

POST-ANAESTHETIC RESPIRATORY COMPLAINTS FOLLOWING ENDOTRACHEAL ANAESTHESIA IN LOWER ABDOMINAL OBSTETRIC AND GYNAECOLOGY SURGERY

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ABSTRACT

Background: Postanaesthetic respiratory complications represent a significant negative aspect of surgical care.

Objective: To assess the incidence and possible associated risk factors for postanaesthetic respiratory complaints following endotracheal anaesthesia in lower abdominal surgery in obstetric and gynecology patients in our hospital.

Setting: A Teaching Hospital in Nigeria.

Design: Prospective study

Methodology: All consenting adult patients, aged 16-45years, undergoing caesarean section and major gynaecological abdominal operations, under general anaesthesia with endotracheal intubation, over a period of 8months, were studied. Postoperative respiratory symptoms, (sorethroat, hoarseness and cough), were assessed in the ward, by direct questioning method, daily for 5days. Those presenting with cough had their chest examined, and fever ($T^0 > 37^0C$), was noted. Patients with positive chest signs had radiological examinations of the chest done for confirmation.

Results: A total of 202 patients were studied. Out of these, 152(75.2%) patients had various forms of postoperative respiratory complaints. Overall, it was observed that caesarean section patients were more likely, than gynaecology patients, to report these respiratory complications in the postoperative period (88.4% vs. 58.9%). This difference was statistically significant ($p < 0.05$). The incidence of sorethroat directly correlated with the size of the endotracheal tube used ($r = 0.936$). There was a statistically significant difference in the incidence of sorethroat between the caesarean section patients and gynaecology patients ($p < 0.00$), particularly with endotracheal tube sizes larger than 7.5mm ID ($p < 0.03$). Duration of intubation, which was slightly longer in gynaecology patients (mean = 72.48 ± 30.62), and number of intubation attempts, did not have statistically significant effect on the incidence of respiratory complaints.

Conclusion: The use of small endotracheal tube sizes ($< 8.5mm$) should be preferred in women, particularly in obstetric anaesthesia (6.5-7.5mm), to minimize the incidence of postoperative respiratory complications.

Key words: Respiratory, Complaints, Post-anaesthesia, Obstetrics, Gynaecology (Accepted 27 July 2007)

INTRODUCTION

Despite recent advances in anaesthesia and surgery, major surgical operations are still beset with undesirable postoperative sequelae. These represent a significant negative aspect of surgical care, which may in no small way diminish patients' confidence in the healthcare. The respiratory system is particularly vulnerable when general anaesthesia with endotracheal intubation is used. This is because the conduct of this technique of anaesthesia often

involves interference with the normal airway Mucosal barrier mechanisms by way of instrumentation, or interference with the normal mucosal or ciliary activities due to inhalation of unhumidified anaesthetic gases. The interference, in many cases, may lead to trauma, foreign body contamination, mucosal dryness and airway irritation, which manifest in various ways in the postoperative period¹⁻³. An earlier survey of anaesthesia-related postoperative complications in our hospital revealed a higher incidence of respiratory complications, (sorethroat, hoarseness

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and cough), following caesarean section Compared to other surgical procedures⁴. This was corroborated by frequent complaints from the nurses in the post-caesarean section ward about their observation of these symptoms in the patient who had general anaesthesia. Although respiratory complaints are not uncommon following endotracheal anaesthesia, a higher incidence in association with obstetric anaesthesia, compared with other surgical procedures has not been documented. Hence, we decided to undertake this controlled study in which the study subjects, comprising caesarean section (C/S), and gynaecology (GY), patients; both females and comparable in age; undergoing lower abdominal operations, were exposed to the same theatre setting, and anesthetic technique and materials. The aims were to assess the true incidence and possible associated factors for post-anaesthetic respiratory complaints following major lower abdominal operations in obstetric and gynecology, and to compare the incidence in the two groups. Major operations in this study referred to all abdominal operations in which muscle relaxation and endotracheal intubation were required (table 2). The study did not consider the surgical aspects of the operations, or surgical differences between obstetric (caesarean section) and gynaecologic abdominal operations.

MATERIALS AND METHOD:

A proforma was designed to record in section a: Patient's age, hospital number, date of operation, intubation attempts, duration of intubation, size and type of endotracheal tube (ETT) used and anaesthetic drugs used; and in section b: specific respiratory symptoms of sorethroat, hoarseness of the voice and cough.

All consenting patients, aged 16-45 years, undergoing caesarean section, and major gynaecologic abdominal operations, under general anaesthesia with endotracheal intubation over a period of 8 months were recruited into the study. The patients were assessed preoperatively to exclude pre-existing symptoms and signs, which might have some relevance to the subsequent assessment of the respiratory symptoms being evaluated. Exclusion criteria included: patient's refusal, pre-existing history of throat pain, hoarseness of the voice and cough, unconscious or sedated patients, patients too ill to answer questions at the time of postoperative assessment and patients who needed nasogastric tube postoperatively. Patients who were on antibiotics preoperatively were also excluded.

All the patients were anaesthetized using reusable breathing circuits, reservoir bags, endotracheal tube connectors and tracheal tubes, which had been washed with antiseptic solution, thoroughly rinsed in water, and dried after previous use. The laryngoscope was washed in all cases with soap and water and dried between procedures.

A standard technique of anesthesia was used in all the patients. The patients were pre-oxygenated for 3-5 minutes and induced with thiopental 4-5mg/kg body weight. Following administration of suxamethonium 100mg, the trachea was intubated, as atraumatically as possible, using a low residual volume high-pressure cuffed portex endotracheal tube size 7.0-8.5mm internal diameter (ID). The tubes were properly lubricated with KY jelly. The cuffs were filled with air until no leak was heard. A clean oropharyngeal airway (size 3 or 4) was inserted and retained in place throughout the operation. Anaesthesia was maintained with halothane and nitrous oxide in oxygen, and muscle relaxation was provided with pancuronium bromide. Ventilation was by manual intermittent positive pressure ventilation (IPPV). Analgesia was supplemented with pentazocine 30mg/pethidine 50mg, given at induction in gynaecological operations and after the delivery of the baby in caesarean section. At the end of the operation the residual muscle paralysis was reversed with neostigmine 2.5mg and atropine 1.2mg. Extubation of the trachea was carried out in the operating room after the trachea tube cuff had been deflated. At the end of the anaesthesia, the attending anaesthetist completed section A of the proforma. Postoperative symptoms were assessed in the ward by direct questioning method. A registrar in anaesthesia, who was unaware of the group of the patient, daily interviewed the patient for 5 days, concerning the respiratory symptoms being evaluated. Those presenting with cough had their chest examined, and fever, ($T^{37^{\circ}C}$), was noted. Patients with positive chest signs had radiological examinations of the chest done for confirmation. The responses of the patients and positive examination findings were entered into the proforma manually.

DATA ANALYSIS

Data were analyzed by Chi-square test, using a significance level of $P < 0.05$ where applicable. Results are presented as numbers, means, percentages and pie chart.

A total of 216 patients, both electives and emergencies, made up of 124 C/S and 92 GY cases were recruited into the study. Out of these 14 patients (12 C/S and 2GY) were excluded for various reasons such as prolonged postoperative drowsiness due to diazepam sedation in 8 C/S patients, and failure to cooperate for postoperative assessment in 6 patients (4 in C/S group and 2 in GY group). Thus, there were data for 202 patients (112 for C/S and 90 for GY). The age distribution of the patients in the two groups is shown in table 1. Majority of the patients (67.3%)

were between the ages of 31 years and 40 years. The GY patients were slightly, but not significantly, older (mean age 36.12 SD 6.1) than the C/S patients (mean age 32.62 SD 7.1) ($P > 0.05$). The indications for operation in the C/S group and types of operation in the G/Y group are shown in figures 1 and 2 respectively. Fifty of the patients (24.8%), 13(11.6%) in C/S group and 37(41.1%) in GY group, had no postoperative complaints. The remaining 152 (75.2%) patients, 99(88.4%) in the C/S group and 53(58.9%) in the GY group, had various forms of postoperative respiratory complaints. The distribution of the different respiratory complaints is as shown in table 2.

Sore throat

A total of 119 (58.9%) patients, consisting of 78(69.6%) in the C/S group and 41(41.6%) in the GY group, complained of some forms of discomfort in the throat postoperatively. In 20 (16.8%) of them, (12 in the C/S group), the discomfort was described as minimal or scratchy, while the remaining 99(83.2%) experienced definite evidence of soreness with varying degrees of discomfort on swallowing and talking. Symptoms resolved within 48 hours postoperatively in 35 patients, lasted 3 days in 47 patients and 4 days in 8 patients. All the patients were free of symptoms by the 5th postoperative day. The incidence of sorethroat was higher in the C/S patients compared to GY patients. This difference was statistically significant ($P = 0.00$). There was positive correlation in the two groups between the size of the ETT used and the incidence of sorethroat ($r = 0.936$). It was found that the larger the ETT, the higher the incidence of sorethroat observed in the two groups. Although this was not statistically significant within the C/S group, it was statistically significant ($P < 0.05$) between the two groups, with ETT sizes larger than 7.5mm ID (table 3).

Hoarseness

Fifty-two patients (25.7%), consisting of 40 in the C/S group, (35.7%), and 12 in the GY group, (13.3%), experienced hoarseness of the voice within 24 hours postoperatively. Hoarseness was mild in 36 patients (17.8%) and marked in 16 patients (7.9%). They were all in association with sorethroat. The voice cleared by the 2nd postoperative day in 23 patients, lasted 3 days in 17 patients and cleared in the remaining 12 patients by the 4th postoperative day. No specific treatment was offered and none of the patients exhibited associated evidence of airway obstruction.

Cough

Seventy two patients (35.6%), consisting of 58 in C/S group (51.8%) and 14 in GY group (15.6%), experienced cough of varying degrees of severity. Majority of these patients (69 or 34.2%)

had just mild dry irritating cough, which was experienced only in the first 48 hours in 17 patients (8.4%), and lasted 3-4 days in the remaining 52 patients (25.7%). Three patients (1.5%), 2 in C/S group and 1 in GY group, had productive cough, which started about the 3rd postoperative day. There was associated fever (T^0 38.5-39) and positive chest signs (crepitations) suggestive of pneumonia. Radiological examinations of the chest confirmed lobar pneumonia in 1 patient (C/S group) and bronchopneumonia in the remaining 2 patients (one each from both groups). They all responded to a course of antibiotics based on the results of sputum culture and sensitivity.

Duration of intubation, which was slightly longer for patients in the GY group, (mean value 72.48 SD 30.9 vs 58.70 SD 30.62) had no statistical significance on the incidence of sorethroat, hoarseness and cough in the two groups ($P > 0.05$). Also the incidence of multiple intubation attempts, which was proportionally higher in the C/S group (7 or 6.3% vs 3 or 2.7%), did not have any statistical difference in the incidence of sorethroat in the two groups. All the laryngoscopies were performed by experienced members of the department (consultants, residents and nurse anaesthetists). The status of the laryngoscopists did not have any statistical significance on the incidence of sorethroat, hoarseness, and cough in the two groups ($p > 0.05$).

Table 1: Age Distribution of the Patients

Age (years)	C/S group	GY group	Total
16-20	5(2.5%)	1(0.5%)	6(3.0%)
21-25	8(4.0%)	3(1.5%)	11(5.5%)
26-30	23(11.4%)	12(5.9%)	35(17.3%)
31-35	40(19.8%)	23(11.4%)	63(31.2%)
36-40	33(16.3%)	40(19.8%)	73(36.1%)
41-45	3(1.5%)	11(5.5%)	14(7.0%)
Total	112(55.4%)	90(44.6%)	202(100%)

Table 2: Comparison of the incidence of postoperative respiratory complaints between C/S and GY patients

Complaint	C/S group (n=112)	GY group (n=90)	X ²	P-value
Sorethroat	78 (69.6%)	41 (45.6%)	10.99	0.0009
Cough	58 (51.8)	14 (15.6)	27.00	0.0000
Hoarsenes	40 (35.7)	12 (13.3)	11.93	0.0005

X²=Yates corrected chi square

Note: some patients had multiple complaints.

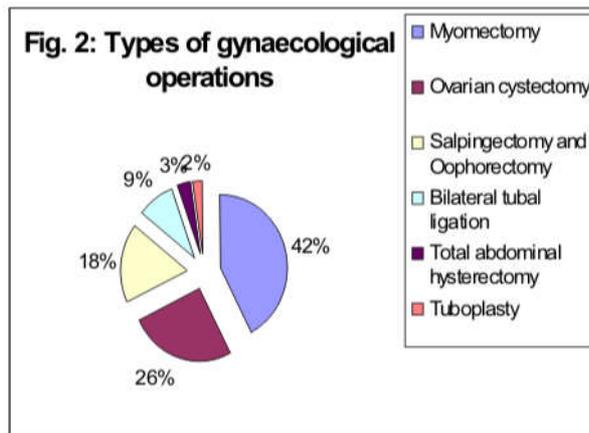
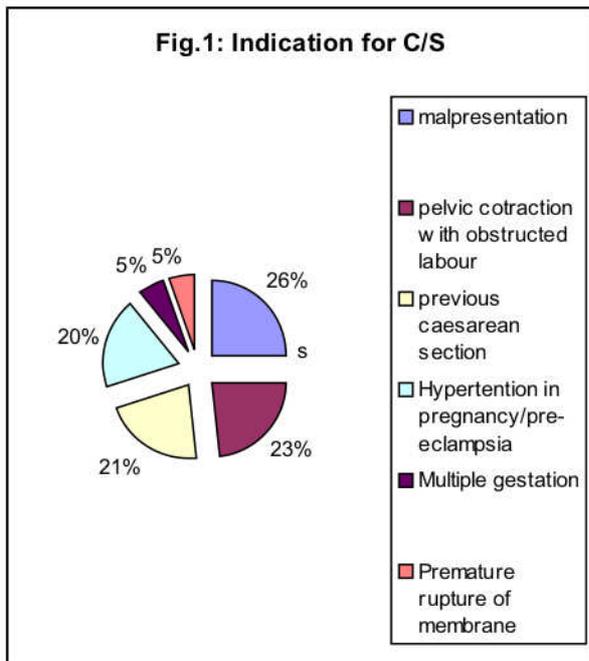


Table 3: Comparison of Incidence of Sorethroat in C/S and GY Patients With Respect to Different Sizes of ETT

ETT (mm)	Incidence of sorethroat		X ²	p-value
	C/S group n ₁	GY group n ₂		
7.0 (n ₁ =36, n ₂ =12)	21 (58.3%)	5 (41.7%)	0.45	0.5035
7.5 (n ₁ =44, n ₂ =33)	28 (63.6%)	14 (42.4%)	2.62	0.1055
8.0 (n ₁ =18, n ₂ =24)	15 (83.3%)	11 (45.8%)	4.65	0.0311
8.5 (n ₁ =14, n ₂ =21)	14 (100%)	11 (52.4%)	7.15	0.0075

n₁= number of patients intubated in C/S group.
n₂= number of patients intubated in GY group.
X²= Yates corrected chi square.

DISCUSSION

Respiratory morbidities after anaesthesia include many widely diverse symptoms, which

have for several decades remained an area of interest and concern for anaesthetists. Sorethroat, hoarseness and cough due to tracheitis, are usually transitory complications which are fairly common. While relatively unimportant medically, they are significant to the patient as they add to postoperative discomfort. We observed a high incidence of these respiratory morbidities in our patients. The incidence was significantly higher in the C/S patients compared to GY patients.

Sorethroat is a common complication after general anaesthesia in which endotracheal intubation has been used.^{4, 5} The incidence is commonly quoted as being between 14.4% - 76%.^{3, 6, 7} Several studies have reported a sex difference in incidence with females being found to be more susceptible than their male counterparts.^{3, 8, 9} It is particularly a recognized clinical problem in thyroidectomy, which of course is predominantly a female problem, in which several studies have reported considerably higher incidence compared to other surgical procedures that do not involve the neck.^{3, 10} However, a higher incidence in obstetric anaesthesia compared to other abdominal procedures in females, as observed previously by us⁴ and confirmed in this study, has not been documented. Several factors could account for this finding, which was statistically significant in our study (P<0.05). Postoperative sorethroat has been found to be a consequence of trauma to the larynx and pharynx during intubation, and pressure-induced ischemic airway injuries caused by the endotracheal tube or its cuff^{5, 11}. The obstetric patients with relatively soft and oedematous airway, caused by capillary engorgement, would be particularly susceptible to these intubation-induced airway injuries. It is therefore not surprising that a significantly higher proportion of obstetric patients, compared to gynaecology patients, experienced postoperative sorethroat in our study. This is in spite of all precautions taken to minimize trauma to the airway structures from laryngoscopy. The incidence of sorethroat directly correlated with the size of the endotracheal tube used in our patients. This is not surprising since the degree of mucosal injury caused by a tracheal tube is known to be related to the size of the tube vis-à-vis the caliber of the trachea^{5, 12}. Consequently, the use of smaller sized ETT may be preferred for obstetric patients. We recommend sizes in the range 6.5-7.5mm. The use of cuffed ETT of these sizes, have not been shown to compromise ventilation and will prevent aspiration when the cuff is appropriately inflated⁵. However, the choice of endotracheal tube for patients in our study was dictated more by availability. It was not possible to control this factor due to erratic supply of endotracheal tubes to the department. Moreover, we

resolved not to deviate much from our routine practice in order to be able to find answers to our previous observations on the subject.

Studies have shown that inflation of a tracheal tube cuff immediately produced complete barrier to the passage of marker ink, suggesting an obstruction to the flow in the capillary bed¹³. The damage caused to the tracheal mucosa by this capillary obstruction is known to be related to cuff design^{13, 14}. Furthermore, inflation of the low-residual volume high pressure cuff to pressures above 30mmHg has been found to significantly compromise the blood flow in rabbit tracheal mucosa¹³. We used ETT of varying cuff designs in our patients depending on availability. Although intracuff pressure was not measured overinflation of the cuff was avoided by ensuring that it was filled with just enough volume of air to prevent audible leak around it. This was to minimize the cuff mucosal contact and limit the depth of any pressure-induced mucosal injury. The short duration of the throat pain which cleared completely in all the patients by the fifth postoperative day, would suggest a superficial mucosal injury only.

The incidence of hoarseness following obstetric or gynecological operations has not been documented previously. However, previous reports involving other surgical operations indicate a consistent association with tracheal intubation, and positive correlation with the incidence of sorethroat, as seen in this study^{3, 4}. Hoarseness may be attributed to oedema of the glottis, larynx or vocal cords due to pressure from EET or its cuff. The magnitude of this post-intubation oedema is likely to be more pronounced in obstetric patients, in whom the airway is already soft and oedematous. Hence, the higher incidence of hoarseness recorded in our obstetric patients. This difference was statistically significant ($p = 0.0005$). However, none of the patients experienced oedema severe enough to cause airway obstruction.

Cough was also observed as a frequent postoperative complication in our patients. Since the cough was mild and unproductive in the majority of the patients, it could be attributed to post intubation irritation of the airways. A dry cough usually indicates irritation of the large airway¹⁵. It is not an uncommon postoperative complaint probably due to the mild tracheitis, which frequently follows endotracheal anaesthesia¹. The incidence was highest in obstetric patients probably due to increased tube/cuff-trachea contact, resulting from the narrowed airway caused by increased soft tissue oedema. The incidence of postoperative pneumonia (1.5%) recorded in this study is slightly lower than the previously quoted figure of 3-25%^{16, 17}. This is probably due to strict adherence to simple hygienic measures in the care

and handling of our anaesthetic equipment. Various sources have been implicated for chest infection in surgical patients¹⁸. These include aspiration of bacteria organisms colonizing the pharynx, inhalation of contaminated air, haematogenous spread from distant focus and direct spread from local infection¹⁸. Also numerous studies have documented the presence of bacteria on and in anaesthesia equipment^{19, 20}. However, the significance of this in the development of postoperative pulmonary infection remains controversial²⁰. The use of a sterile anaesthesia breathing circuit with a bacterial filter has been shown to offer no more protection against development of postoperative pulmonary infection than does the observance of simple hygienic measures of thorough washing and drying of reusable anesthetic breathing circuits, as commonly practised in our centre²⁰. The source of pneumonia in the three patients is not known, but it could be from any of the sources mentioned above, or remotely, a silent aspiration of regurgitated material during anaesthesia. None of our patients had any evidence of systemic or respiratory tract infection prior to anaesthesia.

CONCLUSION

The findings of this study confirmed previous observations^{5, 12} that the larger the ETT size, the higher the incidence of postoperative respiratory morbidities; and that the obstetric patient is more at risk of postoperative respiratory morbidities than the gynaecology patient⁴. Although tracheal intubation remains an absolute necessity in obstetric anaesthesia for good airway protection, we recommend the use of small ETT sizes (6.5 7.5mmID) to minimize the pressure-induced trauma on the laryngeal and tracheal mucosae. Overinflation of the tracheal tube cuff should also be avoided in order to limit the extent of any pressure induced ischemic injury.

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