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Research Article

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Local Anaesthesia of the Pharynx for the Oesophago-gastroduodenoscopy (OGD); New (JASMEG) Technique with Better Patient Tolerance and Reduced Risk of Airborne Spread

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ABSTRACT

Background: Oesophago-gastro-duodenoscopy (OGD-Gastroscopy) is a procedure routinely performed in secondary care. Lignocaine as a local anaesthetic is administered prior, to make patients more comfortable. During the Coronavirus disease-19 (COVID-19) epidemic, with the virus known to be predominantly spread via cough droplets, there was great concern in endoscopic units. About 1500 healthcare workers died in the United Kingdom due to COVID-19, some from endoscopic units. This study was commenced during the COVID-19.

Objective: The study focused on the administration of lignocaine as a local anaesthetic prior to OGD. The current modality is to administer lignocaine to the patients' posterior pharynx with their mouth open: "mouth-open" technique. We proposed the 'JASMEG' technique, involving spraying the pharynx with the mouth closed around the spray nozzle. Our aim was to determine if the novel JASMEG technique of lignocaine administration, reduced incidence of cough, increased patient comfort and reduced patient anxiety. Design: As a service improvement audit design, there were 474 patients (male: female = 1.13) undergoing an OGD as part of routine care in a district general hospital in the United Kingdom. Of these, 222 had their OGD with their mouths open (122♂ and 100♀) and 252 patients with JASMEG, with their mouths closed (130♂ and 122♀). Results: Compared to the "mouth-open" group, the "JASMEG" group demonstrated a smaller increase in pulse rate (group difference = -3.97, $p< 0.001$), lower anxiety scores (group difference = -1.31, $p < 0.001$), higher comfort scores (group difference = 1.07, $p< 0.001$) and most importantly a lower incidence of cough (13 out of 252 vs 190 out of 222; $p<0.001$). Conclusion: We propose that colleagues should consider adopting the JASMEG technique during OGD. JASMEG potentially reduces infection spread, is more comfortable for patients and with reduced anxiety.

Keywords: Oesophago-Gastro-Duodenoscopy, Lignocaine Spray, Mouth-Open, Mouth-Closed ('Jasmeg Technique'), Covid-19, Cough, Discomfort, Anxiety

Key Messages

- During gastroscopy, the current modality is to administer lignocaine to the patients' posterior pharynx with their mouth open, with risk of cough and spread of viral particles eg COVID-19. About 1500 healthcare workers including from endoscopic units died in the United Kingdom due to COVID-19. Our aim was to use a novel JASMEG technique to administer lignocaine.
- Compared to the control group, the "JASMEG" group demonstrated most importantly a lower incidence of cough (13 out of 252 vs 190 out of 222; $p<0.001$); smaller increase in pulse rate (group difference = -3.97, $p< 0.001$), lower anxiety scores (group difference = -1.31, $p < 0.001$), higher comfort scores (group difference = 1.07, $p< 0.001$).

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- Colleagues should consider adopting the JASMEG technique during Gastroscopy as JASMEG potentially reduces infection spread, and is more comfortable for patients and with reduced anxiety.

Background

Oesophago-gastro-duodenoscopy (OGD) is a procedure routinely performed in secondary care. Lignocaine as a local anaesthesia, is administered to make OGD more comfortable for patients. Coronavirus disease-19 (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring specialist treatment. However, some persons will become seriously ill, require medical attention and may die. Higher mortality rates have been reported among older adults and those with pre-existing health conditions, including cancers, cardiovascular disease, chronic respiratory disease, diabetes, hypertension, and obesity.1,2 Anyone can get sick with COVID-19, become seriously ill or die at any age. The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. Protecting oneself and others from infection by wearing appropriate personal protection equipment (PPE), hand washing or using an alcohol-based hand-rub frequently plus being vaccinated and following local guidance is the best way to stop the virus spreading.2,3. Regarding endoscopy, the virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important therefore to practice respiratory etiquette, for example by reducing induction to cough as much as practicable.

During the COVID-19 epidemic in which many persons died worldwide2 and about 1500 healthcare workers died in the United Kingdom4 there was great worry regarding infection spread during OGD. Current practice guidelines in the United Kingdom and the United States recommend the administration of lignocaine anaesthetic spray prior to gastroscopy procedures with the patients' mouth wide open. There is no, evidence on the effectiveness of lignocaine administration with the patients' mouth closed. Whilst it was acknowledged during the COVID-19 that proper use of the range PPE is a pivotal factor in safeguarding health care personnel during endoscopy, there was little or no attempt to change the most obvious potential method of aerosol spread via patients cough at the start of the OGD [5].

This study was developed in during the COVID-19 epidemic, and especially because of the deaths of healthcare workers, focused on the difference in administration of lignocaine. The most widely used method is to spray the back of the patients' pharynx with their mouth open: "mouth-open" technique. We here proposed that a modified technique, involving spraying the pharynx with the mouth closed around the spray nozzle: "mouth-closed" technique ('JASMEG Technique') would be safer in terms of cough and possible cough droplets, possibly containing virus particles to reduce the spread of airborne infection such as COVID-19. The proposal was made to reflect the common mastication wisdom of not eating with the mouth open, because that is known to induce cough as a reflex to prevent aspiration pneumonia [6].

Aims

To determine if administration of lignocaine using the "mouth-closed" - JASMEG - method of administrating lignocaine spray reduced the incidence of cough, increased patient comfort and reduced patient anxiety, the latter as evidenced by reduced pulse rate.

Method

This was an open label study judged as a service improvement study by the local Ethics committee. There were 474 patients (male: female = 1.13) undergoing an OGD as part of routine care in a district general hospital in the United Kingdom. There was a total of 474 patients with 222 having their mouths open (122♂ and 100♀) and 252 patients with their mouths closed (130♂ and 122♀). The eligibility criteria were patients requiring an OGD for diagnostic or therapeutic purposes. These patients, 18 years to 25 years old, were selected if they had previous administration of lignocaine throat spray with their mouths open and had been very anxious (self-disclosed).

They were placed randomly into the mouth-open and mouth-closed (JASMEG) Groups. Patients with a lignocaine throat spray allergy were excluded. Each patient was administered 5 puffs of lignocaine spray which contained 10% lignocaine per spray.

The JASMEG method of administration of lignocaine spray involved asking the patient to close their mouth once the nozzle was inside their mouth and visualised to be close to their pharynx. To ascertain which method of administering local anaesthesia was more effective, the following measures were recorded: pulse rate before procedure, pulse rate after procedure, comfort score, anxiety score, and presence of a cough.

Comfort and anxiety were scored on a 5-point-Likert scale with 1 being most comfortable/least anxious, and 5 being least comfortable/most anxious [7]. Change in pulse rate was the pulse rate after procedure minus pulse rate before procedure. Comfort and anxiety scores were each analysed ("mouth closed" vs. "mouth open") using linear regression models. Models were controlled for sex. The relationship between incidence of cough and analysis group was analysed using Fisher's exact test. Cohen's d effect sizes were derived from the linear regression models of change in pulse rate, comfort score and anxiety score. Cohen's d for the effect of mouth open / closed on the incidence of cough was derived from a logistic regression model of cough on mouth open / closed group. The model controlled for sex [7].

Results

Table 1: A breakdown of the sample by Group analysis and Sex

Mouth open / closed	Sex		
	Male	Female	Total
Open	122	100	222
Closed	130	122	252
Total	252	222	474

There 222 patients with their mouths open; (122♂ and 100♀) and 252 patients with their mouths closed (130♂ and 122♀).

Table 2: Summary Statistics and Comparison of Pulse Rates by Group

Parameter	All Before	All After	All Change	Mouth Open Before	Mouth Open After	Mouth Open Change	Mouth Closed Before	Mouth Closed After	Mouth Closed Change
Min	53	56	-5	53	59	-5	54	56	-5
Median	65	70	4	65	72	6	64.5	70	3.5
Max	110	110	35	110	110	35	110	105	21
Mean	69.9	75.9	6	69.8	77.9	8.1	70	74.1	4.1
Standard Deviation	13.5	13.1	6.1	13.1	13.7	7.4	14	12.2	3.8

The increase in pulse rate was significantly lower in the "mouth-closed" than the "mouth-open" group: $\beta = -3.97$, $p < 0.001$

Table 3: Summary statistics for comfort and anxiety scores plus comparison of comfort and anxiety scores by group

	All		Mouth open		Mouth closed	
	Comfort	Anxiety	Comfort	Anxiety	Comfort	Anxiety
Min	1	1	1	1	1	1
Median	2	2	2	3	1	1
Max	5	4	5	4	5	4
Mean	1.9	2.0	2.5	2.7	1.4	1.4
Standard Deviation	0.9	1.0	0.9	0.9	0.6	0.6

Comfort scores were significantly better in the "mouth-closed" than in the "mouth-open" group: $\beta = -1.07$, $p < 0.001$. Anxiety scores were also significantly better in the "mouth-closed" group: $\beta = -1.31$, $p < 0.001$. There were no significant differences in results by sex.

Table 4: Incidence of Cough in the "Mouth Open" And "Mouth Closed" Groups

Mouth open / closed	Cough		
	No	Yes	Total
Open	32	190	222
Closed	239	13	252
Total	271	203	474

Cough was significantly less common in the "mouth-closed" (n=13) than in the "mouth-open" (n=190) group: $p < 0.001$ (Fisher's exact test).

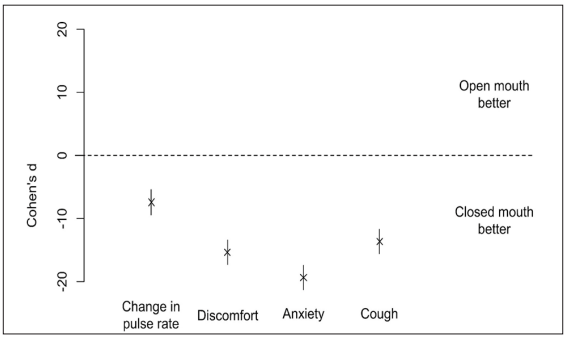

Figure 1: Summary of point estimates and 95% confidence intervals for Cohen's d effect size measures from regression models comparing outcomes between the Mouth Open and JASMEG (Mouth Closed) techniques. Calculation of the effect size as per the Cohen's d methodology as undertaken here clearly shows that not only are the differences different between mouth closed and mouth open for changes in pulse rate, discomfort, anxiety and cough, statistically different i.e. that the differences between the 2 groups have not arisen by chance ($p<0.05$), but that the differences are practically meaningful and important because the magnitude of the effect sizes are large, especially for patient anxiety

Discussion

Oesophago-gastro-duodenoscopy (OGD) is a procedure routinely performed in secondary care. Lignocaine as a local anaesthetic is administered to make OGD more comfortable for patients. COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring specialist treatment. Some patients may become seriously ill, require medical attention and may die. Higher mortality rates have been reported among older adults and those with pre-existing health conditions, including cancers, cardiovascular disease, chronic respiratory disease, diabetes, hypertension, and obesity [1,2]. The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. Protecting oneself and others from infection by wearing appropriate personal protection equipment (PPE), using an alcohol-based hand-rub frequently, being vaccinated and following local guidance is the best way to stop the virus spreading [2,3]. Regarding endoscopy, the virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important therefore to practice respiratory etiquette, for example by reducing induction to cough as much as practicable.

During the COVID-19 epidemic in which many persons died worldwide, and about 1500 healthcare workers died in the

United Kingdom there was great worry regarding infection spread during OGD Current practice guidelines in the United Kingdom and the United States recommend the administration of lignocaine anaesthetic spray prior to gastroscopy procedures with the patients' mouth wide open [1,4,5]. There is no, evidence on the effectiveness of lignocaine administration with the patients' mouth closed. Whilst it was acknowledged during the COVID-19 that proper use of the range PPE is a pivotal factor in safeguarding health care personnel during endoscopy, there was little or no attempt to change the most obvious potential method of aerosol spread via patients cough at the start of the OGD and during the OGD [5].

The proposal was made to reflect the common mastication wisdom of not eating with the mouth open, because that is known to induce cough as a reflex to prevent aspiration pneumonia [6].

The epiglottis a cartilaginous flap on top of the glottis functions to prevent food or liquid entering the larynx and onwards to the trachea and lungs to then possibly cause aspiration pneumonia. The epiglottis is usually upright at rest, with the mouth closed, allowing air to pass into the larynx and lungs. With the mouth closing as to swallow, the epiglottis closes and positions itself to cover the larynx and directs food or fluid to the oesophagus away from the trachea. With the mouth open, and not swallowing, the epiglottis opens and the larynx is uncovered. In then spraying lignocaine with the mouth open, the larynx is unprotected, droplets of lignocaine are more likely to enter the larynx and induce coughing. It was for this anatomical-physiological reason that we devised JASMEG [6].

The results presented here clearly demonstrate that this new modality of applying local anaesthetic spray to patients undergoing OGD is superior in terms of patient comfort, anxiety levels, subjectively assessed, and objectively assessed with difference in pulse rate and the presence of cough. Most importantly, coughing is markedly reduced with the JASMEG modality (mouth-closed) technique of administering lignocaine. It is probable therefore that aerosol spraying through coughing and possible cough droplets that might contain virus particles would be reduced. Furthermore, this method essentially eliminates aerosols generated possibly containing viral particles during OGDs.

Whilst it was acknowledged during the COVID-19 epidemic that proper use of the range personal protective equipment is a pivotal factor in safeguarding health care personnel during endoscopy, there was little or no attempt to change the most obvious potential method of aerosol spread via patient cough at the start of the OGD [6]. In fact, whilst the majority of endoscopists wore gowns (91-94%) and all wore gloves, only a small minority wore surgical masks (21-31%), face shields (12-34%), eye protection (13-21%) or hair protection (11-12%). The COVID-19 pandemic has been a wakeup call for many endoscopists regarding their use of personal protective equipment, and the majority reported a plan to increase use of surgical masks, face shields and hair protection, to reduce risk of transmission of hospital-acquired infections [7].

Conclusion

Given the substantial number of patients, and the supportive statistics, it is likely that the observed results are real. A limitation however, of our study is the open label design but that was unavoidable without substantially increasing the procedure time at a time when endoscopies were under great pressure. Another is that the study involved younger adults, aged 18-25 years only. Our intention going forward is to use the JASMEG technique in older adults and subsequently in adolescents. Furthermore, the Endoscopist and staff would also need to be masked to Group assignment. The "JASMEG technique" is a low-cost, environmentally friendly and safer alternative to the mouth-open current technique. It most likely reduces transmission of aerosol-transmitted infections, such as COVID-19 while also making it a more comfortable procedure for patients as statistically shown here.

Description of Manuscript

The description of how each author contributed to the manuscript is as follows:

Jude A Oben - Conceptualization: Lead; Methodology: Lead; Supervision: Lead Visualization: Lead; Writing – review & editing: Lead

Esther Killan - Data curation: Supporting; Methodology: Supporting;

Writing – original draft: Supporting; Writing – review & editing: Supporting

Suchika Garg - Data curation: Supporting; Writing – original draft: Supporting

Marlon Amulong - Data curation: Supporting; Methodology: Supporting

Julian Gardiner - Data curation: Lead; Formal analysis: Lead; Methodology: Supporting

Conflict of Interest

A "Conflict of Interest" statement for all authors: "I, the designated Corresponding Author, on behalf of myself and my co-authors, certify that there is no conflict of interest for all Authors".

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