

# Patients' self- use of mobile phone camera to capture extraction socket: a proposal as distant clinical patient follow-up after exodontia in this COVID era

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## ABSTRACT

**Introduction:** Exodontia is one of the most common procedures carried out by the oral surgeon and post- surgical follow-up is important in the management of patients who undergo exodontia. The outbreak of COVID 19 has necessitated preventive measures which include social distancing and reduction in interpersonal contacts, especially when carrying out dental procedures that usually require close proximity to patients.

**Objective:** To describe the possibility of using self-taken photographs of extraction socket as a means of assessing post extraction outcome

**Methods:** This involves the patients taking a photograph of the extraction socket with their phone and sending the photos through WhatsApp to the surgeon. The posterior teeth were chosen because of the possible challenge posed by their location in the oral cavity.

Patients were coached on how to seat and position their camera phones. Scores were given to each wall of the extraction socket with 30% allotted to the floor of the socket and 20% for the other walls of the socket; the total value for the 5 walls of the extraction socket came to 110% in the Likert rating.

**Outcome:** To access the feasibility of such photos replacing the clinical presence of the patients during follow-up for monitoring of extraction sockets.

**Results:** Twenty (20) photographs were expected but 16 (80%) photos were received. Three (19%) of the photos were not acceptable due to difficulty in socket identification. These three photos were ranked in the VAS as 0 and 1. One of the photos was assigned 0 because it was off target. Thirteen (81%) of them captured the walls of the extraction socket to varying degrees of satisfaction. The result of the scores ranged from 0-110% in the Likert rating. Specifically, one patient scored 110%; 4: 80-90%; and 3 scored 0%. Overall, 62.5% were satisfactory.

**Conclusion:** Distant clinical examination of patients' extraction socket can be possible through the use of self-taken patients' photo of extraction socket. The ability of the patients to adequately capture their extraction sockets can be improved by more coaching on proper position and angulation of their phone camera. Other surgeons can use the laid down guidelines to agree or not as to the extent the intended purpose for the photographs were achieved.

**Keywords:** follow-up, self-taken photos, COVID-19.

## INTRODUCTION

Patient follow-up after a procedure is important in the management of a patient. Exodontia is one of the most common procedures carried out by the oral surgeon. Follow-up of cases is necessary to monitor patients' compliance with post-operative instructions and healing of the extraction socket. Post extraction socket healing process begins with clot formation and ends with epithelized closure of the bone filled socket (Cardaroli et al., 2003). This postoperative progress of a wound depends not only on care but also on the behaviour of the patient. Excessively rinsing of the mouth on the day of the operation, tobacco or alcohol consumption, as well as exerting strenuous physical effort can lead to the loss of the coagulum and consequently infection (Cohen & Cohen-Le'vy, 2014). Infectious complications can occur when the formation of coagulum does not take place or is altered by early fibrinolysis. There can be simple, granulomatous and dry alveolitis which will present with pain, two to four days after surgery (Cohen & Cohen-Le'vy, 2014).

Dental procedures are carried out in close proximity to patients. A dental professional's frequent direct or indirect contact with human fluids, patient materials, and contaminated dental instruments or environmental surfaces makes a possible route to the spread of viruses (Cleveland et al., 2016). Coronavirus is a contagious, virulent organism, with an incubation period ranging from 2 to 14 days within which asymptomatic patients can transmit infection. It is difficult to identify carriers and asymptomatic patients during the incubation period. Therefore, stringent measures are currently being applied, including social distancing, hand washing, wearing of face masks, total lockdown of cities and countries, aggressive contact tracing, and community testing, all in the bid to prevent, control, and contain the spread of the disease (ECDC, 2020; Sohrabi et al., 2020).

The viral load in saliva has been reported to be very high in both symptomatic and asymptomatic patients and this can place both the oral health worker and the patient at higher risk of infection, because, procedures are carried out in close proximity to patients (Spagnuolo et al., 2020). There is evidence of the transmissibility of the corona virus during close contact through respiratory droplets and by fomites (van Doremalen et al., 2020). Thus, the virus can spread directly from person to person when a COVID-19 infected person coughs or exhales producing droplets that reach the nose, mouth or eyes of another person (WHO. Novel Coronavirus-China. 2020.)

Due to the fear of contracting the virus, or as a moral duty to prevent spreading COVID-19 among their patients, some dental professionals have been known to limiting their services (Coulthard, 2020). Effective measures utilizing limitation of contact between patients and doctors are needed to prevent this

infection. To reduce viral spread, which can be as a result of frequent visitation and hence contact due to follow-up, the use of mobile phones as a means of clinical examination was suggested to the patients.

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This involves the patients taking a photograph of their extraction socket with their phone and sending the photos through WhatsApp to the surgeon. To improve visualization of the sockets, household instruments like the flat handle of a table spoon was suggested as a retractor of the cheek or tongue as needed. Household items have been known to serve as tongue depressors (Yanagihara et al., 2020) and have been used for telehealth examination in otolaryngologic studies due to obstacles in visualizing anatomic spaces that are small, poorly lit, or otherwise inaccessible without specialized equipment (Ansary et al., 2019; Greenhalgh et al., 2020).

Visual Analogue Scales (VAS) are psychometric response scales used to measure subjective characteristics or attitudes. It can be used to monitor the course of a clinical disease (Klimek et al., 2017). It is typically presented as a horizontal line, anchored with two verbal descriptors at the extremes where respondents indicate their perceived status by placing a mark along the horizontal line at the most appropriate point (Wewers and Lowe, 1990). They are effectively classless, meaning that, theoretically, they permit an infinite number of gradations between the endpoints (Klimek et al., 2017).

Likert-type scales are one of the most popular rating scales used in surveys to measure respondents' traits. They typically have three or more response categories to choose from, and respondents select the category that reflects their state and trait best (Likert, 1932). A six-point scale encourages participants to consider the question more carefully and make a choice that either leans positively or negatively – perceptions are rarely neutral, and the six-point scale helps account for the reality – (Thompson, 2018). The validity and reliability of the Likert scale have been widely debated, yet it has been found that as the size of a Likert scale increases, validity and reliability may also increase (Lozano et al., 2008).

The objective of this study was to consider the use of photography for distant clinical examination of the extraction socket; therefore, to reduce the number of patients and those that escort them to the clinic. Ultimately, to reduce the spread of the corona virus in this era of COVID-19 pandemic without compromising the delivery of robust healthcare to the patient

## MATERIALS AND METHODS

This study was carried out in the oral and maxillofacial department of central hospital Benin, Edo State Nigeria in March, 2021 within a week.

**Design:** It was a prospective observational study.

**Participants:** Patients with smart phones who had undergone exodontia were recruited for this study.

**Recruitment:** Patients who were to have simple forceps extractions that did not involve (1) a space infection; (2) anterior teeth; (3) third molar surgeries; and (4) did not involve sedation were chosen daily from patients scheduled for routine exodontia in the clinic. The exclusion of teeth with space infection and third molar surgeries was to reduce factors that could delay mouth opening. A sedated patient may have been too anxious to remember instructions given as to guidelines for use of photography. Anterior teeth were excluded because it was the opinion of this surgeon that photographing them may not pose much of a challenge.

The requirements were that patients had a mobile phone and could afford to buy data to transfer photograph to the Surgeon's phone through WhatsApp.

Patients were informed that due to the pandemic and the need to reduce social contact as much as possible, this study was to assess the possible use of the photographs taken of their extraction sockets by themselves as a representative of their presence in the dental clinic. The photographs of their sockets will then be used for distant clinical examination but with the intent of delivering quality care to them. All patients consented.

**Inclusion criterion:** sockets of extracted posterior teeth in all quadrants of the jaw.

Posterior teeth were regarded as premolars and molars. The justification for using posterior teeth only was to test for ease of access of capturing the extraction socket.

**Data collected:** Demographic information, including age and gender were taken. Other data collected were tooth involved and quadrant of the jaw.

Patients were advised to take the photographs on the 5<sup>th</sup> day post exodontia because granulomatous and dry alveolitis can be detected from two to four days after surgery. (Cohen & Cohen-Le'vy, 2014).

### **Visualization of the extraction socket:**

Visualization of an extraction socket (of the posterior teeth) by a dentist in the clinic requires that a patient is reclined on the dental chair, light source directed to the mouth and a mirror used to retract the cheek and/or tongue. This can be quite a challenge for the patients to achieve in their environment. For visualization of the sockets to be easier for the patients, it was suggested to them that: they sit on a chair; they tilt their head back and raise their chin; they use the handle of a table spoon to retract their cheek and take the photograph

of the extraction socket or anyone close to them could take the photograph of their socket

These instructions were given before the extraction and they were gently reminded after the procedure.

Patients were asked to phone in with any complaint from the extraction socket if they had any.

### **Assessment of photos:**

A Visual Analogue response Scale was used with a rating between 0 to 10. The lines of 0 to 10 corresponded to the verbal descriptions of the extraction sockets according to the laid down guidelines (table 2). This ranged from inability to capture extraction socket (off target) which was marked as zero (0) to ability to capture all 5 walls clearly which was marked as 10 (table 2). The overall objective was to monitor healing of the extraction socket.

A 6-point Likert scale with increasing reliability of scales was used to elicit the opinion of this researcher as to the level of acceptability of the measurement being used (table 3). The use of the photograph to monitor the healing of the extraction socket does not deviate from its intended purpose which is to monitor post extraction healing. The assessment of the photos by the surgeon followed the laid down principles of assessment of the extraction sockets according to the definition of terms for this proposal. Therefore, the image of the socket so captured can be used as a monitoring tool by different surgeons. It will be easy for them to agree or disagree on the extent to which the photographs represent the purpose that they were intended for.

The images of the sockets in the right and left quadrants of the upper and lower jaws of only posterior teeth were examined.

Acceptability of photographs was based on its ability to replace clinical follow-up. Photographs of extraction socket of each quadrant was assessed and rated as satisfactory or not based on how much of the socket was shown: All five aspects of the socket walls that is: floor (apical wall) of the socket; mesial wall; distal wall; buccal wall; lingual/palatal walls were the parameters assessed in the photograph. The images were examined critically to assess whether these walls were captured satisfactorily.

Scores were given to each wall of the extraction socket with 30% allotted to the floor of the socket and 20% for the other walls of the socket. Due to the nature of the outcome of interest, this scoring of the floor of the socket was chosen to explain further the clinical outcome sought for.

The total value for the 5 walls of the extraction socket came to 110%. The allotment of an odd number signifies the visualization of the floor of the socket in that patient's photograph.

The levels of acceptability were: not satisfactory; slightly satisfactory; moderately satisfactory; satisfactory; very satisfactory and extremely

satisfactory. The difference between slightly satisfactory and not satisfactory was just a minute amount of acceptability. In moderately satisfactory, the acceptability of the photo for clinical monitoring was just within acceptable limits.

**Outcome:** This was ability of patient to capture the photo of the socket and acceptability of the image captured to represent the extraction socket. For patients that did not meet the ultimate goal, they were asked to visit the clinic for review.

**Analysis of data:**

Descriptive analysis of extracted data was done on tables and graph using Microsoft Excel 2010.

**RESULTS**

Out of the 20 patients recruited, 15 patients responded by sending 16 photos to the WhasApp page of the writer's phone: two photos were from one patient, this was because this patient had extraction of two teeth-one on either side of the upper jaw at the beginning and end of the week when this data was collected. The age, gender and teeth extracted of these patients are represented in table 1.

One of the patients sent his photo day 1 post operatively due to persistent bleeding after the extraction. He was advised to come to the clinic immediately for further management of the extraction socket. No other complications were reported by the

other patients; the remaining patients sent their photographs between 5 to 10 days post operatively.

**Assessment of patients' photos:**

Photos were not cropped and are presented exactly as the patients sent them. They were however blinded, to prevent identification.

The result of the scores ranged from 0-110% in the Likert rating. Specifically, one patient scored 110%; 4: 80-90%; and 3 scored 0% (figure 1 - 8).

Figure 1 shows that no extraction socket could be identified in the patients' photo, while figure 3 shows one wall of the extraction socket barely visible.

Figures 4 - 7 shows the visibility of the floor of the extraction sockets in addition to the walls of the socket in varying degrees. Figure 8 was the only photograph that captured all the walls of the extraction socket but the image was blurred.

Table 2 lists the items on lines 0 to 10 on the VAS scale. The end point descriptions range from inability to capture the extraction socket (off target) which is zero (0) to ability to capture all 5 walls clearly. The midpoint which is 5 describes two walls that should include an apical wall. There were more patients on VAS scores 5 and 7: four patients each.

Table 3 shows the rating of the acceptability of the photos sent by each patient on a 6-point Likert scale. Out of the 16 photos sent in by patients, 10 were found to be satisfactory to extremely satisfactory. This gives a total percentage of 62.5.

Table 1: demographic data and extracted tooth of patients

S/N	Age (years)	Gender	Extracted tooth
1	48	Female	16
2	54	Male	36
3	23	Male	16
4	21	Male	47
5	7	Female	16
6	7	Female	26
7	25	Male	26
8	22	Female	36
9	38	Female	46
10	25	Male	46
11	23	Female	46
12	21	Male	47
13	18	Female	25
14	24	Female	27
15	55	Female	37
16	23	Male	36

Table 2: VAS Scores for patients

Guideline for data collection	VAS Score	Number of patients
Inability to capture extraction socket (off target)	0	1
Extraction space captured but socket not seen	1	2
Socket seen but walls cannot be identified	2	0
Any wall of the socket	3	1
Two walls without apical wall	4	2

Two walls including apical wall	5	4
Three walls without apical wall	6	1
Three walls including apical wall	7	4
Four walls without apical wall	8	0
Four walls with apical wall (5 complete walls) but image not clear	9	1
Ability to capture all 5 walls clearly	10	0

**Table 3: Likert items and Scores**

Likert items	Percentage allotted (%)	Likert Scores	Number of patients
No visible socket wall	0	Not satisfactory	3
One socket wall-not apical-	20	Slightly	
Apical socket wall	30	Satisfactory	1
Two walls, none apical	40	Moderately	
Two walls, one is apical	50	Satisfactory	2
Three walls, none apical	60	Satisfactory	
Three walls, one is apical	70		5
Four walls, none is apical	80	Very	
Four walls, one is apical	90	Satisfactory	4
All five walls	110	Extremely satisfactory	1



Figure 1  
VAS=0  
Likert=Not satisfactory (0%)



Figure 2 VAS=1  
Likert=Not satisfactory (0%)



Figure 3  
VAS=3  
Likert=Slightly -minutely- satisfactory (20%)



Figure 4  
VAS=4  
Likert=Moderately satisfactory(40%)



Figure 5 VAS=5  
Likert=Satisfactory (70%)



Figure 6  
VAS=6  
Likert=Satisfactory (60%)



Figure 7 VAS=7 Likert=Very satisfactory (90%)





Figure 8

VAS=9

Likert=Extremely satisfactory (110%)

#### Limitation

This includes ownership of mobile phone with internet. Even with available phones with internet connection, financial difficulty to recharge the phones was an added limitation.

#### CONCLUSION

The proposal of the use of self-taken photographs of the extraction socket after exodontia to supplement patient follow-up is a simple and straight forward technique to contribute to the non-pharmacological method of COVID-19 prevention in the health sector by reducing person to person contact. This study has demonstrated the possibility of using patients' self-taken photographs of extraction socket as a means of monitoring

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