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**Editor-in-Chief  
O. BAIYEWU**

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O. O. OLORUNSOGO  
J. O. LAWOYIN**

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## Anaesthesia for gasless laparoscopy: our experience

PT Sotunmbi\* and J Otokwala\*\*

*Department of Anaesthesia\*, University College Hospital Ibadan and  
Department of Anaesthesia\*\*, University of Port Harcourt, Nigeria*

### Summary

The development of minimally invasive surgery has revolutionized surgical procedure with its attendant influence on anaesthetic practice. These innovations carry potential risks to the patients, and the anaesthetist's ability to recognize and harness these challenges to ensure the safety of the patient and the comfort of the surgeon is plausible and an acceptable norm. Thirteen gynaecological cases were selected for demonstration at the University College Hospital Ibadan between 6/11/07 to 15/11/07. All selected patients were American Society of Anaesthesiologists (ASA) physical status 1 and 2 and were scheduled for the operation. The procedure was duly discussed with the patients and consents for both general anaesthesia and the procedure were obtained. General anaesthesia with endotracheal intubation and muscle relaxant technique was preferred and used in all the patients. The following monitoring parameters were utilized; Electrocardiogram (ECG); Non invasive blood pressure (NIBP); pulse oximeter, end tidal CO<sub>2</sub> (ETCO<sub>2</sub>); temperature; both peripheral and core (hypo pharyngeal) and the patients were mechanically ventilated using the Drager anaesthetic machine with circle breathing systems. Surgery comprised of three diagnostic procedure (3) 23.0%, (adnexial mass (1) -chronic pelvic pain (2)), four hysterectomies 30.8% for dysfunctional uterine, bleeding, myomectomy (4) 30.0%, Ovarian Cystectomy (2) 15.4%. We had the privilege to conduct anaesthesia for Lift (Gasless) Laparoscopic surgery at the University College Hospital (UCH) Ibadan and would like to share pertinent issues relevant to anaesthesia and about this novel technique.

**Keywords:** *Gasless laparoscopy: anaesthetists..*

### Résumé

Le développement de la chirurgie invasive minimale a révolutionné la procédure chirurgicale avec sa participation influence par la pratique anesthetique. Ces innovations portent des risques potentiels aux patients et l'habilité de l'anesthésiste

a reconnaître et veiller sur ces défis pour assurer la précaution sur le patient et le confort du chirurgien est une norme acceptable. Treize cas gynécologiques étaient sélectionnés pour cas de démonstration au Centre Hospitalier Universitaire d'Ibadan au Nigeria entre 6/11/07 to 15/11/07. Tous es patients sélectionnés respectaient les critères de statut physique 1 et 2 de la Société Américaine Anesthésiologistes(SAA) et planifiés pour une opération. La procédure était pleinement discutée avec le patient et le consentement obtenu. L'anesthésie générale avec une intubation endo- trachéale et une technique de relaxation musculaire était préférée et utilise chez tous les patients. Les paramètres suivant étaient contrôlés ; Electrocardiogramme (ECG); la pression artérielle non-invasive (NIBP); oximetre a pouls, volume tidale finale CO<sub>2</sub> (VTCO<sub>2</sub>); température peripherale et corporelle (hypo pharyngale) et les patients étaient ventilés de façon mécanique utilisant la machine anesthetique de Drager avec des systèmes cyclique de ventilation. La chirurgie compris trois procédures diagnostique (3) 23.0%, (masse indexicale (1) -douleur chronique pelvienne (2)), quatre hystérectomies 30.8% pour dysfonctionnement utérine, saignement, myomectomie (4) 30.0%, Cystectomie ovarienne (2) 15.4%. Nous Avons eu le privilège de faire l'anesthésie pour la chirurgie laparoscopique sans gaz au Centre Universitaire Hospitalier(UCH) Ibadan et voudrait partager ces issues pertinent a l'anesthésie et la nouvelle technique.

### Introduction

Laparoscopy is gradually becoming a technique in surgical management of patients in an attempt to reduce hospital stay and morbidity. It has come to stay as a *gynaecological* procedure [1] and basically involves insufflating the peritoneal cavity with carbon dioxide (CO<sub>2</sub>) and a rigid telescope (the Laparoscope) with an attached camera introduced into the abdominal cavity to visualize internal organs [2] and having the same relayed to a monitoring screen. Other gases such as nitrous oxide, argon and helium are also used.

In a bid to circumvent the risks associated with pneumoperitonium with carbon dioxide, a subset of the technique was developed which aims at enlarging the intra abdominal cavity using a special

lift system via a small cut in the lower umbilicus and raising the abdominal wall mechanically [3]. Here the surgeon can use the same instrument for open conventional laparotomy, to get a similar view into the abdominal cavity as that afforded by laparoscopy with gas.

One basic argument against the technique is the time involved in setting up the instruments which has been described as being too time consuming. But even if the operating time is relatively important for the daily routine in a section that orientates itself to operations, it should not be the main argument for choosing a certain operation method [4]. Gasless is cost effective unlike the costly gas laparoscopy [5], with a smaller conversion rate to laparotomy if required which has the advantages of still having the abdominal wall elevated [6,7]. The abdo – lift device provides visualization of the peritoneal cavity, similar to that of pneumoperitoneum, and bipolar scissors are multifaceted and reusable instruments that help minimize instrument exchange and thereby contributes to the shorter time of surgery [8,9]. Other benefits that affect anaesthesia include, the elimination of the side effects of cold carbon dioxide pneumoperitoneum [10] which, in addition to building up pressures in the abdominal cavity and reducing the body temperature, also causing pain which can persist for several days and radiating to the shoulder and neck regions thus prolonging and complicating recovery [11]. It is expected that there will not be lowering the threshold for arrhythmias in the presence of Halogenated hydrocarbons especially halothane [12]. Venous gas embolism though rare and of an unknown mechanism, has been reported to complicate gynaecological laparoscopies [13, 14] as well as being implicated in port- site metastasis. Here carboperitoneum is said to stimulate the tumour growth at port – sites than by the gasless laparoscopy [15]. Carbon dioxide also changes the milieu of the peritoneal cells, thus provoking hypoxemia and acidosis, which can act as a cofactor in adhesion formation [16]. All these factors make the gasless technique, unique technique to explore even in our environment.

### Patients and Methods

All the thirteen patients were elective gynaecological cases selected and admitted into the University College Hospital Ibadan between 6/11/07 to 15/11/07.

The inclusion criteria were: patients with body weight not exceeding 70kg and of the American Society of Anaesthesiologists physical status 1 and 2. Pre

anaesthetic assessment with a review of the laboratory investigations was uneventful. They were starved for about 6 hours to solid food and three hours to clear fluids prior to surgery.

Blood was grouped and cross matched for the patients who were to undergo myomectomy for uterine fibroids. Consent for general anaesthesia was sought and obtained. The age ranged from 24years, to 36yrs with their weights below 70kg.

### Conduct of anaesthesia

General Anaesthesia is preferred using the muscle relaxant technique intermittent positive pressure ventilation, with a volatile agent or any other supplement.

Routine checking of the basic and available monitors and the paraphernalia for general anaesthesia was done and the patient's vital signs; temperature, pulse, non invasive blood pressure, electrocardiogram (ECG) and pulse oximeter by the digital platysmogram were obtained.

After pre-oxygenation with 3-4vital capacity breaths, anaesthesia was induced using Propofol 140mg (2mg/1kg). Endotracheal intubation was facilitated by intravenous suxamethonium 50 – 100mg in (5) patients and the intubating dose of pancuronium 6mg (0.1mg/kg) utilized in (8) patients based on the airway assessment. The correct placement of the endotracheal tube was confirmed both clinically and by the end tidal carbon dioxide reading (capnography). Analgesia was effected using intravenous morphine sulphate 4mg-10mg at (0.1mg /kg) and at the close of surgery, 600mg paracetamol (acetaminophen) administered intravenously was used as an alternative. Maintenance of anaesthesia was done using either Isoflurane in seven (7) Halothane six (6) patients, depending on its availability. Muscle relaxation was achieved with pancuronium at 0.1mg 1kg in all the patients.

All the patients were properly monitored using; the digital pulse platysmograph; temperature probes – core and peripheral; non-invasive blood pressure (NIBP) and end tidal carbon dioxide (ETCO<sub>2</sub>). Urethral catheterization for urinary output was also carried out. The head – down or Trendelenburg position with the degree of head – down not measured but was as decided by the surgeon.

### Post operation care

Full neuromuscular recovery was facilitated with the administration of intravenous dose of neostigmine 2.5mg and glycopyrrolate 0.4mg and on having a satisfactory clinical recovery of muscle function; the

patients were transferred to the wards, through the recovery rooms.

### Result

All the patients spent between three (for diagnostic) and five days post operatively and were discharged home devoid of any postoperative. The stay of 3-5 days in hospital in this series is for safety for beginners.

### Discussion

Laparoscopic techniques, though alien to some health facilities in the developing world, have found acceptance in our environment and have become routine procedures in some private health facilities in Nigeria. The benefits accruable are in multiples and range from the placement of smaller incisions, than with the traditional techniques. Others include decreased postoperative pain; less postoperative ileus, shorter hospital stays [17,18], earlier ambulation and smaller surgical scars.

The hallmark of anaesthesia is patient's safety and every innovation in medicine and surgery must be properly harnessed to ensure that these procedures are performed safely [20].

Life threatening complications are associated with the creation of pneumoperitoneum with pressurized and cold carbon dioxide and this affects the cardiopulmonary and neuro endocrine systems, especially in the elderly. The cephalad displacement of the diaphragm, causing a decrease in lung compliance and a diminished functional residual capacity (FRC), ventilation, perfusion mismatch and pulmonary stunting etc, all these contribute to a decrease in arterial oxygenation [21] oliguria [22] (urine output <0.5ml/kg/hr), increases in potassium level [23], reduction in regional blood flow to all intra abdominal organs including hepatic, mesenteric, intestinal mucosa, stomach, duodenum, pancreas and spleen as the intra abdominal pressure approaches 15mmHg [24].

The above problems are associated with the increase in intra abdominal pressure, which the gas laparoscopy entails and is a cause of morbidity and mortality especially in the elderly and those with lung pathologies [25].

The Laparolift, Laparotensor that elevates the anterior part of the abdominal wall 10-15cm, maintains a normal intra abdominal pressure (IAP) to values lower than 20mmHg thus avoiding the adverse effects of the absorbed carbon dioxide.

In our experience; the real problem that this technique poses is in the positioning and its effects

on the physiology of the patients which were not encountered in our series.

The head down position (Trendelenburg) sub serves most pelvic procedures and the following problems that we did not encounter should be noted.

- (i) A displacement of the tip of the tracheal tube in adults, resulting in endobronchial intubation and hypoxaemia. Capnoperitoneum and the head-down position have been found to produce a significant caudal movement of the tracheal tube in the trachea.
- (ii) A cephalad shift in abdominal viscera and the diaphragm, resulting in a reduction in the functional residual capacity (FRC), total lung volume, and pulmonary compliance
- (iii) An increase in the preload, mean arterial pressure (MAP) and cardiac output, which predisposes to the tendency to develop postoperative headache, facial swelling and increase in intracranial pressure (ICP).
- (iv) Nerve injuries such as brachial plexus neuropathies as well as other peripheral nerve injuries (ulna, common peroneal nerves etc.)

There was no conversion to open laparotomy or gas laparoscopy in all the procedures, visualization was better as there was no interference with gut. Although any anaesthetic technique may be employed such as regional, we opted for general anaesthesia with tracheal intubation and positive-pressure ventilation which has the advantage of avoiding the risk of regurgitation from increased intra abdominal pressure (IAP).

### Conclusion

We report the first recorded experience with Gasless laparoscopy in Nigeria and with the highlighted issues of benefit to the anaesthetists and indeed the patients.

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