Tropical Journal of Obstetrics & Gynaecology
ISSN-Print: 0189-5117
Online: 2543-148X
Official Publication of Society of Obstetrics & Gynaecology of Nigeria

Original Article

Factors Affecting Anaesthesia Preference for Gynaecological Surgeries in a Nigerian Tertiary Institution

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ABSTRACT

Background: Gynecological surgeries are varied, can be complex, involve low and high risk patients. Equipment, appropriate drugs and personnel are scarce, thus deciding on the mode of anesthesia could occasionally be challenging. ***Objective:*** To review the factors that affect anesthesia preference for gynecological surgical procedures in our institution. **Materials and Methods:** This was a seven year retrospective survey of the clinical records of all patients who had gynecological surgeries in our center between January 2012 and December 2019.The following data were collected; age, indication for surgery, type of surgery, type of incision, site of surgery, nature of surgery (emergency or elective), type of anesthesia, ASA status, and cadre of the anesthesiologist to see how they influenced the choice of anesthesia. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 for simple frequencies and matched for type of anesthesia. **Results:** A total of 2778 gynecological operations were performed during the study period. There was the equal use of GA and RA. Emergency and endoscopic surgeries, pediatric patients, surgery on the fallopian tube, ovary or vulva, and anesthesia by a Nurse anesthesiologist influenced anesthesia in favor of General Anesthesia (GA), while the elderly and middle age groups, abdominal myomectomy, cervical cerclage, vaginal hysterectomy, hysteroscopic adhesiolysis, myometrial, cervical or vaginal surgeries, pfannestiel incision, ASA I patients, physician anesthetist and senior registrars influenced anesthesia in favor of Regional anesthesia (RA). CONCLUSION. All the factors analyzed influenced the choice of anaesthesia in line with best global practice. Where this was not the case as in the case of, ASA status and pediatric patients, explanation could been found in the peculiar circumstance of our center. **Keywords:** Anesthesia preference, Regional anesthesia, Gynecological surgeries, General Anesthesia

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Introduction

Gynecological surgeries are varied, could be complex and involve all age groups as well as high and low risk patients.[1,2] Regional Anesthesia (RA) and General anesthesia (GA) are generally considered safe and are commonly used. There is a global trend of the preferred and increased use of RA. For gynecological thromboembolism and pulmonary embolism when compared to GA.[3,4] While there is no anesthesia of choice the chosen mode of anesthesia will be determined by factors such as site and type of surgery, patient's preference, age, expertise of the anesthesiologist, availability of anesthetic equipment and lifesaving drugs, pathology, and the type and extent of incision.[5-7] A study of the factors influencing anesthesia preference for gynecological surgeries will assist in proper planning, personnel mobilization as well as allow for easy adaptability and proper utilization of available resources.

Materials and Methods

The Doctors and nurses theatre records of patients that had gynecological surgery in our institution from January 2012 and December 2018 were retrospectively reviewed. The following data were collected; age, indication for surgery, type of surgery, type of incision, site of surgery, nature of surgery (emergency or elective), type of anaesthesia, ASA status as well as the cadre of the anesthesiologist. The patients were grouped by age into children (0-15 years), young adults (16-44 years), middle aged (45-64 years) and elderly (65 years and above). Surgery was considered an elective if the patient had the surgery scheduled on the published operating list while all others were considered as emergencies. Patients who had surgeries under spinal, epidural or combined spinal epidural anaesthesia were considered as RA technique while those who had their surgery while asleep and not sedated were grouped under GA. A patient who had RA that was converted to GA was grouped as failed regional technique and not considered as RA or GA. Data analysis with SPSS version 20 examined simple frequencies as well as comparison between anesthetic technique and age, nature of surgery, type of surgery, indication for surgery, type of incision, nature of surgery (emergency surgery/elective surgery), ASA status and cadre of anesthesiologist using Fisher's Exact, Chi square. Statistical significance was assumed at $p<0.05$.

Results

A total of two thousand seven hundred and seventy eight (2778) Gynecological surgeries were done with Age range of 2-85 years and mean of 36.2±10.6years. Table I. Majority of the surgeries 82.5% (2291/2778) were performed in the young adult age group (16-44years), while only 2.1% (58/2778)were carried out in children. General anaesthesia was used in 76.9% (20/26) of the children. Spinal was more used in the elderly 43.1% (25/58) and CSE in the middle age group 22.6% (91/403). Table II. Shows the types of gynecological surgeries performed as well as the frequency distribution of the different types of anaesthesia. Surgeries whose frequencies were less than five were grouped together and categorized as others and this constituted 3.0% (82/2778). Open abdominal myomectomy 30.1% (836/2778), Exploratory Laparotomy 17.1% (474/2778), Total Abdominal Hysterectomy 10.6% (282/2778), Cervical cerclage 6.5% (180/2778), EUA staging and biopsy 5.3% (146/2778)and Lap and Dye test 4.5% (108/2778) were the six most common Gynecological procedures performed. There was a comparable use of GA 50.0% (1385/2778)and RA 47.0% (1306/2778). (Spinal, 33.0% (918/2778) and combined spinal epidural 14.0% (388/2778)). Regional Anaesthesia was used most 67% (spinal 38.5% (322/836), CSE 28.5% (239/836)), for Open abdominal myomectomy, TAH 65.3% (spinal 38.3% (108/282), CSE 27% (76/282), cervical cerclage 57.8% (spinal 57.8% (105/180), hysteroscopic adhesiolysis 55% (spinal 55% (44/80) and vaginal hysterectomy 63.9% (spinal 42.6% 20/47, CSE 21.3%). Table 3 indicates that the leading sites of surgery were the Myometrium 54% (1500/2778), cervix 14.1% (392/2778) and fallopian tube 12.1% (344/2778). Surgeries on the fallopian tube, ovary and vulva attracted a high use

of general anaesthesia 70.6% (243/344), 66.4% (170/256) and 60.0% (6/10) respectively while surgeries on the myometrium 54.6% (819/1500), cervix 42.9% (194/392), and vaginal 49.1% (88/179) attracted a comparatively high use for RA (spinal +and combined spinal/epidural anesthesia) when compared to GA. Table 4. Senior registrars performed the majority 63.4% (1761/2778) of the total anesthesia, Nurse Anesthesiologist 26.2% (729/2778) and consultants 9.3% (258/2778). The cadre of the anesthesiologist was not stated in 4 cases. Registrars, consultants and nurse anesthesiologists performed mainly GA 76.9% (20/26), 61.6% (159/258) and 63.7% (442/694) respectively. Senior registrars performed the greater majority of RA 53.7% (946/1761), (spinal 36.1%(636/1761) and combined spinal epidural anaesthesia 17.6% (310/1761). Nurse anesthesiologists performed mainly GA 63.7% (442/694) and spinal anesthesia 32.9% (228/694). Table 5. Regional Anesthesia was performed more by physician anesthesiologist 79.8% (1040/1303) compared to Nurse Anesthesiologist.

Table 6. In 27.6% (766/2778) of patients, surgery did not require an incision. Midline incisions attracted a comparative equal use of GA and RA. 37% (493/1336) and 33.5% (448/1336) respectively. Spinal attracted a high use for pfannestiel incisions 39.6% (268/676) with a total RA use of 60.2% (spinal (39.6%) and combined spinal epidural anaesthesia (20.6%). Regional Anaesthesia was used more 51.8% (1118/2159) for elective procedures (Spinal 35.6% (768/2159), CSE 16.2% (350/2159), while GA was used more 68.2% (422/619) for emergency procedures. Table 7.All the ASA physical status classification attracted a higher use of GA: ASA I 43.8% (959/2189), ASA II 72.4% (401/554) and ASAIII 85.7% (30/35). Overall ASA I patients attracted the highest use for RA 45% (spinal 28.7% (798/2189, combined spinal epidural 16.3% (356/2189). One hundred and eighty two patients 6.5% had endoscopic surgeries comprising hysteroscopy 3.0% and laparoscopy and dye 3.5%. General anaesthesia was used more for the two main endoscopic procedures; laparoscopy and dye 90.8% (89/98) and hysteroscopy 51.2% (43/84). Table 7.

Table 1: Frequency distribution of anesthesia performance for the different age groups

	Age groups				
Type of Anesthesia	**0-15 (pediatrics) N (%)**	**16-44 (Young Adult) N (%)**	**45-64 (Middle Age) N(%)**	**≥65 (Elderly) N (%)**	**Total N(%)**
Spinal Anesthesia	3(11.5)	765(33.4)	125(31.0)	25(43.1)	918(33.0)
General Anesthesia (GA)	20(76.9)	1176(51.3)	169(41.9)	25(43.1)	1390(50.0)
Combined Spinal/Epidural Anesthesia (CSE)	2(7.7)	286(12.5)	91(22.6)	7(12.1)	386(13.9)
Sedation	1(3.8)	0	1(0.2)	0	2(0.1)
Spinal/GA	0	50(2.2)	11(2.7)	0	61(2.2)
CSE/GA	0	2(0.1)	2(0.5)	0	4(0.1)
L.A	0	10(0.4)	3(0.7)	1(1.7)	14(0.5)
Paracervical Block	0	2(0.1)	1(0.2)	0	3(0.1)
Total	**26(0.9)**	**2291(82.5)**	**403(14.5)**	**58(2.1)**	**2778(100.0)**
X^2	58.339	37.974	40.875	5.767	
P-value	<0.001	<0.001	<0.001	0.673	

Table 2: Frequency distribution of Anesthesia performance by the different types of Gynecological procedures

	Spinal	GA	CSE	Sedation	Spinal/ GA	CSE/ GA	L.A	Para-cervical Block	Total
Open AbdMyomectomy	322	242	239	0	30	1	2	0	836
Exploratory Laparotomy	102	345	12	0	4	1	1	0	474
Total abdominal hysterectomy	108	88	76	1	8	1	0	0	282
Cervical cerclage	104	72	0	0	4	0	0	0	180
E.U.A/Staging/Biopsy	52	84	9	0	0	0	0	1	146
Lap and Dye test	4	121	1	0	0	0	0	0	126
Evacuation of retained products of conception	31	75	2	0	0	0	0	0	108
Hysteroscopicadhesiolysis	44	35	0	0	1	0	0	0	80
cystectomy	18	39	8	0	3	0	0	0	68
Blind adhesiolysis	8	51	2	0	0	0	0	0	61
Vaginal hysterectomy	20	13	10	0	1	0	3	0	47
Trans Abd fibroid polypectomy	16	12	5	0	0	0	0	0	33
2nd wound closure	6	22	1	0	1	0	1	0	31
Laparotomy	12	11	3	0	0	0	0	0	26
Suction curettage	7	11	0	0	0	0	0	0	18
Debulking surgery	0	17	0	0	0	0	0	0	17
V.V.F repair	10	5	1	0	0	0	0	0	16
Hysterotomy	4	9	1	0	0	0	1	0	15
Marsupialization	5	5	0	0	1	0	2	0	13
Hysteroscopy diagnostic	5	7	0	0	0	0	0	0	12
Perineal tear repair	4	4	0	0	2	0	2	0	12
Salpingectomy	8	2	1	0	0	0	0	0	11
Trans abdpolypectomy	5	3	2	0	0	0	0	0	10
Cervical dilatation	2	8	0	0	0	0	0	0	10
Vaginoplasty	3	`4	1	0	1	0	0	0	9
E.U.A	0	8	0	0	0	0	0	0	8
Repair of cervical laceration	0	8	0	0	0	0	0	0	8
Wound exploration	0	7	0	0	0	0	2	0	9
Radical hysterectomy	1	3	3	0	0	0	0	0	7
Endometrial curettage	2	2	2	0	0	0	0	1	7
Cystectomy + TAH	2	4	0	0	0	0	0	0	6
Anterior colporaphy	4	1	0	0	0	0	0	0	5
Cervical cauterization	3	2	0	0	0	0	0	0	5
Cervical dilatation and uterine evacuation	4	1	0	0	0	0	0	0	5
Clitoral cyst excision	0	2	1	0	2	0	0	0	5
Others	7	58	10	1	1	1	2	2	82
TOTAL	**918**	**1385**	**388**	**2**	**61**	**4**	**16**	**4**	**2778**

Table 3: Frequency distribution of anesthesia performance for the different sites of surgery

	Site of Surgery									
Type of Anesthesia	**Abdomen N (%)**	**Vaginal N (%)**	**Vulva N (%)**	**Ovaryn (%)**	**Fallopian tube N (%)**	**Myome-trium N (%)**	**Endo-metrium N (%)**	**Cervix N (%)**	**Imageries Studies N (%)**	**Total N (%)**
Spinal	13(14.1)	74(41.3)	4(40.0)	55(21.5)	86(25.0)	515(34.3)	2(66.7)	168(42.9)	1(50.0)	918(33.0)
General Anesthesia (GA)	71(77.2)	78(43.6)	6(60.0)	170(66.4)	243(70.6)	633(42.2)	0	188(48.0)	1(50.0)	1390(50.0)
Combined Spinal/Epidural Anesthesia (CSE)	6(6.5)	14(7.8)	0	24(9.4)	11(3.2)	304(20.3)	1(33.3)	26(6.6)	0	386(13.9)
Sedation	0	0	0	1(0.4)	0	1(0.1)	0	0	0	2(0.1)
Spinal/GA	1(1.1)	7(3.9)	0	6(2.3)	2(0.6)	38(2.5)	0	7(1.8)	0	61(2.2)
CSE/GA	0	0	0	0	1(0.3)	3(0.2)	0	0	0	4(0.1)
L.A	1(1.1)	5(2.8)	0	0	1(0.3)	5(0.3)	0	2(0.5)	0	14(0.5)
Paracervical Block	0	1(0.6)	0	0	0	1(0.1)	0	1(0.3)	0	3(0.1)
Total	**92(3.3)**	**179(6.4)**	**10(0.4)**	**256(9.2)**	**344(12.4)**	**1500(54.0)**	**3(0.1)**	**392(14.1)**	**2(0.1)**	**2778(100)**
X^2	29.822	40.243	2.044	37.244	76.933	190.313	3.438	39.767	0.088	
P-value	<0.001	<0.001	0.980	<0.001	<0.001	<0.001	0.904	<0.001	0.767	

Table 4. Frequency distribution of Anesthesia performance by the different cadre and status of anesthesiologists

	Anesthesiologist Status				
Type of Anesthesia	**Consultant N (%**	**Senior Register N (%)**	**Registrar N (%)**	**Total physician Anesthe-siologist N (%)**	**Nurse N(%)**
Spinal	50(19.4)	636(36.1)	3(11.5)	689(33.7)	228(31.3)
General Anesthesia (GA)	159(61.6)	766(43.5)	20(76.9)	945(46.2)	442(60.6)
Combined Spinal/Epidural Anesthesia (CSE)	40(15.5)	310(17.6)	1(3.8)	351(17.2)	(0)
Sedation	1(0.4)	1(0.1)	0	2(0.1)	0
Spinal/GA	5(1.9)	33(1.9)	2(7.7)	40(2.0)	21(2.9)
CSE/GA	2(0.8)	2(0.1)	0	4(0.2)	0
L.A	1(0.4)	10(0.6)	0	11(0.5)	3(0.4)
Paracervical Block	0	3(0.2)	0	3(0.1)	0
TOTAL	258(9.3)	1761(63.4)	26(0.9)	2045(73.6)	729(26.2)
X^2	36.635	97.426	17.487	88.219	88.219
P-value	<0.001	<0.001	0.025	<0.001	<0.001

Table 5: Frequency Distribution of Anesthesia Performance by Different Cadre and Status of Anesthesiologist

Type of Anesthesia	**Consultant N (%)**	**Senior Register N (%)**	**Registrar N (%)**	**Physician N (%)**	**Nurses N (%)**	X^2	**P.Value**
Regional	90 (6.9)	946 (76.2)	4 (0.3)	1040 (79.8)	263 (20.2)	92.481	<0.001
General Anesthesia	159 (11.5)	766 (55.2)	20 (1.4)	945 (68.1)	442 (31.9)	248.627	<0.001
Sedation	1 (50.0)	1 (50.0)	0	2 (100.0)	0	4.167	0.244
Spinal/GA	5 (8.2)	33 (54.1)	2 (3.3)	40 (65.6)	216 (34.4)	170	0.104
CSE/GA	2 (50.0)	2 (50.0)	0	40 (100.0)	0	8.336	0.040
L.A	1 (7.1)	10 (71.4)	0	11 (78.6)	3 (21.4)	0.468	0.926
Paracervical Block	0	3 (100.0)	0	3 (100.0)	0	1.728	0.631
Total	258 (9.3)	1761 (63.4)	0	2045 (73.6)	729 (26.2)		

Table 6: Frequency distribution of anesthesia performance for the different types of incision and Nature of surgery

	Type of Incision		Type of Incision	
Type of Anesthesia	**Pfannestiel N (%)**	**Midline N (%)**	**Elective N (%)**	**Emergency N (%)**
Spinal	268(39.6)	261(19.5)	768 (35.6)	150(24.2)
General Anesthesia (GA)	240(35.5)	493(37)	968(44.8)	422(68.2)
Combined Spinal/Epidural Anesthesia (CSE)	139(20.6)	187(14)	350 (16.2)	36(5.8)
Sedation	1(0.1)	1(0.1)	2(0.1)	0(0)
Spinal/GA	24(3.6)	16(1.2)	54(2.5)	7(1.1)
CSE/GA	1(0.1)	2(0.15)	3(0.1)	1(0.2)
L.A	3(0.4)	3(0.2)	12(0.6)	2(0.3)
Paracervical Block	-	-	2(0.1)	1(0.2)
Total	676(24.3)	1336(48.1)	2159(77.7)	619(22.3)
	X^2 -47.786	P-value-<0.001	X^2-114.288	P-value-<0.001

Table 7: Frequency distribution of anesthesia performance for the different ASA status and Endoscopic surgeries

	ASA Status			Endoscopic Surgery	
Type of Anesthesia	**Asa 1 N (%)**	**Asa 2 N (%)**	**Asa 3 N (%)**	**Hysteroscopic N (%)**	**Lap and Dye N (%)**
Spinal	798(28. 7%)	115(20.7)	5 (14.2)	36(42.9)	6(6.1)
General Anesthesia (GA)	959(43.8)	401(72.4)	30 (85.7)	43(51.2)	89(90.8)
Combined Spinal/Epidural Anesthesia (CSE)	356(16.3)	30(5.4)	0	3(3.6)	3(3.1)
Sedation	2(0.1)	0	0	0	0
Spinal/GA	56(2.6)	5(0.9)	0	2(2.4)	0
CSE/GA	3(0.1)	1(0.2)	0	0	0
L.A	12(0.5)	2(0.4)	0	0	0
Paracervical Block	3(0.1)	0	0	0	0
TOTAL	2189(78.8)	554(19.9)	35(1.3)	84(3.0)	98(3.5)
	X^2 -148.355	P-value-<0.001		X^2-67.698	P-value-<0.001

Discussion

Our study shows that though GA was most used, 50%, the use of RA was also equally high 47%. Contributory factors include the high use of GA by nurse anesthesiologist (60.6%), Registrars (76.9%), the high use of GA for the pediatric age group (76.9%), abdominal procedures (77.2%), emergency surgeries (68.1%), Laparoscopy and dye (90.8%) procedures, exploratory laparotomies 77.2%, as well as surgeries on the fallopian tube, ovary and vulva, 70.6%, 66.4% and 63.7% respectively. This is matched by a high use of RA for

procedures such as abdominal myomectomy 64%, TAH 65.3%, Cervical cerclage 57.8%, blind adhesiolysis 55% and vaginal hysterectomy 63.9%, the high use of RA by physician anaesthetists 79.8%, SR 53.7% and the high use of RA for pfannestiel incisions 60.2% and Elective procedures 51.8%. This good mix of anesthetic technique suggests the presence of good, competent and skilled trainers and trainees and the availability and good supply of appropriate drugs and equipment for both procedures. Others include the availability of life-saving drugs, facility for safe blood transfusion services and setup to manage the expected emergencies, good operating theatre infrastructure, reliable electricity supply and the availability of compressed oxygen.[6] This is unlike the study by Hodges et al.,[8] where only 23% of anesthesiologists had the minimum requirements for the safe provision of anaesthesia to an adult.

Regional anaesthesia was mostly performed by physician anesthesiologists 79.8%.This is similar to the finding by Adekola et al.,[9] in their review that showed that 63.70% of the RA in their study was established by physician anesthesiologists with more than five years' experience. Our institution has both Physician and Nurse Anesthesiologists providing anaesthesia services. The performance of RA requires a balance of theoretical knowledge, practical skills and experience. While the two cadres of anesthesiologists can carry out spinal anaesthesia, this cannot be said of epidural anaesthesia that requires more technical know-how and greater knowledge base than what is covered by the syllabus and 18 months training of Nurse Anesthesiologist.[10] In addition epidural anesthesia is only performed by residents (Physician) with two to two and a half years of training following proficiency in spinal anesthesia as epidural anaesthesia is presumed to be technically more difficult.[9]

Senior Registrars (SR) performed the greater majority of the RA, 53.7%. Senior Registrars by virtue of their duration (at least 3years) in the training program, exposure, experience, skill and knowledge are expected to be; competent and proficient in the performance of RA techniques, be good at deciding the option of anaesthesia that is most suitable for a patient and also teach the junior upcoming ones. In addition competence in the performance of RA is a prerequisite for anaesthesia specialist certification.[11,12] This is because where patient autonomy is valued, the anesthesiologist should be able to offer an informed choice of a RA as an alternative to GA for the relevant surgical procedure. The expertise of the anesthesiologist also plays a major role in determining the choice of regional or GA for procedures that are amenable to both methods of anesthesia.[5] The review by Adekola et al.,[9] also showed that 63.70% of the central neuraxial anesthesia in their study was established by an anesthetist with more than five years' experience, which can be likened to the SR cadre.

Regional anesthesia was more frequently employed in the elderly, middle age and young adult age groups, 55.1%, 53.6% and 45.9% respectively. The type of anesthesia (general versus regional anesthesia) has no substantial effect on perioperative morbidity and mortality in any age group.[13] Perioperative outcome will however be influenced by a multitude of factors, such as the type, duration and invasiveness of the operation, the presence of co-existing medical diseases, and the skill and expertise of the anesthesiologist and surgeon.

This study shows that surgeries on the myometrium (66.7%), cervix (42.9%), vaginal (41.3%) and vulva (40.0) attracted a high use of spinal while combined spinal epidural anesthesia was also used for a large proportion (20.3%) of endometrial surgeries. This is hardly surprising as surgeries for pathologies in these sites are amenable to both RA and GA. Since there is no anesthesia of choice it intuitively makes sense for the anesthesiologist to want to opt for RA as a decline in the use of GA for gynecological surgeries holds special benefits for the patients which include a reduction in the incidence of PONV as well as Deep Vein thrombosis (DVT) and consequent Pulmonary embolism.[3,14]

Spinal Anesthesia attracted a significantly

higher use for Pfannestiel incisions (39.6%) compared to other methods of anesthesia with a total RA use of 60.2%. Use of the Pfannestiel incision is the most common method for performing Caesarian sections today because of the benefits it confers.[15] Spinal anesthesia has been advocated as the preferred technique of anesthesia for caesarean delivery.[16] This fact could be responsible for the higher spinal use for Pfannestiel incisions as seen in our study as the anesthesia practitioners are already familiar with its use for caesarean section.

Data from this study indicates that elective procedures attracted a significantly higher use of RA 51.8%, (spinal 35.6%, CSE 16.2%). Elective surgery accounts for the vast majority of research efforts and is considered a safe intervention.[17] Elective surgeries are carried out often on essentially haemodynamically stable patients and a wide range of gynecological surgical procedures such as myomectomy, hysterectomy, cervical cerclage, laparoscopy and dye tests e.t.c are done as electives in the absence of complications requiring urgent intervention. Elective surgeries allow for adequate optimization and preparation of patients before surgery as there is often sufficient time for this. Safe and efficient surgical and anaesthesia practice requires an optimized and well prepared patient following pre-anesthetic evaluation. Inadequate preoperative preparation of the patient is a major contributory factor to the primary causes of perioperative mortality.[18] Adequate preoperative evaluation and preparation results in a reduction in anxiety states and anxiety of being awake during surgery is one of the most common reasons for choosing GA.[19] The provision of sufficient information about anesthesia at preoperative review makes patients to feel very reassured thus reducing their anxiety state.[20] A well informed patient is more likely to give consent for RA. This may be responsible for the higher use of RA for elective surgeries as seen in this study.

Nurse anesthesiologists performed more of GA (60.6%) even though many of the procedures such as surgeries requiring pfannestiel incisions, surgeries on the vulva, vaginal, cervix and hysteroscopic surgeries are clearly amenable to RA. This is contrary to the study by Fenteet al.,[21] where RA was utilized more, 49.9% as against GA 48.1%. However in their study, Caesarian Section accounted for 40.32% of the cases anesthetized. This study did not include caesarean section. If the percentage of anesthesia done for Caesarean section is deducted from the total RA anesthesia rate, this leaves a RA rate of 9.58%. In the developed world, the Nurse anesthesiologist play an essential role in providing anesthesia service; however, this requires a proper curriculum-based training and skill development modules. In the United States of America, Certified Registered Nurse Anesthesiologist (CRNAs) administer every type of anesthetic, work in every type of practice setting and provide care for every type of operation or procedure.[7] This is because CRNAs have acquired a minimum of; a Master's degree focusing on anaesthesia or have received 23 years post-nursing training, have completed extensive clinical training, and have passed a certification exam approved by the National Board of Certification and Re-certification of Nurse Anesthetists (NBCRNA). In developing countries as in the developed nations, such delegation of physician`s work has an important role, but there is lack of proper education and structured training program for these cadre of anesthesiologists. In Nigeria, the CRNA holds a diploma certificate after 18 months of post basic nursing training in anesthesia. In addition, the training is designed for the provision of GA for uncomplicated and minor surgical procedures. As a result, their practice is expected to be limited to rural areas.[22] These and the seeming poor proficiency in RA especially epidural anesthesia may have been responsible for the choice of GA for most of the procedures done by Nurse Anesthesiologists.

This study shows that GA was used more (76.9%) in children. This is similar to the finding by McGreal and Wood,[23] where 95% of the pediatric patients that presented to their facility over a fifteen year period received a general anesthetic. Despite this high use of GA, Pediatric Regional Anesthesia (PRA) is an essential part of modern

pediatric anesthesia practice for the benefit it confers to both the patient and the hospital.[24] These include the provision of excellent, superior and long-lasting analgesia without risk of respiratory depression, attenuation of the peri-operative stress response, early tracheal extubation after major abdominal or thoracic surgery, decrease in the number of days spent in the intensive care unit and rapid recovery of gastro-intestinal function.[14] With adequate training and the provision of modern equipment, all RA techniques can be safely performed in the pediatric population. Overall the use of PRA has been found to be safe in a large series of patients.[24] Lack of training and proficiency and absence of appropriate equipment are major hindrances to the use of PRA in our center. The alternative being the use of GA as seen in this study.

Our study indicates that GA was used more 68.2% (422/619) for emergency surgeries that constituted about a fifth 22.3% of the total gynecological surgical workload. The objective of emergency anaesthesia is to allow for the correction of the surgical pathology with minimum risk to the patient within the time allowed. The choice of type anaesthesia for emergency procedures is guided by the nature and site of the surgical technique, the preferences of the anesthesiologist, presence or otherwise of patient co-morbidities, patients' choice and urgency of the surgery.[15] General anaesthesia as well as RA can be used for emergency surgeries. However, due to the urgency of emergency procedures, GA is more often employed than RA. The apparent simplicity of the induction of GA as compared to RA has been suggested as a factor in the popularity of GA for emergency procedures. It is the belief that both anaesthesia preparation, anesthesia induction and anaesthesia readiness times are shorter during GA compared to RA. In a pilot simulation study, insertion of spinal anesthesia was found to be as quick as GA, nevertheless, the time to achieve surgical anesthesia was longer compared to GA.[25] Other reasons why the anesthesiologist may opt for the use of GA include the fact that; (1) most surgical emergencies are performed as After-hours surgery and anesthesia and at odd times or at night. These are periods when available manpower could be low with junior and or inexperienced staff on duty. Despite the fact that there is provision for the recruitment of assistance from senior colleagues, this is often not the case with the result that there is a pile up and backlog of emergency surgical cases requiring attention. Cases are thus triaged based on urgency. This puts the anesthesiologist under considerable pressure resulting in the option for the technique with the fastest mode of induction. (2) Where the pathology is associated with significant blood loss and consequent hemodynamic instability as in ruptured ectopic pregnancy or retention of placenta products of conception, anesthesia would normally be by the technique with the fastest mode of induction in order to hasten surgical intervention time. (3) There is also the challenge of using local regional anesthesia in an emergency population. This requires the availability of skilled anesthesiologist out of hours and the duration of anesthetic induction in a time-pressured procedure. (4) In the emergency setting where it is anticipated that the regional technique may be converted to GA, the surgical team (including the patient) may opt for a GA as default.[26] Finally, despite the benefits of improved surgical outcomes from RA, it is not fully favored by all surgeons for its perceived delay in operating rooms and unpredictable success rate.[27] Surgeon's choice of anesthesia method has been found to have a great impact on patient's choice. Where the surgeon is unfavorable disposed to a particular mode of anesthesia, the patient is not likely to accent to that method of anaesthesia with the result that the patient will not accept when offered by the anesthesiologist. In RA, patient's refusal is an absolute contraindication as one should never coerce patients to accept a procedure.[26]

The two main endoscopic procedures attracted a significantly higher use of GA; laparoscopy and dye 90.8% and hysteroscopy 51.2% compared to other methods of anesthesia. Endoscopic procedures have been traditionally performed under GA due to concerns about pneumo-peritoneum-related respiratory changes associated

with it. Recently the use of RA and peripheral nerve blocks have been introduced for these procedures. Evidence suggests the safety of the use of spinal, continuous epidural, general anesthesia combined with continuous epidural anesthesia, combined spinal-epidural anesthesia with minimal side effects which can easily be managed with the available pharmacological drugs.[28] However with the obvious decrease of operation time, balanced anesthesia with endotracheal intubation has become more and more popular. Other limitations to the use of RA in endoscopic surgery include the limited work space, high failure rate of RA, higher intra operative morbidity and significant arterial blood gas alterations associated with RA. The high use of GA in our center as seen in this study may be due to one or a combination of the above factors. With regards to the side effects of GA such as the pressor response to endotracheal intubation, increased release of stress hormones, sore throat, post-operative pain, PONV, these can be managed with appropriate pharmacological drugs.[29]

All the ASA physical status classification attracted a higher use of GA: Overall ASA I patients attracted the highest use for RA 45% (spinal 28.7% and combined spinal epidural 16.3%). The ASA classification of physical status (PS) is accepted as a standard for assessing preoperative fitness and is a reliable, valid and independent metric for determining risk of postoperative complications and mortality. The score strongly correlates with postoperative comorbidities and complications for patients undergoing both elective and emergency procedures. The higher the ASA score, the greater the percentage of postoperative complications and medical interventions and for all types of RA increasing ASA status shifts the balance in favor of avoiding GA when possible.[11,30] The choice of anesthesia is guided among other considerations by the nature of the surgical technique, the site of surgery, the availability of drugs and equipment for the performance of RA and the preference of the anesthesiologist as determined by the skill of the anesthesiologist for the performance of RA. A careful search of the literature shows that the influence of ASA on the choice of anesthesia has not been studied. For procedures that are amenable to both modes of anesthesia, RA is advocated because of its superior benefits over GA.[4,5,11] Considering the fact that; the residents in our center are well skilled in the performance of RA and the availability of drugs and equipment for the performance of RA, this deference for the higher use of GA especially for ASA I and II patients is hard to explain and therefore needs further evaluation in a prospective study.

Conclusion

Most of the factors reviewed in this study were found to influence anesthesia preference such that the practice in our center is in line with best global practice. With regards to the use of mainly GA for pediatric patients, this was attributed to lack of the requisite training, proficiency and absence of appropriate equipment. It is hoped that this will be addressed forthwith. The low use of RA for most ASA I and II patients also needs to be investigated using appropriate prospective study.

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