile glove group, while in the present study and that of Cheung et al⁶ patients were randomly allocated into the 2 groups. Randomization has many unique advantages when compared with other methods of allocation.¹¹ First, the potential for bias is removed. Secondly, the study groups tend to be comparable with respect to all variables except for the intervention being studied. On the other hand, alternate assignment to study and comparison groups is always liable to potential bias.¹¹

Several conditions¹²⁻²⁴ have been documented in the literature to influence the healing of extraction sockets, and thereby predispose those patients with the conditions to developing socket healing complications. Other factors that may influence socket wound healing are oral contraceptive use, presence of local infection, multiple extractions, and anemia.^{25,26} According to the criteria for comparing 2 groups as recommended in evidence-based dentistry,²⁷ these conditions (confounding factors) that could influence the outcome of this study were eliminated so as to make the 2 groups as similar as possible in the present study. However, our study further supports the works of Giglio et al³ and Cheung et al,⁶ that dental extraction with the wearing of clean nonsterile gloves carries no higher risk of producing socket wound healing disturbances than wearing sterile gloves.

Although, our study did not involve impacted teeth, Giglio et al³ involved some patients who required surgical flaps and their results suggested that the findings may also be applicable to the removal of such teeth.

The concern that contamination in a box of clean nonsterile gloves may increase the occurrence of infection may be reasonable. However, clean gloves are considerably cheaper than the individually packed sterilized gloves and health management authorities may demand justification for purchase of more expensive sterile gloves for dental extraction.⁶ Furthermore, in these days of increasing litigation in clinical practice, dental surgeons need to base the choice of any materials used on their patients on sound clinical evidence. The principles and methods of evidence-based dentistry avail dentists the opportunity to apply research findings to the care of their patients.²⁸ Evidence-based practice involves tracking down the available evidence, assessing its validity, and then using the best evidence to inform decisions regarding care.²⁸

The use of sterile gloves for nonsurgical dental extraction is desirable. But in a situation where the practitioner chooses to use sterile gloves, strict attention to the gloving process is essential to maintain a

sterile field. An interesting result from Giglio et al³ showed that positive cultures were obtained from the swab taken over the palm of the surgeon's gloved hand before surgery in 50% and 85% of the specimens in both sterile and clean nonsterile glove groups, respectively. The 2 predominate organisms found on the sterile gloves are commonly found on the skin. This finding underscores the importance of good hand washing technique and strict adherence to the gloving process.

In conclusion, the present study confirmed the findings of others that routine nonsurgical dental extraction can be safely performed by surgeons wearing nonsterile but surgically clean gloves without increasing the risk of postoperative infection.

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