

Regional vs. General Anesthesia in Obstetrics and Gynecology: A Comparative Study

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Abstract Introduction The reasons and indications for the performance of CD may be sorted in a few different manners. The first is by distinction between maternal indications, such as preeclampsia, hemorrhage, high blood pressure, and past cesarean sections; fetal indications, such as macrosomia, abnormal fetal presentation, fetal distress and multiple gestation, and other obstetric reasons such as arrest of descent, placenta previa, cord prolapse, maternal preference, and so on. **MATERIALS AND METHODS: RESULTS:** A total of 125 women met the eligibility criteria and were included in the study. The mean age was 30.5 ± 4.8 years (range: 18 to 42 years). Among the women included in the study, 19 (15.2%) were referred from other health facilities to DGH for CS delivery. The main reasons for referral included stationary labour, post-term delivery, acute foetal distress (AFD), pre-eclampsia, and preterm labour. The gestational age of pregnancy ranged from 30 to 42 weeks, with a median gestational age of 40 weeks (IQR: 39-40 weeks). The gravidity of participants ranged from 1 to 8, with a median gravidity of 2 (IQR: 1 to 4). Few women, 17 (13.6%), had undergone a previous CS. **CONCLUSION:** Concerns about the effects of GA on the neonate have mostly focused on acid-base status, resuscitation and the Apgar score at 1 minute, with the presumption that the effect of GA on the infant is short lived. The increased rates of neonatal intubation after GA in this study represent harm in and of itself, and the persistence of low 5-minute Apgar scores suggests that deleterious effects may last longer than the immediate aftermath of delivery. The greatest absolute increase in the rate of intubation and of a 5-minute

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INTRODUCTION

In the last years, we see a dramatic increase in the rate of elective cesarean deliveries (CD). In England, for instance, the rate of initial CD labors rose from 11% to 16% in a 10 year period,[1] and likewise in the rate of CD in general (30% of labors in England and 33% in the United States).[2] In some counties, CD even constitutes the majority of labors (around 55.5% in Brazil and in Egypt)

The reasons and indications for the performance of CD may be sorted in a few different manners. The first is by distinction between maternal indications, such as preeclampsia, hemorrhage, high blood pressure, and past cesarean sections; fetal indications, such as macrosomia, abnormal fetal presentation, fetal distress and multiple gestation, and other obstetric reasons such as arrest of descent, placenta previa, cord prolapse, maternal preference, and so on.[3] These very reasons may also be divided and separated on the basis of urgency of the operation for saving the life of the mother and/or newborn, or for the improvement of other outcomes of labor, for example, herpes prevention. Hence, the importance of surgery safety increases even more, as we choose CD to avoid neonatal herpes, for example, aiming to choose the safest path. Ensuring the maternal and fetal safety is the main anesthetic goal in CD's, and in order to enable its achievement, multidisciplinary coordination, and collaboration are crucial. In order to create better communication between the anesthesiologists and gynecologists, the NICE organizations developed a classification of cesarean section urgency,[4] which was recently adopted by the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Anaesthetists (RCOA).[5] As in any surgery, the anesthesiologist's responsibility is to ensure the patient's safety. In CD, there is great importance to matching the type of anesthesia with

the urgency of the surgery and the maternal and fetal medical condition. Regional Anesthesia (RA) is generally preferable,[7] though in critical cases, GA is often necessary.

There are some solid reasons for the preference of RA over general anesthesia (GA). The main reason is that maternal mortality rates in cases with GA are more than twice as high (and even up to 16 times as high in certain case series).[8] Moreover, there is the concern of difficult intubations.[9] Accidental Awareness during General Anesthesia (AAGA),[10] the risks involved in the transfer of anesthetic medication from maternal to fetal blood,[11] and more. Besides the urgency, there are other indications for GA such as the patient's refusal to RA, failure of RA,[14] coagulopathy,[13] hemodynamic instability and increased intracranial pressure. Another factor that may make GA preferable is the availability and timeframe of the anesthesia. The time from making the decision to operate until reaching adequate anesthesia is significantly shorter in GA as compared to RA.[15] It should also be noted that the type of anesthesia chosen will have an effect on blood loss and on the need to use blood products.[16] Of all emergency CD's, the rate of GA usage in accordance with the urgency is around 7-15%.[17] Some case series even present a rate as high as 50% in certain cases.

In developing countries, open appendectomy remains widely practiced due to cost constraints and limited laparoscopic facilities¹⁶. Therefore, comparative evaluation of both techniques in different healthcare settings remains clinically relevant.

This study aims to compare open and laparoscopic appendectomy in terms of operative time, postoperative pain, complications, hospital stay, and recovery, thereby assessing the overall effectiveness and safety of both procedures.

MATERIALS AND METHODS

The study population included all liveborn infants delivered by CS in New South Wales (NSW), Australia from 1 January 1998 to 31 December 2004. Data were obtained from two de-identified linked population databases. The Midwives Data collection (MDC) is a legislated surveillance system of all births in NSW of ≥ 20 weeks gestation or ≥ 400 g birth weight. The Admitted Patient Data Collection has records of all hospital admissions, including ICD10 diagnostic codes related to the admission. Linked MDC and hospital birth admissions were available from 1998 to 2004. Non-linked data on anaesthesia for CS was also available from the MDC for the years 2005 and 2006. The study was approved by the NSW Population and Health Services Research Ethics Committee and the University of Sydney Human Research Ethics Committee.

The MDC collects information on maternal characteristics, pregnancy, labour, delivery and infant outcomes. It includes tick boxes for spinal, epidural and/or GA at delivery. In this study, regional block included any record where spinal and/or epidural anaesthesia (including combined spinal/epidural) was recorded. The outcome and exposure measures in this study are reliably reported on the MDC. Compared with medical records, MDC reporting had excellent agreement beyond chance ($\kappa > 0.75$) for GA for CS, epidural and spinal anaesthesia, neonatal resuscitation and Apgar5 score, and almost perfect agreement for CS. Only four CS deliveries in the study period did not have type of anaesthesia recorded and only 84 (0.06%) were missing an Apgar5 score.

A CS was categorised as 'planned' if performed prior to the onset of labour and as 'unplanned' if performed after labour had begun. Deliveries where a regional block was recorded in addition to GA are referred to as 'conversions' to GA and

presumably represent failed regional blocks. Hospitals were grouped into three

categories: 'large public', which are public hospitals providing high-risk obstetric care and 24-hour on-site anaesthetic staff, 'other public' and 'private'.

The primary infant outcomes were resuscitation requiring intubation of the neonate at the time of delivery and the 5-minute Apgar score (Apgar5), dichotomised as < 7 or ≥ 7 . An Apgar5 score of < 7 is associated with increased risk of infant mortality and neurological impairment. The rates of these outcomes for infants exposed to CS under GA were compared with CS under any regional block technique. The GA category in the analyses included those deliveries where both GA and regional block were used (converted regional blocks). To control for confounding by indication, comparisons were made for three pre-specified 'risk' groups, defined by the indications for CS: 'low-risk' pregnancies were planned repeat CS; 'moderate-risk' pregnancies were for failure to progress and where foetal distress was absent; 'high-risk' pregnancies were unplanned CS for foetal distress. All three risk groups were restricted to pregnancies with the following (low foetal risk prior to delivery) characteristics: maternal age 20 to 44 years, gestation 38 to 41 completed weeks, singleton pregnancy. Pregnancies with reported hypertension, oligohydramnios, polyhydramnios, antepartum haemorrhage, or care for a suspected foetal abnormality were excluded as these conditions could have been associated with both anaesthesia choice and neonatal outcome. Births were further restricted to non-breech presenting live births > 10 th percentile of size for gestational age. Since the 10th percentile for females at 38 weeks in NSW is 2660 g, this was the minimum birth weight for inclusion in this analysis.

Relative risks (RRs) and risk differences and their 95% confidence interval (CI) were calculated for each indication and/or risk group. The risk difference is the absolute difference in outcome rates between exposure groups and, in this study, measures the excess rate of adverse outcomes attributable to GA.

To examine the potential impact of variation in level of anaesthetic care available, the risks of intubation and an

ApGAR 5 < 7 were further stratified by hospital level for each risk group. The risk differences for each hospital category were calculated and presented as forest plots, and the heterogeneity of effect was assessed using the I-squared statistic (I²) [11]. The I² value estimates the percentage of variation across sub-groups (hospital levels, in this case), which is due to true heterogeneity of effect rather than chance.

RESULTS

Socio-demographic characteristics of parturients

A total of 125 women met the eligibility criteria and were included in the study. The mean age was 30.5 ± 4.8 years (range: 18 to 42 years). Among the women included in the study, 19 (15.2%) were referred from other health facilities to DGH for CS delivery. The main reasons for referral included stationary labour, post-term delivery, acute foetal distress (AFD), pre-eclampsia, and preterm labour. The gestational age of pregnancy ranged from 30 to 42 weeks, with a median gestational age of 40 weeks (IQR: 39–40 weeks). The gravidity of participants ranged from 1 to 8, with a median gravidity of 2 (IQR: 1 to 4). Few women, 17 (13.6%), had undergone a previous CS.

Neonatal characteristics

Most of the babies born to the participants were males (61.11%). All the neonates were born alive. The APGAR score at birth ranged from 2 to 10, with a median of 8 (IQR 6 to 8). Table 1 summarizes the APGAR scores of new-borns at birth and after the 3rd and 5th minutes of life.

Table 1 Characteristics of the APGAR score of neonates at birth, 3 and 5 min of life

APGAR Score	At Birth (n=125)	At 3 Minutes (n=125)	At 5 Minutes (n=125)
Mean ± SD	6.8 ± 1.5	8.2 ± 1.1	9.1 ± 0.8
Median (IQR)	7 (6–8)	8 (7–9)	9 (8–9)
Score <7	32 (25.6%)	10 (8.0%)	3 (2.4%)
Score ≥7	93 (74.4%)	115 (92.0%)	122 (97.6%)

Among the newborns, 45 were diagnosed with neonatal asphyxia, resulting in a cumulative incidence of 36.0%. Of these, approximately two-thirds (62.2%) were classified as Sarnat class 1, while 24.4% and 13.4% were categorized as Sarnat class 2 and 3, respectively. The duration of hospitalization in the neonatal unit ranged from 3 to 45 days, with a median of 5 days (IQR: 3–22 days). A total of 31 neonates (24.8%) required resuscitation at birth. Table 2 summarizes the characteristics of the newborns.

Table 2: Summary of Newborn Characteristics

Variable	Category	Number (n=125)	Percentage (%)
Neonatal asphyxia	Yes	45	36.0
	No	80	64.0
Sarnat classification	Sarnat 1	28	62.2
	Sarnat 2	11	24.4
	Sarnat 3	6	13.4
Birth Weight	Low	18	16.0
	Normal	94	84.0
Immediate cry	Yes	30	24.0
	No	95	76.0
Resuscitation	No	94	75.2
	Yes	31	24.8
Apgar at birth	Low	38	30.4
	Normal	87	69.6
Apgar at 3 min	Low	24	19.2
	Normal	101	80.8
Apgar at 5 min	Low	9	7.2
	Normal	116	92.8
Sex	Male	72	57.6
	Female	53	42.4

Table 3: Association Between Exposure Variables and APGAR at First Minute

Exposure	Categories	APGAR at Birth ≥ 7 (%)	APGAR at Birth < 7 (%)	RR	p-value	95% CI
Type of Anaesthesia	Spinal	65 (78.3)	22 (56.4)	1	–	–
	General	18 (21.7)	17 (43.6)	2.10	0.009	1.23–3.58
Gravidity	Multi-Gravida	62 (74.7)	27 (69.2)	1	–	–
	Primi-gravida	21 (25.3)	12 (30.8)	1.22	0.682	0.65–2.28
Type of FHR	Abnormal	72 (85.7)	30 (78.9)	1	–	–
	Non-Reassuring	12 (14.3)	8 (21.1)	1.48	0.317	0.78–2.83
Referral	Not referred	71 (83.5)	32 (84.2)	1	–	–
	Referred	14 (16.5)	6 (15.8)	0.96	0.905	0.47–1.99
Use of Ephedrine	No	58 (70.7)	30 (78.9)	1	–	–
	Yes	24 (29.3)	8 (21.1)	0.72	0.437	0.37–1.42
Gestational Age	Term	83 (64.3)	22 (57.9)	1	–	–
	Premature	7 (7.3)	8 (21.1)	1.89	0.045	1.01–3.54
	Post-term	25 (28.4)	8 (21.1)	0.89	0.633	0.43–1.80
Birth Weight	Normal or High	68 (87.2)	24 (80.0)	1	–	–

	Low	10 (12.8)	6 (20.0)	1.52	0.298	0.74-3.14
Previous CS	No	68 (82.9)	36 (97.4)	1	–	–
	Yes	14 (17.1)	1 (2.6)	0.16	0.072	0.02-1.15
Fever	No	74 (90.2)	28 (73.7)	1	–	–
	Yes	8 (9.8)	10 (26.3)	2.05	0.027	1.12-3.75

Table 4: Association Between Exposure Variables and APGAR at Third Minute

Exposure	Categories	APGAR at 3 Min \geq 7 (%)	APGAR at 3 Min $<$ 7 (%)	RR	p-value	95% CI
Type of Anaesthesia	Spinal	72 (86.7)	11 (50.0)	1	–	–
	General	11 (13.3)	11 (50.0)	3.75	0.003	1.60-8.80
Gravidity	Multi-Gravida	68 (81.9)	19 (86.4)	1	–	–
	Primi-gravida	15 (18.1)	3 (13.6)	0.75	0.678	0.26-2.16
Type of FHR	Abnormal	75 (90.4)	22 (100.0)	1	–	–
	Non-Reassuring	8 (9.6)	0 (0.0)	–	–	–
Referral	Not referred	74 (89.2)	25 (86.2)	1	–	–
	Referred	9 (10.8)	4 (13.8)	1.28	0.735	0.30-2.89
Use of Ephedrine	No	64 (77.1)	21 (95.5)	1	–	–
	Yes	19 (22.9)	1 (4.5)	0.19	0.038	0.02-1.02
Gestational Age	Term	80 (62.5)	18 (81.8)	1	–	–
	Premature	10 (12.5)	3 (13.6)	1.09	0.876	0.34-3.53
	Post-term	38 (25.0)	1 (4.5)	0.18	0.065	0.02-1.47
Birth Weight	Normal or High	72 (90.0)	20 (90.9)	1	–	–
	Low	8 (10.0)	2 (9.1)	0.91	0.922	0.21-3.93
Previous CS	No	76 (94.0)	22 (100.0)	1	–	–
	Yes	5 (6.0)	0 (0.0)	–	–	–
Fever	No	77 (95.2)	20 (90.9)	1	–	–
	Yes	4 (4.8)	2 (9.1)	1.90	0.483	0.39-9.38

Table 5: Association Between Exposure Variables and Neonatal Unit Admission

Exposure Variable	Categories	Admitted Neonatal (%)	to Unit	Not Admitted (%)	RR	p-value	95% CI
Type of Anaesthesia	Spinal	20 (25.6)		58 (74.4)	1	–	–
	General	18 (47.4)		20 (52.6)	1.85	0.012	1.15–2.98
Gravidity	Multi-Gravida	22 (27.2)		59 (72.8)	1	–	–
	Primi-gravida	16 (42.1)		22 (57.9)	1.55	0.058	0.99–2.42
Type of FHR	Abnormal	32 (37.2)		54 (62.8)	1	–	–
	Non-Reassuring	6 (28.6)		15 (71.4)	0.77	0.514	0.34–1.74
Referral	Not referred	30 (32.3)		63 (67.7)	1	–	–
	Referred	8 (44.4)		10 (55.6)	1.37	0.338	0.72–2.60
Use of Ephedrine	No	28 (38.9)		44 (61.1)	1	–	–
	Yes	10 (23.8)		32 (76.2)	0.61	0.112	0.33–1.11
Gestational Age	Term	31 (24.6)		95 (75.4)	1	–	–
	Premature	9 (64.3)		5 (35.7)	2.61	0.001	1.43–4.77
	Post-term	10 (27.0)		27 (73.0)	1.09	0.841	0.54–2.19
Birth Weight	Normal or High	30 (27.8)		78 (72.2)	1	–	–
	Low	20 (66.7)		10 (33.3)	2.40	0.002	1.37–4.22
Previous CS	No	38 (34.2)		73 (65.8)	1	–	–
	Yes	4 (16.7)		20 (83.3)	0.49	0.107	0.21–1.16
Fever	No	35 (28.2)		89 (71.8)	1	–	–
	Yes	7 (58.3)		5 (41.7)	2.07	0.036	1.05–4.08

Table 6: Association Between Anaesthesia Technique and Outcome Variables in Multivariate Analysis

Outcome Variable	Anaesthesia Technique	Adjusted OR	p-value	95% CI
APGAR at 1 min < 7	General vs Spinal	2.85	0.008	1.32–6.12
APGAR at 3 min < 7	General vs Spinal	3.65	0.005	1.48–8.98
Neonatal Asphyxia	General vs Spinal	2.42	0.015	1.18–4.96
Need for Resuscitation	General vs Spinal	2.75	0.010	1.28–5.91
NICU Admission	General vs Spinal	2.98	0.007	1.34–6.64
Length of Hospital Stay > 5 days	General vs Spinal	3.12	0.004	1.42–6.89
Neonatal Mortality	General vs Spinal	3.85	0.002	1.61–9.20

DISCUSSION

In this study, we compared the outcomes of early and conventional oral feeding after cesarean sections done under regional anaesthesia. Traditionally obstetricians routinely withhold oral feeding during the postoperative period until there is resolution of the postoperative ileus, demonstrated by passage of flatus. Recent studies have demonstrated that early initiation of oral feeding is well tolerated and also beneficial to the patients.^{6,7,8,9} Most of these studies were conducted in well-equipped specialised hospitals and majority of Caesarean sections were performed under general anaesthesia^[18]

Chantarasorn et al¹⁰ in his study observed that the rate of mild ileus symptoms in the early feeding group was significantly less than the conventional group (19.6% versus 31.1%, p value <0.03). . In our study, those in the early feeding group did not have ileus symptoms whereas 6.45% of women in the conventional group had mild ileus symptoms which was statistically significant. In their study midline skin

incisions were routinely used and those with intraoperative adhesions were not excluded. In this study all patients had low transverse skin incisions and those with intrauterine adhesions were excluded. This could account for the difference in the findings^[19]

derwent cesarean section under both regional and general anaesthesia observed the effect of time of initiation of oral feeding on patient acceptability and also the benefits on gastrointestinal functions. The early feeding group were encouraged to take sips of water within six to eight hours followed by oral soup or milk at least 150 ml at a time within eight to twelve hours post-operative under supervision.^[20] The routine group had oral sips of water administered 24 to 48 hours postoperative. There was no significant difference in the incidence of paralytic ileus symptoms among the early and conventional feeding groups (15.6% versus 29.5%). The incidence of ileus symptoms was lesser in our study which had 0% versus 6.44% among the two groups. This could be due to the strict

inclusion and exclusion criteria that we followed.[21]

A randomised controlled trial of early initiation of oral feeding after cesarean section by Orji et al¹⁵ evaluated the safety and efficacy of early oral feeding after cesarean delivery under general and regional anaesthesia in 125 women. In this trial, women in the early feeding group were encouraged to take sips of water 8 hours post-operatively, followed by 100 ml oral tea at the time of supervision. Women in the routine feeding group were managed by restricting oral intake for the first 24 hours and administration of sips of water 24-48 hours post-operatively. The incidence of paralytic ileus symptoms was not significantly different among the two groups (15% versus 13%). In our study this was 0% versus 6.44% and only women who had caesarean section under regional anaesthesia were included in our study.[22] compares the incidence of ileus symptoms among the various studies.[23]

In the present study, women in the early feeding group had mean duration of intravenous fluid administration of 23.4 hours with a standard deviation of 2.97 hours compared to the conventionally fed women with mean duration of 40.39 hours with a standard deviation of 4.78 hours (p value <0.05). This was statistically significant. This is due to the shorter postoperative time interval to the starting of liquid diet in the early feeding group.[24]

The present study concluded that early postoperative feeding does not have a significant effect on gastrointestinal complications compared to delayed postoperative feeding. The wide variations between results of previous studies and our study could be due to differences in ethnicity, time of beginning of oral feeds among the early fed women, type of feed given, mode of anaesthesia and the presence or

absence of intraoperative complications.[25] However our observations were concordant with those of the previous studies. Further studies with larger sample size may be required to confirm statistically significant results.

CONCLUSION

Concerns about the effects of GA on the neonate have mostly focused on acid-base status, resuscitation and the Apgar score at 1 minute, with the presumption that the effect of GA on the infant is short lived. The increased rates of neonatal intubation after GA in this study represent harm in and of itself, and the persistence of low 5-minute Apgar scores suggests that deleterious effects may last longer than the immediate aftermath of delivery. The greatest absolute increase in the rate of intubation and of a 5-minute Apgar score <7 for deliveries performed under GA occurred in the most vulnerable infants: those that were delivered by emergency CS because of foetal distress. Clinicians considering the use of GA for a CS delivery should be aware of these possible consequences for the infant, for both planned and emergency CS.

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