

Unsedated Flexible Upper Gastrointestinal Endoscopy: Need for Routine Oxygen Monitoring?

*Embu H Y, FWACS; **Misauno M J, FWACS; *Isamade E S, FMCA, FWACS; ***Yilkudi M G, FWACS

*Department of Anaesthesia, Jos University Teaching Hospital, Jos-Nigeria. **Department of Surgery, Jos University teaching Hospital, Jos-Nigeria. ***Department of Surgery, University of Abuja Teaching Hospital, Abuja-Nigeria.

Abstract

Background: To determine the incidence of oxygen desaturation and whether routine oxygen monitoring is necessary during unsedated diagnostic flexible upper gastrointestinal endoscopy.

Methods: A prospective study involving 54 consecutive in and out patients who had diagnostic upper gastrointestinal endoscopy at the endoscopy suit of the Jos University Teaching Hospital, Jos, Nigeria between March 2007 and October 2007. The patients were reviewed before the procedure and classified according to the American Society of Anesthesiologists' (ASA) classification into classes I, II, III and IV. Endoscopy was carried out after topical pharyngeal anaesthesia using 10% lidocaine spray and oxygen saturation was monitored throughout the procedure.

Results: There were 30 males and 24 females, with a male, female ratio of 1.25:1. The mean age was 46.7 with a range of 17 to 81 years. Mild to moderate desaturation occurred in 10(18.5%) of the patients while severe desaturation occurred in 7(12.9%) of the patients. All cases of severe desaturation lasted less than 30 seconds and no supplementary oxygen was needed. There were no significant statistical correlations between desaturation and gender, age, duration of procedure or ASA status of the patients.

Conclusion: Routine oxygen monitoring may not be necessary in patients undergoing unsedated diagnostic upper gastrointestinal endoscopy and who do not have respiratory disease.

Key words: Upper gastrointestinal endoscopy, Diagnostic, Oxygen saturation, unsedated

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Introduction

Flexible upper gastrointestinal endoscopy is generally considered a safe procedure and a great percentage of these procedures are diagnostic in nature. Though a number of studies have reported oxygen desaturation

during the procedure¹⁻³, there are conflicting reports as to whether routine pulse oximetry and oxygen supplementation are necessary³⁻⁵. Routine measurement or monitoring of oxygen saturation is not practiced in many institutions. Some studies have reported cardiovascular complications which are associated with periods of severe hypoxaemia^{6,7}. Sinus tachycardia is common but more serious complications like ventricular arrhythmia, angina pectoris, myocardial infarction and cardiac arrest are unusual^{1,2,8}.

Arterial oxygen desaturation during upper gastrointestinal endoscopy has been correlated with factors like patient's age, premedication, pulmonary disease, history of smoking, size of endoscope and duration of procedure^{5,7,8}. For now though it is difficult to determine risk factors for severe desaturation in patients with no respiratory pathology who are undergoing non-sedated upper gastrointestinal endoscopy. We conducted a prospective study on patients undergoing diagnostic non-sedated flexible oesophagogastroduodenoscopy in our hospital to determine the incidence of oxygen desaturation and to ascertain factors responsible for this.

Materials And Methods

Study Population

Approval for the study was obtained from the hospital ethical committee. Fifty-four consecutive in and out patients who had diagnostic upper gastrointestinal endoscopy at the endoscopy suit of the Jos University Teaching Hospital between March 2007 and October 2007 were recruited for the study. Patients were reviewed before the procedure and classified according to the American Society of Anesthesiologists' (ASA) classification into classes I, II, III or IV (fig. 1). Patients assessed as belonging to class V or worse were excluded from the study. Other exclusion criteria included patients with preexisting lung disease, respiratory distress or patients with baseline oxygen saturation \leq 90% or those requiring oxygen therapy. Patients requiring sedation or general anaesthesia for the procedure were also not included in the study.

The patients were all monitored in the endoscopy suit. The procedures were carried out by the same endoscopist with an assistant using an Olympus GIF P30 endoscope. All the patients were positioned in the left lateral position and breathing room air. Ten percent lignocain spray was applied to the patients' pharynx before the procedure and no sedatives were administered to any of the patients.

Oxygen saturation was monitored continuously using a hand-held NONIN Onyx II pulse oximeter. Monitoring was started 2 minutes before the commencement of the procedure and continued for 10 minutes after the end of the procedure. Significant decreases in oxygen saturation and the period during the procedure when they occurred were noted. The durations of the procedures were also noted and so were the patients' biodata.

Mild to moderate oxygen desaturation was defined as a drop in oxygen saturation by >4% from the baseline for those patients whose baseline saturation was >94% or a drop to between 91 and 93% for those whose baseline was 94%. Severe oxygen desaturation was defined as oxygen saturation of ≤90%. Statistical analysis was done by the Fisher exact test using the Epiinfo 3:4:1 version with the level of significance set at P<0.05.

Results

There were 30 males and 24 females with a male, female ratio of 1.25:1. The mean age was 46.7 years with a range of 17 to 81 years. The mean duration of the procedures was 10.6 minutes and ranged from 7 to 17 minutes.

Mild to moderate desaturation occurred in 10(18.5%) of the patient population while severe desaturation, SaO₂ <90% occurred in 7(12.9%) of the patients. No desaturation occurred in 37(68.6%) of the patients. Desaturation occurred more frequently during insertion of scope than at removal (14 verses 3 episodes). All cases of severe desaturation lasted less than 30 seconds and no supplemental oxygen was required.

Out of the 24 females in the study, 2(8%) had severe desaturation while 5(17%) of the 30 males in the study also had severe desaturation. Two patients 50 years and below experienced severe desaturation while 5(22%) patients above 50 years experienced severe desaturation, (table 1). Of the 37 patients whose procedure lasted less than 10 minutes, 7(19%) had mild to moderate desaturation while 4(11%) had severe desaturation and 3(18%) of the 17 patients whose procedure lasted 10 minutes or more experienced severe desaturation. Thirty-four patients belonged to ASA class I and II, and of these, 3(9%) had severe desaturation while 3(18%) of the 17

patients in ASA class III and IV had severe desaturation (table II). There were no significant statistical correlations between desaturation and gender, age, duration of procedure or ASA status of the patients.

Table I. Age By Desaturation

AGE(YEARS)	MILD-MODERATE DESATURATION	SEVERE DESATURATION	NO DESATURATION	TOTAL
≤ 50	6(19%)	2(6%)	23(75%)	31
> 50	5(22%)	5(22%)	13(56%)	23
TOTAL	11	7	36	54

P = 0.1074

Table II. Asa Status By Desaturation

ASA CLASS	MILD-MODERATE DESATURATION	SEVERE DESATURATION	NO DESATURATION	TOTAL
I - II	10(29%)	3(8%)	21(62%)	34
III - IV	9(45%)	4(20%)	7(35%)	20
TOTAL	19	7	28	54

P = 0.2207

ASAPHYSICAL STATUS CLASSIFICATION

- I. Healthy patient
- II. Mild systemic disease, no functional limitation
- III. Moderate systemic disease; definite functional limitation
- IV. Severe systemic disease that is a constant threat to life
- V. Moribund patient; unlikely to survive 24 hours with or without operation

FIGURE 1. Classification of physical status by the American Society of Anesthesiologists

Discussion

Flexible upper gastrointestinal endoscopy may be performed for diagnostic or therapeutic purposes, though the majority of the procedures are diagnostic in nature. Many institutions do not routinely monitor oxygen saturation during upper gastrointestinal endoscopy, and as such the incidence of oxygen desaturation is not known in many cases. In our study we discovered that oxygen desaturation is quite common during upper gastrointestinal endoscopy. Mild to moderate desaturation occurred in 18.5% of our patients while severe desaturation occurred in 12.9%. This is similar to results obtained by Iwao et al and Alcain et al^{2,9}, but quite below what was obtained by Banks et al and Osinaike et al^{5,10}. Studies that reported higher incidences of severe desaturation were probably as a result of sedatives given to the patients before the commencement of the procedure. Sedation is used to facilitate endoscopy and is thought to render the procedure more acceptable to the patients by increasing comfort and reducing anxiety. It may be necessary to use sedation when interventions are performed because therapeutic upper gastrointestinal endoscopies usually last longer than diagnostic endoscopies. Sedation though has been found to cause desaturation by inducing respiratory depression especially where a combination of benzodiazepines and opioids are given^{11,12}, or when the patients have

respiratory disease. Continuous monitoring of oxygen saturation has been recommended for sedated patients during endoscopy^{4,12,13}. Routine supplementary oxygen has also been suggested¹⁴, and the use of short acting benzodiazepines like midazolam rather than diazepam has been found to be associated with less decreases in oxygen saturation levels^{12,13}. Some deeply sedated patients may aspirate small quantities of materials during endoscopy thereby contributing to a drop in oxygen saturation and besides, sedation increases the cost of the procedure and additional time is needed to sedate and recover the patients. None of our patients was sedated for the procedure. They all were administered topical anaesthesia before the procedure and they tolerated the procedure probably because they were brief lasting an average of 10 minutes. Our patients also did not have respiratory problems prior to the procedure.

About 31.4% of our patients experienced desaturation (mild, moderate or severe). The mechanical effect from the presence of the endoscope in the oropharynx may induce breath holding and occasionally gagging or coughing. This may be the reason for the drop in oxygen saturation during insertion of the scope but as the patient gets used to the presence of the scope in the airway, desaturation is less common. The size of endoscope has been implicated in causing desaturation with the bigger endoscopes causing greater decreases in oxygen saturation⁸. Trevisani L et al advocated that ultrathin transnasal upper gastrointestinal endoscopy is better tolerated by patients and causes fewer adverse effects on cardiopulmonary function^{15,16}. Though some studies did not find endoscopic size to be a factor in desaturation^{5,17}, size was not a factor in our study because we used the same size of endoscope for all our patients.

In our study we did not find any statistically significant relationship between desaturation and gender, age, duration of procedure or ASA status of the patients. We did not come across any study that showed a relationship between decrease in oxygen saturation and gender,

however, some studies have shown a relationship between desaturation and age and also with duration of the procedure¹⁰. Other studies like in our case did not find any such relationships^{2,5,13}. One of the studies that found a relationship between desaturation and duration of endoscopy found that the relationship only became significant in cases lasting more than 27 minutes. None of our procedures lasted that long.

Muller S et al found a relationship between ASA status of patients and desaturation in endoscopy patients¹⁸. They discovered that significant desaturation occurred in ASA III patients, but then their patients were sedated during the procedure. It appears that patients who undergo upper gastrointestinal endoscopy using topical anaesthesia without sedation experience less desaturation compared to sedated patients. The period of desaturation is also shorter in unsedated patients. The drop in oxygen saturation appear benign in these patients. We also found that our patients tolerated the procedure well with just topical pharyngeal anaesthesia. This is similar to findings in another study¹⁹. The use of topical anaesthesia for endoscopy though is not without its adverse effects. Methaemoglobinaemia has been reported after the use of topical benzocaine²⁰. Though this complication is rare, endoscopists should use topical anaesthetic sprays with caution and not exceed the safe-dose limits especially in children, the elderly and patients with compromised cardiovascular status.

Unsedated diagnostic flexible upper gastrointestinal endoscopy appears to be associated with lower incidence of desaturation. The durations of these incidences are also much shorter in unsedated patients. Though we were unable to find factors related to the degree of desaturation we feel routine oxygen monitoring may not be necessary in patients undergoing unsedated diagnostic endoscopy and who do not have respiratory disease.

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