

# Experiences and challenges of gynecological endoscopy in a low-resource setting, Southeast Nigeria

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## ABSTRACT

**Background:** The scope of endoscopy is expanding more and more as experience is gained with training and collaborations, however, these expansions could be slowed by challenges.

**Objectives:** To determine the experiences and challenges of gyne-endoscopic surgery.

**Materials and Methods:** This study was a prospective analysis of all women undergoing gynecologic endoscopy at Federal Teaching Hospital Abakaliki (FETHA), Nigeria from 2012 to 2014. Patients were recruited based on eligibility for endoscopy surgery. Written informed consent was obtained before any of the gyne-endoscopic surgery. Ethical approval for the study was given by the ethics and research committee of FETHA. Laparoscopy and hysteroscopy were performed by the managing team. EPI Info version 3.5.1 statistical software (Atlanta, GA, USA) was used for data analysis.

**Results:** Seventy-three different gyne-endoscopic surgeries were done, with dye test accounting for majority 28 (77.8%). The duration of surgery ranged from 23 to 248 minutes, and the surgery with the longest duration was total laparoscopic hysterectomy while laparoscopy and dye test had the shortest operating time. The mean duration of hospitalization was  $20.3 \pm 14.4$  hours. There were 2 (5.6%) conversions to open surgery. Most common complication was abdominal pain 26 (72.2%). The challenges include third party partnership, lack of vital equipment, poor maintenance, epileptic power supply, late presentation of cases, and misconception.

**Conclusion:** Gyne-endoscopy is essential in contemporary medicine. Reduction in operating time occurs as skills and experience improve; the challenges are many.


**Key words:** Challenges; endoscopy; experience; gynecology; hysteroscopy; laparoscopy.

## Introduction

Cosmesis and improved quality of life are of utmost concern in modern day medical practice. This has revolutionized contemporary gynecology resulting in an increased quest for gynecological endoscopy. This practice of gynecological endoscopy is at its peak in developed countries but is still at low level of development and performance in most developing countries where major health challenge is how to cope with mortality and morbidity following preventable

causes. Commonly, cosmesis is the desire of every woman. This buttresses the need and necessity for acquisition of endoscopic surgical skills and experiences for all gynecological procedure. In the midst of all these experiences

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and skills in endoscopy, there is always a learning curve with the anticipated and unanticipated challenges. However, there are almost no medical, demographic, or technical limits for the application of endoscopy in gynecology because the benefits it provides are extraordinary.<sup>[1]</sup>

Modern endoscopy began with Philip Bozzini who in 1805 visualized the urethra with a light reflector.<sup>[2]</sup> This simple procedure has transformed to the modern day endoscopy with automated endoscopy equipment and robotic surgery machine. The scope of endoscopy is expanding more and more as experience is gained with training and collaborations. In addition, the endoscopic machines and working instruments are made more user friendly. At present, there is a shift in the trend of open surgery to endoscopy in both laparoscopy and hysteroscopy, especially in developed countries. Consequently, almost all known gynecologic procedures have been performed endoscopically in the developed world.<sup>[3]</sup> Even the complex procedures including oncological surgical procedures can now be performed using laparoscopy.<sup>[3-5]</sup> Laparoscopy and hysteroscopy are used either as the main approach for an adequate surgical procedure or as an assisting technique, thus facilitating, supplementing, and providing safety of the main procedure.<sup>[4]</sup> Indeed, it has been suggested that endoscopy will become the approach of choice for all gynecologic conditions globally because of its acknowledged advantages of minimal trauma, crystal clear visualization, low incidence of complications, reduction of adhesions formation by at least 20%, and favorable postoperative course along with rapid recovery and cosmetic effect.<sup>[6,7]</sup> Advanced laparoscopic procedures have necessitated the development of new technology for vascular control to reduce the hemostatic challenges.<sup>[4]</sup>

Endoscopy is facing a lot of challenges, especially in developing countries. However, we have to surmount these challenges if it is to remain and maintain its position as a better alternative to open surgery and the most elegant procedures for gynecological procedures. The challenges facing endoscopy lies in the acquisition and maintenance of the equipment, the need for training and re-training, the need for back up services, and after all the fact that relatively known open surgery alternative methods are readily available. These open surgeries are taught, demonstrated, and practiced in medical schools' tutorials and during clinical postings. Further, the act of different open surgeries are taught and demonstrated to younger colleagues who assist and perform these surgeries during training under supervision, but endoscopy is not readily available in most hospitals and is seen as a subspecialty procedure that is

usually acquired after fellowship examinations in most developing countries.

In Nigeria, gyne-endoscopic procedures were mainly for diagnostic purposes and a few tubal sterilizations.<sup>[8-10]</sup> There was poor acceptance, intense criticism, and nonavailability of endoscopy machines in most centers. As a result, this rapidly evolving subspecialty in gynecology slowed and eventually came to a virtual halt as a result of infrastructural decay in most government hospitals in Nigeria.<sup>[8]</sup> A handful of private hospitals in Nigeria, however, managed to keep laparoscopy alive in their practices, and they are the ones credited with the published reports of operative laparoscopy in Nigeria.<sup>[8,9]</sup> Recently, there was a reawakening in the practice of endoscopy in private, Government and private partner proprietorship in Nigeria.

The experiences and challenges of endoscopy differ from one hospital to another and these differences are dependent on the commitment of the governing bodies or boards of the hospital and that of the endoscopic surgeons as well as whether the hospital is solely a private establishment, public private partnership, or solely government owned and operated hospital.

Therefore, we wish to showcase our experiences and challenges of setting up and working in an endoscopy outlet at a Federal Government owned teaching hospital in Abakaliki southeast Nigeria.

## Materials and Methods

This study was conducted at the Federal Teaching Hospital Abakaliki (FETHA) Ebonyi State, Nigeria. FETHA is a major tertiary health facility located in the capital city of the state and is an accredited center for postgraduate residency training in obstetrics and gynecology.

The study was a prospective analysis of all women undergoing gynecologic endoscopy at Federal Teaching Hospital Abakaliki Ebonyi State, Nigeria over a 3-year period from January 2012 when the endoscopy unit was fully established to December 2014. All data were collected prospectively using a specifically designed study instrument. Patients were recruited based on eligibility for endoscopy surgery from the gynecology clinic and gynecological emergency unit after thorough evaluation. Adequate counseling was provided for all patients and written informed consent was obtained before gyne-endoscopic surgery. Ethical approval for the study was given by the ethics and research committee of Federal Teaching Hospital Abakaliki.

All patients had clinical and radiologic evaluation (ultrasonography or hysterosalpingography, as appropriate) along with laboratory investigations for proper diagnosis and identification of any existing co-morbidities. Every patient was reviewed preoperatively by the anesthesiologist. Surgeries were performed with conscious sedation, regional anesthesia, and general anesthesia as agreed by the managing team and the anesthesiologist. Carbon dioxide (CO<sub>2</sub>) pneumoperitoneum was used for all laparoscopy cases via the Veress needle technique, and intra-abdominal pressure was maintained between 14 mmHg and 18 mmHg. The Palmer's point entry technique was used in patients who had previous abdominal surgery that healed by secondary intention. The total number of ports used in each case ranged between two and four, depending upon the operative procedure performed. Equipment used include a trolley stand containing standard definition camera and monitor, a light source and fiberoptic light cable, a simple electrosurgical generator, a quadromanometric insufflator, and a suction machine. The working equipment comprised a 10-mm and a 5-mm 0° laparoscope, 4mm 30° hysteroscope, 10 mm and 5 mm trocars and cannula, and different working hand instruments designed for specific functions. Hysteroscopy was done with diagnostic or operative sheath. Normal saline or Ringers lactate was used for diagnostic hysteroscopy and operative not requiring electrosurgical machine when hysteroscopic scissors or biopsy forceps was used. The distending medium used for operative hysteroscopy requiring electrosurgical unit were sterile water and 5% dextrose water. Lots of improvised techniques were implemented as in improvised endobag using surgical gloves. Colpotomy was used to retrieve moderately sized mass as we did not have morcellator. Subcuticular skin closure with 2/0 Vicryl was used to close the port sites. Patients were usually allowed oral intake once they were fully conscious, and were later discharged home on oral analgesics (usually opioids) on the day of operation or the first postoperative day or as deemed fit for discharge. Prophylactic antibiotic were given to all patients. Patient's wound dressings were removed on the first postoperative day. Patients were subsequently seen in the gynecology clinic 1 week postoperatively.

Information gathered from the participants were entered into the computer using 2008 EPI Info version 3.5.1 statistical software (Atlanta, GA, USA), which was used for data analysis. Univariate and bivariate analyses were done by stratification of variables, which was used to determine findings.

## Results

Over the 3 years of gynecological endoscopy, a total of 36 cases were managed at the Federal Teaching hospital

Abakaliki, Ebonyi, Nigeria out of a total of 809 gynecological operation, giving a gyne-endoscopic operative rate of 4.45%. The mean age of the patients managed within this period was 33.0 ± 8.0 years with range of 21–55 years. Mean parity was 1.4 ± 1.8 with range of 0–9. The mean weight and body mass index were 65.7 ± 11.7 kg and 25.30 ± 5.8 kg/m<sup>2</sup>, respectively. Majority of the patients were within the age bracket of 25–29 years 11 (30.6%) and 30–34 years 10 (27.8%), as shown in Table 1.

Table 2 showed that the most common indication for gynecological endoscopy was secondary infertility 23 (63.9). This was followed by hysterosalpingogram showing bilateral tubal blockage 9 (25%), uterine synechiae 9 (25%), primary infertility 5 (13.9%), and endometrial polyp 4 (11.1).

Laparoscopy and dye test was done in 28 (77.8%) patients while diagnostic hysteroscopy was done in 17 (47.2%) of the patients. Other endoscopic surgery done included hysteroscopic adhesiolysis 9 (25%), hysteroscopic polypectomy

**Table 1: Sociodemographic variables of participants**

Sociodemographic variables	n=36	Percentages
Age (years)		
20-24	3	8.3
25-29	11	30.6
30-34	10	27.8
35-39	7	19.4
40-44	2	5.6
45-49	3	8.3
Educational status		
No formal education	3	8.3
Primary	3	8.3
Secondary	15	41.7
Tertiary	15	41.7
Parity		
0	12	33.3
1-4	22	61.1
≥5	2	5.6
Religion		
Christianity	34	94.4
Islam	2	5.6
Weight (kg)		
<90	35	97.2
≥90	1	2.8
Body mass index (kg/m <sup>2</sup> )		
18.5-24.9	17	47.2
25-29.9	17	47.2
30-34.9	1	2.8
35-39.9	1	2.8
Prior history of abortion		
+1	12	32.14
+2	3	8.3
0	21	58.3

**Table 2: Indications for gynecological endoscopy**

Indications*	n=36	Percentage
Secondary infertility	23	63.9
HSG diagnosed tubal blockage	9	25.0
Uterine synechiae	9	25.0
Primary infertility	5	13.9
Endometrial polyp	4	11.1
Polycystic ovarian syndrome	3	8.3
Ectopic pregnancy	3	8.3
Uterine fibroid	3	8.3
Hypomenorrhea	3	8.3
Ovarian cyst	1	2.8
Abnormal uterine bleeding	1	2.8
High squamous intraepithelial lesion of the cervix	1	2.8

HSG, Hysterosalpingograph; \*, Multiple entries allowed

4 (11.1), laparoscopy adhesiolysis 4 (11.1), ovarian drilling and diagnostic laparoscopy 3 (8.3%) each, cystectomy and myomectomy 2 (5.6%) each, and total laparoscopic hysterectomy 1 (2.8%). The duration of surgery ranged 23–248 minutes and the surgery with the longest duration of operating time was total laparoscopic hysterectomy while laparoscopy and dye test had the shortest operating time. Most of the endoscopic surgeries 13 (36.1%) lasted for a period of 61–90 minutes, and this was followed by 9 (25%) of the surgeries that lasted for 91–120 minutes. One surgery lasted for more than 240 minutes (>4 hours). A total of 3 (8.3%) were completed within 30 minutes. Four (11.1%) surgeries were completed in 31–60 minutes.

The mean duration of hospital stay was 20.3 ± 14.4 hours with a range of 4–72 hours. Most patients were discharged within 7–24 hours 59 minutes. Five patients (13.9%) were discharged in less than 6 hours of operation while seven patients (19.4%) were discharged within 25–72 hours. The most common complication was abdominal pain 26 (72.2%). Two cases (5.6%) were converted to mini-laparotomy and 2 patients (5.6%) had port site infection, as shown in Table 3.

Common findings in both laparoscopy and hysteroscopy were tubal pathologies. Laparoscopic tubal findings included bilateral patent tubes 12 (33.3%), unilateral patent tube 10 (27.8%), bilateral tubal blockage 6 (16.7%), unilateral hydrosalpinx 6 (16.7%), beaded tubes 5 (13.9%), and bilateral hydrosalpinx 2 (5.6%), as shown in Table 4.

Table 5 showed the type of endoscopic procedures and the duration of the surgery. Total laparoscopic hysterectomy lasted for more than 240 minutes (>4 hours). Laparoscopic ovarian cystectomy was completed within 211–240 minutes. A total of 3 (100%) laparoscopy and dye test were completed within 30 minutes. Diagnostic hysteroscopy 1 (25%), hysteroscopic polypectomy 1 (25%), diagnostic laparoscopy

**Table 3: Procedures, anesthesia used for the procedures, duration of operation, duration of hospitalization, and complication observed in the management**

Variables (total number)	Number	Percentage
Procedure* (73)		
Laparoscopy and dye test	28	77.8
Diagnostic hysteroscopy	17	47.2
Hysteroscopic adhesiolysis	9	25.0
Hysteroscopic polypectomy	4	11.1
Laparoscopic adhesiolysis	4	11.1
Ovarian drilling	3	8.3
Salpingectomy	3	8.3
Cystectomy	2	5.6
Myomectomy	2	5.6
Total laparoscopic hysterectomy	1	2.8
Type of anesthesia given (36)		
General anesthesia	29	80.6
Spinal anesthesia	7	19.4
Duration of operation (36)		
≤30 minutes	4	11.1
30.1-60 minutes	13	36.1
60.1-90 minutes	9	25
90.1-120 minutes	5	13.9
120.1-150 minutes	5	13.9
210.1-240 minutes	1	2.8
>240 minutes	1	2.8
Duration of hospitalization (36)		
<7 h	5	13.9
7-<25 h	24	66.7
25-72 h	7	19.4
Complication* (30)		
Abdominal pain	26	72.2
conversion to Laparotomy	2	5.6
Port site infection	2	5.6

\*, Multiple entries allowed

2 (50%), and laparoscopy and dye test were completed within 31–60 minutes. Most cases in this study were completed within 61–90 minutes including laparoscopy and dye test 11 (84.6%), diagnostic hysteroscopy 6 (46.2%), laparoscopic adhesiolysis 2 (15.4%), hysteroscopic adhesiolysis 3 (23.1%), diagnostic laparoscopy 1 (7.7%), laparoscopic salpingectomy 3 (23.1%), and laparoscopic ovarian drilling 1 (7.7%). Within the operation time interval of 91–120 minutes, 7 (77.8%) laparoscopic and dye test, 5 (55.6%) diagnostic hysteroscopy, 2 (22.2%) laparoscopic adhesiolysis, 1 (11.1%) laparoscopic cystectomy, 1 (11.1%) laparoscopic ovarian drilling, 1 (11.1%) laparoscopic myomectomy, and 4 (30.8%) hysteroscopic polypectomy were completed. A total of 5 (100%) laparoscopy and dye test, 4 (80%) diagnostic hysteroscopy, and 1 (20%) each of laparoscopic ovarian drilling, laparoscopic myomectomy, and hysteroscopic polypectomy were completed within 121–150 minutes.

Table 6 shows the challenges observed in setting-up and running of the gyne-endoscopic unit in our setting. The

challenges observed were third party for the supply and maintenance of endoscopic instruments instead of first party, epileptic electricity supply instead of sustained power supply, out of pocket payment instead of effective health insurance system, poor acceptance of endoscopy instead of good acceptance, no dedicated endoscopy team instead of dedicated and functional team, and bureaucratic processes in the management of the team. The cost of endoscopy operation is expensive. The advanced endoscopic equipment and working materials as well as instruments were not readily available.

**Table 4: Laparoscopic and hysteroscopic findings among the patients**

Findings	n=36	Percentage
<b>Laparoscopic findings*</b>		
Patent tubes (bilateral)	12	33.3
Patent tube (unilateral)	10	27.8
Bilateral tubal blockage	6	16.7
Unilateral hydrosalpinx	6	16.7
Massive adhesion	5	13.9
Beaded fallopian tube	5	13.9
Ovarian cysts	5	13.9
Polycystic ovarian disease	4	11.1
No ectopic pregnancy	3	8.4
Frozen pelvis	2	5.6
Flimsy adhesion on pelvis	2	5.6
Violin string appearance	2	5.6
Bilateral hydrosalpinx	2	5.6
<b>Hysteroscopic findings*</b>		
Normal uterine cavity	8	22.2
Blocked ostia	6	16.7
Blocked ostium	5	13.9
Endometrial polyp	4	11.1
Massive uterine adhesion	2	5.6
Stenosis of the cervix	2	5.6
Flimsy adhesion on cervical	1	2.8
Dilated ostia	1	2.8

**Table 5: Endoscopic operation done and the duration of the surgery**

Duration of surgery (Minutes)	≤30	31-60	61-90	91-120	121-150	211-240	>240
<b>Total number of cases done 36 (%)</b>	<b>3(%)</b>	<b>4(%)</b>	<b>13(%)</b>	<b>9(%)</b>	<b>5(%)</b>	<b>1(%)</b>	<b>1(%)</b>
<b>Operation done*</b>							
Laparoscopy and dye test	3 (100)	1 (25)	11 (84.6)	7 (77.8)	5 (100)	1 (100)	0
Diagnostic hysteroscopy	0	1 (25)	6 (46.2)	5 (55.6)	4 (80)	1 (100)	0
Laparoscopic adhesiolysis	0	0	2 (15.4)	2 (22.2)	1	0	0
Hysteroscopic adhesiolysis	0	0	3 (23.1)	0	0	0	0
Diagnostic laparoscopy	0	2 (25)	1 (7.7)	0	0	0	0
Laparoscopic cystectomy	0	0	0	1 (11.1)	0	1 (100)	0
Total laparoscopic hysterectomy	0	0	0	0	0	0	1 (100)
Laparoscopic salpingectomy	0	0	3 (23.1)	0	0	0	0
Laparoscopic ovarian drilling	0	0	1 (7.7)	1 (11.1)	1 (20)	0	0
Laparoscopic myomectomy	0	0	0	1 (11.1)	1 (20)	0	0
Therapeutic hysteroscopy (polypectomy)	0	1 (25)	0	4 (30.8)	1 (20)	0	0

\*, Multiple entries allowed

## Discussion

Endoscopic experiences and challenges vary from country to country, and even within a country it differs in different hospital establishments. In a government-owned teaching hospital located in a developing country where this study was conducted, the rate of gynecology endoscopy was 36/809 (4.45%) of all gynecological operations. This is higher than 2.8% seen in the National Hospital Abuja Nigeria<sup>[11]</sup> but lower than 23.7% seen at Ile Ife.<sup>[8]</sup> The major reason for the low endoscopic operations could be that endoscopy was still seen as a new concept in the hospital and the environs, and hence, acceptance was an issue. Most gynecologists still prefer the former open nonendoscopic operative and diagnostic procedure in managing gynecological cases probably because of lack of expertise. Hence, patients are not commonly referred for endoscopic operation on presentation to the accident and emergency doctors. Patients with some gynecological conditions do not accept operative options of treatment until when they are contraindicated to endoscopic surgery. Typically, this is illustrated in ruptured ectopic with hemodynamic instability which is a common presentation of ectopic pregnancies in our environment. In general, there had been an intense aversion to surgery in our environment because of fear of morbidities and mortality. Frequent and repeated problems with endoscopic equipment were noted as contributory factors at Abuja and Ile Ife and this was also an issue in our setting.<sup>[8,11]</sup> Damaged working endoscopic instrument resulted in limited endoscopic procedures and most times the only option is to improvise because of the challenges in acquiring and maintaining the endoscopic instruments. Further, bureaucratic issues among some of the hospital personnel also played a role in influencing endoscopic surgery operations as a case could be cancelled or delayed because of hospital inefficiency. Ultimately, assisted reproductive technology has not started in our

**Table 6: Challenges of gyne-endoscopy in our setting and possible best options or solutions**

Challenges	Options	Available options at our setting	Solution or best option
Instrument supply and replacement/maintenance	1 <sup>st</sup> party/2 <sup>nd</sup> party/3 <sup>rd</sup> party	3 <sup>rd</sup> party and improvised	1 <sup>st</sup> party
Presentation of cases/patients	Early presentation, late presentation with complications	Late presentation with complications	Early presentation
Advanced and current instrument	Harmonic, Sonicision, LigAssure, Laser, and Da Vinc (Robotic)	Monopolar and Bipolar	Harmonic, Sonicision, LigAssure, Laser, and Da Vinc (Robotic)
Cost of medication	Health insurance, community support, loan from banks and business organizations, family support	Out of pocket expenditure and family support	Health insurance
Training and re-training	Overseas (Europe, Asia), developing local (Nigeria), endo-trainer	Overseas (India) and local (Coscharis), endo-trainer	Continuous training and re-training
Acceptance in relation to open surgery	Good, moderate, poor	Poor	Good
Dedicated and functional team or unit	Doctor, anesthesiologist, anesthetics, preoperative nurses, biomedical engineers	No comprehensive dedicated team	Dedicated and functional team
Hospital setting	Government, private, private proprietor partnership, mission, joint business, privatized firms	Government with bureaucracy	Joint business, privatized firms
Power supply	Solar, electricity, generator, inverter	Epileptic electricity supply supplemented by generator	Sustained and continuous power supply
Distending medium for operation with electrosurgical machines	Sterile water, 5% dextrose water, glycine, hyskon	Sterile water, 5% dextrose	Glycine, hyskon
Hysteroscopy working instrument	Loop electrodes, bipolar, scissors, grasper, biopsy, pressure pump	Scissors, blood pressure cuff as pressure pump	Loop electrodes, Knife electrodes, Morcellators, bipolar, scissors, grasper, biopsy, pressure pump

hospital as such some cases of infertility opt for gynecological endoscopic evaluation at a center with such facility.

The most common gyne-endoscopic surgery performed was diagnostic laparoscopy for infertility with tubal pathologies as the dominant findings. Operative procedures such as ovarian drilling, adhesiolysis, cystectomy, salpingectomy, polypectomy, myomectomy, and total laparoscopic hysterectomy were done. These were significant advancement in the gyne-endoscopy in our setting as most centers in Nigeria performed only diagnostic endoscopy.<sup>[11]</sup> One of the ovarian masses was a fibroma and conversion to mini-laparotomy for removal of the mass was performed and also a fibroid mass was also removed by a mini-laparotomy. This was because there was no functioning morcellator. The conversion rate to laparotomy in this study was 5.6% and were for removal of masses. Ideally, the conversion rate would have been zero if we had adequate equipment. However, this conversion rate was higher than 2.48% reported in Cameroon<sup>[12]</sup> and 0.67% reported in Kenya<sup>[13]</sup> but lower than that reported in Nigeria<sup>[8]</sup> and some other African countries.<sup>[14]</sup> The common reasons given for the high conversion rate are related to inadequate equipment, equipment malfunction, and poor selection of patients, especially in emergency cases.<sup>[8,13,14]</sup> However it is recommended that all patients scheduled for laparoscopic surgery should consent for possible intraoperative conversion to laparotomy, since in any given unit, 10–15% of all cases

may inadvertently be converted.<sup>[15]</sup> Inadequate instrument is a recurrent problem when the source of procurement of instrument is not from the direct producers (first party) as this creates a gap or breach of communication between the end users and the producer. This was the scenario in our setting where the supply and maintenance of the instrument was by a third party. Third party arrangement is a big challenge to endoscopic set up and could result in frustration to the endoscopic surgeon.

The common complication noticed in this study was abdominal pain which has been reported as a common finding in most gyne-endoscopic procedures. Abdominal pain could be because of the carbon dioxide gaseous distension for creation of pneumoperitonium. It could also be from the coagulation and cutting from the monopolar and bipolar electrosurgical current for operative gynecology. As a result, they were not severe as traumas were minimal and copious irrigation with normal saline on the operated areas, especially in the areas of electrosurgical dissection as such the pain always resolved within 24 hours. There was no mortality within the study period. This showed that gyne-endoscopy could safely be conducted in most gynecological cases and could replace open surgery in future in our setting. Indeed, it has been suggested that endoscopy will become the approach of choice to all gynecological conditions because of its acknowledged benefits.<sup>[6,7]</sup> Minimal

access surgery has been reported to be gaining tremendous potential both in gynecology and general surgery and more specialists are increasingly finding it relevant for various surgical procedures.<sup>[13]</sup> Some gynecologists noted that an increasing number of gynecological procedures are now being competently managed laparoscopically rather than by laparotomy.<sup>[16]</sup> American Association of Gynecologic Laparoscopists has recommended that the majority of patients with pelvic pathology requiring surgery can be managed laparoscopically.<sup>[17]</sup> The laparoscopic approach was principally designed to replace the abdominal route. Fernandez *et al.* noted that, after the introduction of laparoscopic assisted vaginal hysterectomy (LAVH) in Antoine Beclere Hospital, France, within 3 years the procedure accounted for 20% of the hysterectomies, which resulted in a concomitant decrease in the rate of abdominal hysterectomy.<sup>[18]</sup> Brechin *et al.* of the Scottish Laparoscopic Surgery evaluated the use of laparoscopic-assisted vaginal hysterectomy by a cross-section of gynecologists in Scotland.<sup>[19]</sup> Of the 505 cases of laparoscopic assisted vaginal hysterectomy done from April 1994 to March 1996, 463 (91.7%) were successfully performed.<sup>[19]</sup>

In as much as almost all gynecological cases can be managed by endoscopy. The duration of the operation has consistently been noticed as being longer than open surgery, especially in the initial phase of kick starting an endoscopic center. The mean duration of gyne-endoscopic surgery in this study was  $20.3 \pm 1.4$  with a range of 23–248 minutes. The duration of surgery tends to shorten as ergonomics and experience improve. There has always been a learning curve in laparoscopic surgery and this learning curve shortens with practice. However, operative endoscopic surgeries lasted for a longer duration of time in this study than diagnostic cases. This was partly due to inadequate instruments, inadequate power supply, and learning curve. Moreover, some endoscopic cases benefitted from multiple endoscopic operations based on the findings during endoscopy. The endoscopic surgery that lasted for the longest duration of operation time in this study was total laparoscopic hysterectomy. This was the first case of total laparoscopic hysterectomy done in our setting. In one study, it was reported that the time taken for the hysterectomy is significantly longer for laparoscopic hysterectomy compared to abdominal hysterectomy and that it required 36 initial attempts of total laparoscopic hysterectomies to complete the surgery within a time frame comparable to abdominal hysterectomy.<sup>[20]</sup> Reports have shown that the first few endoscopic operations generally takes a relatively longer time (the learning curve) when compared with the last operations in both bipolar and harmonic electrosurgical techniques, hence, the mean operation time after repeated endoscopic surgeries of

hysterectomies will be comparable with that of abdominal hysterectomy.<sup>[4,21]</sup> Similarly Jaturasrivilai reported that the learning curve of LAVH procedure showed that the operative times were decreased from an average of 155 min in the first 10 cases to 91 min in the last 10 cases confirming that learning curve sets a baseline that directly correlates with skill.<sup>[22]</sup> Hence, it is expected that duration of endoscopic operation will reduce as we operate on more cases as there is a learning curve in laparoscopy.

The significant and outstanding advantages of endoscopy are short hospital stay postoperation and early return to duty. The mean duration of hospitalization in this study was  $20.3 \pm 14.4$  hours and all patients were discharged home within 72 hours of operation. In a comparative analysis of laparoscopic hysterectomy and abdominal hysterectomy, it was shown that the postoperative hospital stay ( $2.6 \pm 0.9$  days vs.  $4.5 \pm 1.1$  days) and the time to return to work ( $30.4 \pm 3.1$  days vs.  $50.9 \pm 6.6$  days) were significantly different in the laparoscopic hysterectomy group compared to the abdominal hysterectomy group.<sup>[22]</sup>

The challenges seen in our setting were mainly because of third-party partnership. There was no indigenous company producing endoscopic equipment in Nigeria and as such there was dearth of supply of the instruments on demand. The costs of the instruments were exorbitant and there were not many options for purchase of the endoscopy machines and working instruments. There were lots of bureaucratic processes in our hospital community because of the processes of procurement and administrative bottleneck in approving the required endoscopic material or equipment from the hospital management. The maintenance could be frustrating as the biometric engineers from the third-party partnership and those in our hospital were not certified trained endoscopy engineers. Hence, they were not very knowledgeable on the intricate components of the endoscopic instruments. A lot of materials and instruments were improvised as the basic and appropriately recommended materials were usually not readily available.

The cost of surgery was a strong limiting step to endoscopic procedures in our setting as poverty and poor remuneration are dominant in low resource settings. The dominant payment plan in our setting was from family support and out of pocket expenditure. This was because there was no effective health insurance scheme.

Lack of basic and advanced training and re-training as well as epileptic power supply negatively affected the performance of the endoscopy in our environment. Training and re-training are prerequisite for improvement of skills and expertise

in endoscopic procedure but was lacking in our setting. Endoscopy training and collaboration are necessary for the growth and development of endoscopy in any setting. Sustained power supply is also required for efficient procedure and for reduction of duration of surgery. This is an aspect of endoscopy that is optimal as the surgeries are completely dependent on power for visualization, operation, and recording. This is also necessary as there is an increasing trend of endoscopy to three dimensional surgeries using Robotic, telemedicine and more users' friendly working instruments such as harmonics and sonicision. Robotic and telemedicine are yet to be introduced in Nigeria because of cost and poor partnership.

In conclusion, the act and scope of gynecological endoscopy are growing in developing countries. It is expected that with experience and skill acquisition, endoscopy will most likely be the preferred choice in most gynecology pathologies in low resource settings. The challenges of gyne-endoscopy in our setting are many and ranged from inadequate instrument, late presentation of cases, third-party partnership, inadequate power supply, poor maintenance of endoscopic instruments to misconception, and fear of endoscopic surgery.

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#### Conflicts of interest

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