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A retrospective study of the peri-operative outcomes of obstetric patients with cardiac disease, presenting for a caesarean section, under regional anaesthesia at a quaternary hospital.

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Abstract

Background

Cardiac disease in pregnancy remains a leading cause of maternal morbidity with increased risk of major adverse cardiac events. This retrospective study aims to analyse the anaesthetic management and the peri-operative outcomes in this patient population.

Methods

The database of pregnant cardiac patients, who delivered at Inkosi Albert Luthuli Central Hospital (IALCH) from 1st July 2018 until 31st December 2022 was retrieved. Records of patients who delivered via a caesarean section performed under regional anaesthesia were selected, and their charts were reviewed for the type of anaesthetic and any occurrence of major adverse cardiac events.

Results

305 patients were included in the study period. 247 patients were operated under regional anaesthesia, and 58 were operated under general anaesthesia. Maternal cardiac events occurred in 4.3%. The most frequent neuraxial technique was spinal anaesthesia in 58.7%, followed by combined spinal anaesthesia (CSE) at 29.6%. A high modified WHO risk score was associated with increased rates of major adverse cardiac events (MACE).

Conclusion

The study suggests that regional anaesthesia may be used in high-risk cardiac obstetric patients without an unexpected high incidence of MACE, supporting its cautious use in appropriately selected patients within specialised centres.

Recommendations

Regional anaesthesia should be considered as the first-line anaesthetic technique in appropriately selected pregnant cardiac patients for caesarean section.

Keywords: *Pregnancy, Cardiac disease, Regional anaesthesia, Caesarean section, Maternal outcomes, Risk stratification, Major adverse cardiac events.*
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Introduction

Regional anaesthesia has historically not been the anaesthesia of choice in pregnant patients with cardiac disease presenting for a caesarean section, owing to the cardiovascular changes associated with pregnancy and the haemodynamic effects of the sympathectomy associated with regional anaesthesia, specifically spinal anaesthesia. Subsequently, there are only a few case reports on the use of regional anaesthesia in the management of these patients presenting to theatre for a caesarean section, with

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no studies focusing on the outcomes of the use of regional anaesthesia. Arguments against the use of regional anaesthesia, particularly spinal anaesthesia, are based on the rapid fall in systemic vascular resistance (SVR) following the sympathectomy, leading to a decrease in cardiac output (C.O) and the risk of right-to-left shunting in patients with intracardiac lesions. However, the reduction in systemic vascular resistance (SVR) can be counteracted by administering lower doses of local anaesthetic, the use of an epidural or a combined spinal and epidural (CSE) graded technique, co-hydration with crystalloids, or the administration of a vasopressor infusion such as phenylephrine.[1-3]

Inkosi Albert Luthuli Central Hospital (IALCH), a quaternary hospital, is a referral centre in the province of KwaZulu-Natal for high-risk pregnant patients, including those with severe cardiac disease. The patient population includes patients with corrected and uncorrected congenital heart disease, valvular heart disease, and other acquired heart diseases such as cardiomyopathies and pulmonary hypertension. The administration of regional anaesthesia in this patient population is a common practice at this institution with favourable outcomes. Historically, this was developed due to a lack of critical care resources and ventilators for postoperative care. There is currently a paucity of data looking specifically at the maternal outcomes in this patient population presenting to theatre for a caesarean section under regional anaesthesia. This retrospective study aims to analyse the maternal outcomes of pregnant patients with cardiac disease presenting for a caesarean section under regional anaesthesia. Neuraxial anaesthesia is the more favoured anaesthetic of choice amongst the consultants in my institution and subsequently the main anaesthetic administered in this group of patients, with general anaesthesia administered in those cases where regional anaesthesia is unsuitable or contraindicated.

Methods

Study design and setting

A retrospective observational study was conducted, including all obstetric cardiac patients seen at Inkosi Albert Luthuli Central Hospital, over five years from 1st July 2018 until 31 December 2022, who presented to theatre for a caesarean section performed under regional anaesthesia. Inkosi Albert Luthuli is a 846-bed quaternary hospital located in Durban, KwaZulu-Natal(KZN). It is a public-private partnership. It provides advanced specialist services in the province. It is a referral centre for the entire province of KwaZulu-Natal for high-risk pregnant patients, including those with mild to severe cardiac disease. It provides specialised services including obstetric anaesthesiologists, specialist obstetricians, cardiologists, intensivists, and specialised nursing teams. Patient information was obtained from the IALCH perioperative obstetric database after obtaining permission from both the hospital and KwaZulu-Natal Department of Health (KZN DOH). A chart review of the intra-operative period was conducted, and patient electronic health records were reviewed up to seven days post-op to monitor for any Major Adverse Cardiac Events.

Study population and sample size

The study population was obstetric cardiac patients seen at IALCH, who presented to the theatre for a caesarean section performed under regional anaesthesia in the period from 1 July 2018 until 31 December 2022. The inclusion criteria included obstetric patients of all age groups, diagnosed with any type of cardiac pathology, who presented to the theatre for a Caesarean section performed under regional Anaesthesia in the main obstetric theatre. Exclusion criteria included non- cardiac pregnant patients presenting for a caesarean section & regional anaesthesia utilised for other obstetric reasons other than a caesarean section.

An initial search was conducted using a theatre register, which documents all cases operated in the obstetric theatre. A record of all caesarean sections performed under regional anaesthesia was taken from the period 1 July 2018 until 31 December 2022. A further search was then conducted on the hospital's digital filing system to confirm if any patients had a cardiac pathology and to access the anaesthetic charts, which are scanned and uploaded onto the hospital's digital system under the patient's file number.

An initial sample size of 150 patients with caesarean section performed under regional anaesthesia was calculated to estimate the outcome of these patients to within ±8% with a probability of 95% and using a non-informative baseline of 50%. A sample of this size can detect an effect size of (0.3) between mWHO severity and outcome with 80% power and 95% probability. The sample size was calculated using G*Power. Due to the high numbers seen in our institution, the study had a total of 305 patients.

Bias

To minimize bias, a strict selection criterion was followed for patient selection. Only pregnant cardiac patients, presenting for caesarean section within the specified study period, were considered for the study. Information bias was addressed by using a standardized data collection tool to ensure consistent data collection across all participants.

Data collection and statistical methods

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Data collected was entered into an Excel spreadsheet. Descriptive statistics were used to summarise the data. Frequencies and percentages were used to summarise categorical data such as gender. The frequency distribution of numeric data, such as age, was examined for normality, and means or medians were used appropriately. To account for possible associations, comparisons of variables by outcome were made using Chi-square statistical tests for categorical data and t-test/Wilcoxon rank-sum test for numeric data. All analyses were performed using SPSS.

Ethics

The Biomedical Research Ethics Committee (BREC/00005199/2023) permission was obtained on 28/07/2023. Thereafter, permission was obtained from the KZN Department of Health (NHRD: KZ_202308_027) and Inkosi Albert Luthuli Central Hospital in the same year.

Results

Table 1: Patient characteristics & Indication for caesarean section

PATIENT CHARACTERISTICS BY TOTAL COMPLICATIONS FREQUENCIES AND COLUMN PERCENTAGES WITH FISHER EXACT TEST P- VALUES.

Characteristic	Group	No N (%)	Yes N (%)	Total N (%)	p-value
Age Group (years)	Teen	23(96)	1(4)	24(100)	1.000
	20-30	164 (95.3%)	8 (4.7%)	172 (100%)	
	30-40	98 (96.1%)	4 (3.9%)	102 (100%)	
	>40	7 (100%)	0 (0%)	7 (100%)	
	Mean (Std)-Range	28,43(6,04)- 28	27,31(5,47) R-19	28,39(6,01)- 28	
BMI Group	Underweight	4 (100%)	0 (0%)	4 (100%)	0.513
	Healthy Weight	62 (92.5%)	5 (7.5%)	67 (100%)	
	Overweight	99 (97.1%)	3 (2.9%)	102 (100%)	
	Obesity	127 (96.2%)	5 (3.8%)	132 (100%)	
Ga Group (weeks)	<37	101 (91.8%)	9 (8.2%)	110 (100%)	0.043
	37-40	188 (97.9%)	4 (2.1%)	192 (100%)	
	>40	3 (100%)	0 (0%)	3 (100%)	
	Mean (Std)-Range	36,47(2,42)-13	33,85(3,29) - 9	36,35(2,51) -13	
ASA Grading	2	106 (100%)	0 (0%)	106 (100%)	<0.001
	3	165 (97.1%)	5 (2.9%)	170 (100%)	
	4	21 (72.4%)	8 (27.6%)	29 (100%)	
Indication for caesarean section	Elective	132(98%)	3(2%)	135(100%)	0,097
	Emergency	160(94%)	10(6%)	170(100%)	
	1	105 (96.3%)	4 (3.7%)	109 (100%)	
	2	101 (99.0%)	1 (1.0%)	102 (100%)	
	3	43 (93.5%)	3 (6.5%)	46 (100%)	
	4	17 (85.0%)	3 (15.0%)	20 (100%)	
	5	6 (75.0%)	2 (25.0%)	8 (100%)	
	6	1 (100%)	0 (0%)	1 (100%)	

BMI, *Body mass index*, GA, *Gestational age,* ASA, *American Society of Anesthesiologists (ASA) Physical Status Classification System.*

The study comprised 305 pregnant cardiac patients at Inkosi Albert Luthuli Central Hospital (IALCH) undergoing both elective & emergency caesarean sections (C-sections) from 1st July 2018 to 31st December 2022. Table 1 shows descriptive data of the 305 parturients. Age was categorised into four groups. The largest proportion of patients was in the 20 to 30-year category (56.4%). Complication percentages across age groups ranged from 0.0% to 4.7%. The test for association between age group and complication status was not statistically significant (p=1.000). The average age for the cohort was 28,39 (+-6,01). Body Mass Index (BMI) was classified into four standard categories. Most patients were in the Overweight (33.4%) and Obesity (43.3%) groups. Complication rates across BMI categories varied from 0.0% to 7.5%. No statistically significant association was found between

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BMI group and complication occurrence (p=0.513). Gestational age (Ga) was analysed in three groups. Most patients (63.0%) were in the 37 to 40-week (term) category. The complication rate was highest in the preterm (<37 weeks) group at 8.2%, compared to 2.1% in the term group. A statistically significant association was observed between the Ga group and complication status (p=0.043). The American Society of Anaesthesiologists' physical status Classification (ASA grading) was analysed across three grades. ASA 3 was the most common classification (55.7%). A strong gradient in complication rate was observed: 0.0% for ASA 2, 2.9% for ASA 3, and 27.6% for ASA 4. The association between ASA grade and complication status was highly statistically significant (p<0.001). There was no statistically significant association between the indication for Caesarean section (Elective vs. Emergency) and the occurrence of complications at the conventional alpha level of 0.05 (p = 0.097). While the data shows a numerical difference in complication rates, 2% for elective cases versus 6% for emergency cases, this observed difference is not statistically significant. The p-value (p=0.097), though not meeting the threshold for significance, suggests a trend that may warrant investigation in a larger sample to determine if the observed numerical difference reflects a true underlying association with greater statistical power.

Maternal outcomes

Maternal Outcomes were measured by the occurrence of any major adverse cardiac events peri-operatively and/or within seven days post-operatively. Major adverse cardiac events were defined as the occurrence of the following: myocardial infarction, fatal cardiac arrest, non-fatal cardiac arrest, pulmonary embolism, dysrhythmias, and pulmonary oedema. Maternal cardiovascular events occurred in 4,3% of cases (13 out of 305 patients); 9 patients intra-operatively and 4 patients post-op. Three of the 9 patients who had complications intra-op went on to develop further complications in the postoperative period.

Figure 1: Maternal outcomes

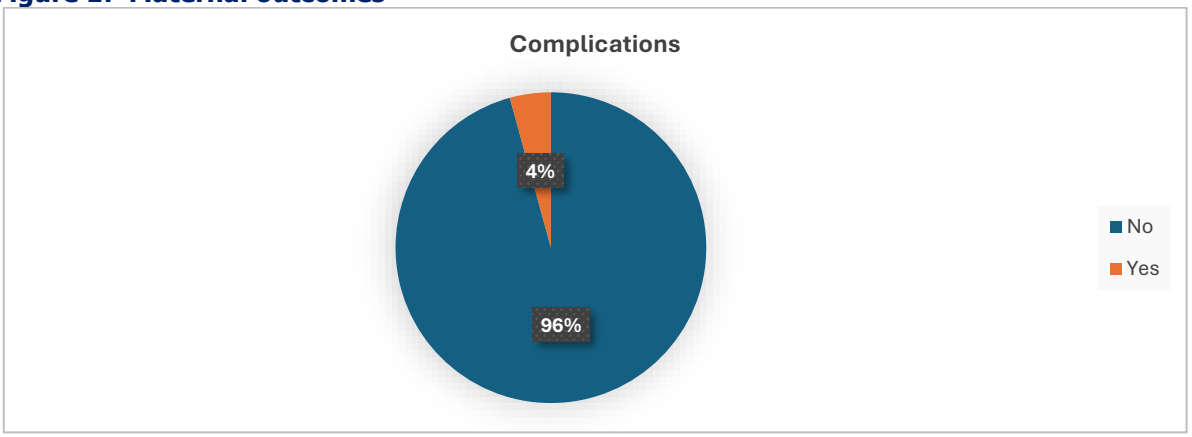

Table 2: Peri-operative complications

	MACE within 7-days: No	MACE within 7-days: Yes	Total	P-Value
Intra-op MACE: No	292 (98.6%)	4 (1.4%)	296	<0.001
Intra-op MACE: Yes	6 (66.7%)	3 (33.3%)	9	

MACE, *Major adverse cardiac events*

Table 2 reveals a strong and statistically significant association between the occurrence of intra-op complications and the subsequent development of major adverse cardiac events within 7 days (p = 0.001). The risk profile diverges sharply between the groups. Patients with no intra-op complication had a very low rate (1.4%) of developing MACE within 7-days, whereas those who developed an intra-op complication experienced a substantially higher rate of 33.3%.

Anaesthetic technique

Spinal anaesthesia was the neuraxial technique of choice in 58,7% of patients, 29.6% received a combined spinal epidural,10.5% received an epidural, and 1.2% of the patients received a spinal catheter. A total of 58 patients

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received a general anaesthetic, with 6 of the 58 patients being converted from a regional technique. The analysis of anaesthetic technique reveals a statistically significant relationship with total complication rates. For neuraxial techniques, spinal anaesthesia demonstrated the lowest complication rate at 1% (1/145), while the general anaesthetic group exhibited the highest rate at 16% (9/58). The difference across all anaesthetic techniques is statistically significant ($p<0.001$). When techniques are broadly categorised, the association is even more pronounced ($p<0.000$). Patients who received regional anaesthesia had a markedly lower complication rate of 2% (4/247). In contrast, those managed with general anaesthesia (GA) or who required conversion to GA had substantially higher rates of 15% (8/52) and 17% (1/6), respectively. The results strongly suggest that the choice of anaesthetic technique is a significant factor in patient outcomes within this cohort. Regional anaesthesia, particularly spinal and combined spinal-epidural (CSE) techniques, is associated with the most favourable safety profile. Conversely, the avoidance of a regional technique, whether through planned general anaesthesia or unplanned conversion, correlates with a complication risk that is approximately seven to eight times higher.

Table 3: Anaesthetic technique and total complications

Anaesthetic TECHNIQUE AND TOTAL COMPLICATIONS ANALYSIS WITH FISHER'S EXACT TEST P-VALUES.

		No Complication N (%)	Yes Complications N (%)	Total N	P-Value
Anaesthetic Technique	CSE	71(97)	2(3)	73(100)	<0.001
	Epidural	25(96)	1(4)	26(100)	
	Spinal anaesthesia	144(99)	1(1)	145(100)	
	Spinal Catheter	3(100)	0(0)	3(100)	
	General anaesthesia	49(84)	9(16)	58(100)	
Neuraxial/GA/GA converted.					
	Converted to GA	5(83)	1(17)	6(100)	<0.000
	GA	44(85)	8(15)	52(100)	
	Regional	243(98)	4(2)	247(100)	

CSE, *Combined spinal & epidural*, GA, *General anaesthetic*.

Risk stratification & prediction of adverse outcomes.

A total of 43,9% of the patients were classified as mWHO class III, according to the modified World Health Organisation risk score, followed by 32,8% in class II and only 4.3% in class I. 19% of the patients were in mWHO class IV, where pregnancy is contraindicated. Patients who developed intra-op and post-op complications fell into both mWHO class III and IV, respectively.

Table 4: mWHO risk classification and total complications

WHO CLASSIFICATION AND TOTAL COMPLICATIONS ANALYSIS WITH FISHER'S EXACT TEST P-VALUES.

	No Complication N (ROW%, COL%)	Yes Complications N (ROW%, COL%)	Total N (ROW%, COL%)	P-Value
WHO I	13(100, 4,5)	0(0, 0)	13(100, 4,3)	<0,000
WHO II	100(100, 34,2)	0(0, 0)	100(100, 32,8)	
WHO III	131(98, 44,9)	3(2, 23,1)	134(100, 43,9)	
WHO IV	48(83, 16,4)	10(17, 76,9)	58(100, 19)	

mWHO, modified World Health Organisation risk score

Figure 2: Patient co-morbidities

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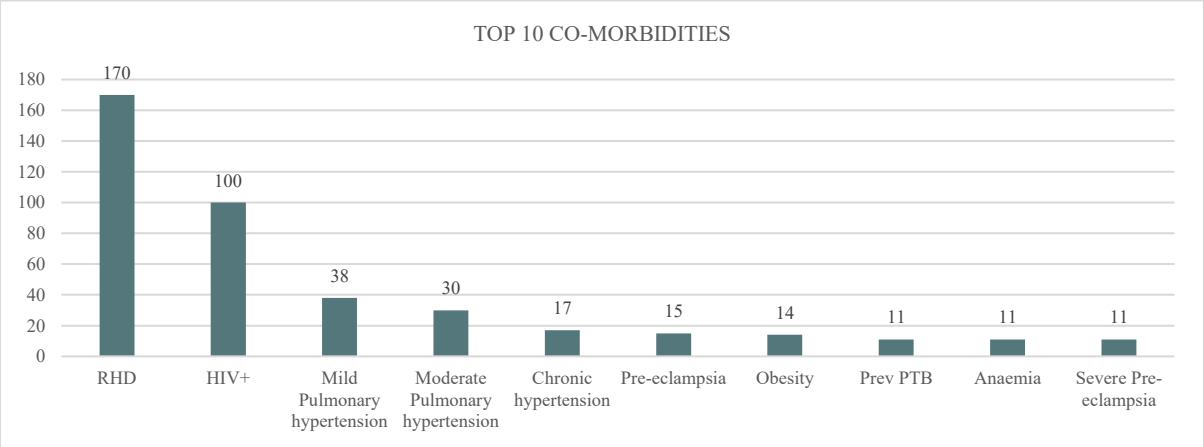

RHD, *Rheumatic heart disease*, PTB, *Pulmonary tuberculosis*

The frequency distribution of comorbidities in the cohort reveals rheumatic heart disease (RHD) as the most prevalent condition (n=170), followed by HIV+ (n=100). Pulmonary hypertension is a common comorbidity, with its mild form (n=38) occurring more frequently than the moderate classification (n=30). Hypertensive disorders are also prevalent, represented by chronic hypertension (n=17), pre-eclampsia (n=15), and severe pre-eclampsia (n=11). The data further indicate notable rates of obesity (n=14), previous pulmonary tuberculosis (PTB) (n=11), and anaemia (n=11). This profile outlines a patient population characterised by a high burden of chronic cardiovascular and infectious conditions, complicated by frequent obstetric and metabolic comorbidities.

The analysis of dominant cardiac pathologies associated with complications reveals that 8 of 48 identified pathologies were associated with a complication. The most substantial contributors to the overall complication burden were mixed mitral valve disease (MMVD) and severe mitral stenosis, with complication rates of 10.9% (5/46) and 7.4% (2/27), respectively, accounting for nearly half of all observed events. The pathologies with the highest prevalence, mitral valve replacement (MVR) (n=52) and MMVD (n=46), presented different risk profiles, with MVR demonstrating a low complication rate of 1.9% despite its frequency. A Fisher's Exact Test confirms a statistically significant association between having one of these eight pathologies and developing a complication ($p = 0.008$).

Dominant cardiac pathology

Table 5: Dominant cardiac pathology with a total complication rate of more than 0%

Cardiac Pathology	No Complication N (%)	Yes Complications N (%)	Total N	Complication Rate
Severe Pulmonary Hypertension	0 (0%)	1 (100%)	1	100%
Cor-pulmonale	0 (0%)	1 (100%)	1	100%
Severe Mitral regurgitation	7 (87.5%)	1 (12.5%)	8	12,50%
DCMO	11 (91.7%)	1 (8.3%)	12	8,30%
Unrepaired VSD	10 (90.9%)	1 (9.1%)	11	9,10%
Severe Mitral Stenosis	25 (92.6%)	2 (7.4%)	27	7,40%
MVR	51 (98.1%)	1 (1.9%)	52	1,90%
MMVD	41 (89.1%)	5 (10.9%)	46	10,90%

DCMO, *Dilated cardiomyopathy*, VSD, *Ventricular septal defect*, MVR, *Mitral valve replacement,* MMVD*, Mixed mitral valve disease.*

Table 6: Special monitoring

SPECIAL MONITORING BY TOTAL COMPLICATION WITH FISHER'S EXACT TEST P – VALUE.

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		No Complication N (%)	Yes Complications N (%)	Total N	P-Value
Special monitoring	No	179(99)	1(7.7)	180(100)	<0,000
	Yes	113(90)	12(92.3)	125(100)	

92.3% of the patients who developed intra-operative MACE had special monitoring, mainly an arterial line for invasive blood pressure monitoring and/or a central venous catheter, highlighting the severity of the patient's condition.

Discussion

This 5-year retrospective review of maternal outcomes in pregnant cardiac patients, presenting to theatre for a caesarean section under regional anaesthesia, found an overall 4.3% mortality rate. It showed a high preference for single-shot spinal anaesthesia as the preferred anaesthetic of choice. The study also showed the modified WHO risk classification as a reliable tool in risk-stratifying these patients and as a predictor of major adverse cardiac events.

The present study demonstrated an overall low total mortality of 4.3% as compared to rates reported internationally[4-8]. Reasons for this could be that IALCH, being a Quaternary hospital, allows for a multidisciplinary approach in managing these patients during the peri-partum & peri-operative period. Maternal cardiovascular events occurred in 4,3% of cases (13 out of 305 patients); 9 patients intra-operatively (2.9%) and 4 patients post-operatively (1.4%). Three of the 9 patients who developed complications intra-operatively went on to develop further complications in the postoperative period. All the patients who developed intra-operative Major adverse cardiac events received a general anaesthetic, with 1 patient converted from a regional technique. The major cardiac adverse events observed were Fatal/non-fatal cardiac arrest (5), Pulmonary oedema (4), myocardial infarction (2), pulmonary emboli (1), & Atrial fibrillation (1). The cardiac pathology in these patients included Eisenmenger's syndrome, severe pulmonary hypertension, and Cor pulmonale. Pulmonary oedema was the most common intra-op complication, followed by non-fatal cardiac arrest, myocardial infarction, and pulmonary embolism.

There was a total of 1.4% mortality post-op or within seven days. Two of the patients who had a non-fatal cardiac arrest intra-operatively developed a fatal cardiac arrest within seven days post-op. They each had Eisenmenger's syndrome and Cor pulmonale secondary to severe pulmonary hypertension.

Two of the patients experienced a cardiac arrest within seven days post-op from severe pulmonary hypertension with no preceding intra-op complication. One patient was complicated by a fatal cardiac arrest post-op following a complication of pulmonary oedema intra-op. These patients were all admitted to the ICU post-operatively as they were classified as high risk of major adverse cardiac event pre-operatively. 9 of the 13 patients with complications all received a GA. Post-operatively, fatal cardiac arrest was a common complication, with 50% of the patients preceded by an intra-operative complication. This suggests that the occurrence of intra-op major adverse cardiac events increases the risk of post-op complications in these patients. This can inform the level of monitoring these patients should receive post-op and the early involvement of a multidisciplinary team in the management post-operatively.

Although a single-shot spinal anaesthetic is preferred for low-risk patients, 58.7% of the patients received a single-shot spinal with no adverse effects. This was followed by CSE in 29.6%, 10.5% epidural, and 1.2% received a spinal catheter. These findings are comparable to other studies assessing the anaesthetic management of these patients [9-11]. There was variation in the contents of the epidural mixture for CSE/epidural and variation in the dosage administered for both spinal anaesthesia and CSE. The popularity of spinal anaesthesia in these patients at IALCH is multifactorial: 1. IALCH is the only referral centre for high-risk pregnant patients in the province of KwaZulu-Natal, and anaesthesia specialist consultants in the department are more familiar with the management of this patient population than consultants in peripheral hospitals. 2. Most of the patient's cardiac lesions were surgically corrected before pregnancy, which greatly assists with the patient's haemodynamics. 3. IALCH, being a quaternary hospital, has onsite Cardiology and ICU services should the patient require their intervention. 4. The availability of more senior and experienced obstetricians in this setting. Our results show a strong preference for the use of neuraxial anaesthesia in pregnant cardiac patients undergoing a caesarean section, with less reliance on general anaesthesia.

A case report by E.L. Hamlyn, which described a low-dose combined spinal-epidural technique in four high-risk obstetric patients who presented to their unit, also showed good results with no major adverse cardiac events reported. The cardiac conditions included pulmonary hypertension, hypertrophic obstructive cardiomyopathy, aortic stenosis, coronary artery disease, and mitral stenosis. All the cases required invasive monitoring in the

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form of invasive arterial blood pressure and central venous pressure, which was similar to our study[12].

In this same period, 58 patients received a general anaesthetic, 6 of which were converted from a neuraxial technique due to either a patchy or failed block & patient anxiety. The choice of a planned GA was mainly informed by the pre-op condition of the patient, which contraindicated the use of a neuraxial technique. Most of these patients presented as emergencies in congestive cardiac failure, severe aortic stenosis, Eisenmenger syndrome, or unrepaired VSD and were unable to tolerate a regional technique. Other patients presented as emergencies while still on anticoagulation. The general theme in deciding which anaesthetic to administer mainly depended on the patient's pre-op condition, use of anticoagulation, and the anaesthetist's level of experience and preference. The results showed a strong relationship between the choice of anaesthesia and patient outcomes, with those managed with general anaesthesia (GA) or who required conversion to GA having substantially higher rates of 15% (8/52) and 17% (1/6), respectively. These are usually much sicker patients, who are unable to tolerate a neuraxial technique. Other contributing factors include the haemodynamic changes associated with induction and intubation, the effects of ventilation on right ventricular preload, pulmonary vascular resistance, cardiac output, and difficulty with liberating these patients from the ventilator. Two studies showed that the use of general anaesthesia is associated with high rates of anaesthesia-related complications and severe maternal morbidity as compared to neuraxial techniques[13] [14].
The variation in the anaesthetic techniques demonstrates that there is no "Gold standard" technique, and the anaesthetic management needs to be individualised based on the clinical presentation of the patient.

The European Society of Cardiology guidelines for management of cardiovascular diseases during pregnancy recommend the use of the modified WHO classification to estimate maternal risk. It integrates all known maternal cardiovascular risk factors, including underlying heart disease and comorbidity. The patients are then classified as very low risk (class I), low to moderate risk (class II), high risk (class III), and extremely high risk (class IV), in which pregnancy is contraindicated[15]

The analysis of the WHO classification in this study revealed a significant relationship with complication rates ($p < 0.000$). The patient distribution across grades was uneven, with WHO III being the most common (43.9%), followed by WHO II (32.8%), WHO IV (19.0%), and WHO I (4.3%). This variation may be explained by the fact that the majority of WHO I and II patients are generally managed at a district or regional hospital, with most patients being undiagnosed or asymptomatic. While Grades I and II were complication-free (0%), the complication rate escalated to 2% in WHO Grade III and dramatically to 17% in WHO Grade IV. Consequently, WHO Grade IV patients, despite constituting less than one-fifth of the population, accounted for the majority (76.9%) of all complications. This finding was surprising since conventional advice to women in this high-risk group is to avoid pregnancy or early termination if pregnancy has already occurred. While recommendations and guidelines are available and often discussed with the patients, we cannot prevent women from choosing to become pregnant, and we infrequently encounter high-risk women who have become pregnant despite our advice. Another possible reason for this change in risk profile is that physicians have become more comfortable with managing women with heart disease, are better capable of managing their problems, and may have therefore modified their advice. It may also simply reflect the existence of increasing numbers of high-risk patients in the population that is being managed at IALCH. The study results suggest that the modified WHO classification is a useful tool for cardiovascular risk assessment in pregnant patients with heart disease and in predicting the risk of major adverse cardiac events in the intra- and postoperative period. A study by D Iluz-Freundlich showed similar findings[6]. The cardiac disease profile included congenital (Tetralogy of Fallot, VSD & ASD) and acquired heart disease (rheumatic heart disease, arrhythmia, and cardiomyopathy). Cardiac lesions present in those patients who developed both intra- and post-op complications included MMVD, MVR, severe mitral stenosis, severe mitral regurgitation, severe pulmonary hypertension, dilated cardiomyopathy, unrepaired ventricular septal defect, and Cor pulmonale. This is in keeping with the prevalence of rheumatic heart disease in our patient population[7].
Twelve of the 13 patients, who developed complications, had special monitoring in the form of an invasive arterial line and central venous catheter, suggesting that these cases were clinically more complex or unstable.

Generalizability

Comparison of studies in this patient population may prove to be difficult due to the differences in the patient cohort. Most studies only look at congenital heart disease [16] [17], versus this study, which looked at both congenital and acquired heart disease. There is also variation in the definition and assessment of major

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adverse cardiac events amongst the different studies, with added variations in sample sizes.

Conclusion

In this cohort, neuraxial anaesthesia was used in high-risk cardiac obstetric patients without an unexpected high incidence of MACE, supporting its cautious use in appropriately selected patients within specialised centres. Consideration of the type of cardiac lesion, surgical correction, and the clinical picture of the patient at presentation is of importance. Anaesthetic interventions need to be specifically tailored to the individual case, as a one-size-fits-all approach is not appropriate. Obstetric anaesthesiologists should use validated risk stratification scoring systems and knowledge about high-risk cardiac disease to ensure high-risk pregnant women deliver in well-resourced hospitals with expert care and vigilant post-op monitoring in a high dependency unit.

Strengths

The study had a large heterogeneous population of patients.

There was a variety of both congenital and acquired heart pathologies, which further diversified our study and made it pragmatic and generalisable.

Limitations

The study is retrospective with a risk of missing or inconsistent data collection.

There was variation in the data recorded in the anaesthetic charts.

Most of the patients in this study had corrected lesions.

Recommendations

The authors recommend more similar studies looking at both maternal and neonatal outcomes in KZN. A multidisciplinary approach should be employed in the management of these patients, and the anaesthetic management should be tailored to the specific patient profile.

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List of abbreviations

IALCH: Inkosi Albert Luthuli Central Hospital
CSE: Combined spinal epidural
MACE: Major adverse cardiac event
WHO: World Health Organisation
SVR: Systemic vascular resistance
C.O: Cardiac output
KZN: KwaZulu-Natal
DOH: Department of Health
BMI: Body mass index
Ga: Gestational age
ASA: American Society of Anaesthesiologists Physical Status Classification System
RHD: Rheumatic heart disease
PTB: Pulmonary tuberculosis
DCMO: Dilated cardiomyopathy
VSD: Ventricular septal defect
MVR: Mitral valve replacement
MMVD: Mixed mitral valve disease
GA: General anaesthetic
ICU: Intensive care unit
ASD: Atrial septal defect

Conflict of interest

The authors declare no conflict of interest.

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Author contributions

Author 1: Study design, data collection, analysis, data interpretation, and manuscript writing.
Author 2: Study design, analysis, and oversight.

Data availability

The data supporting the findings of this study can be provided by the authors on reasonable request.

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References

1. Choudhury, M., Neuraxial anaesthesia in parturient with cardiac disease. Indian Journal of Anaesthesia, 2018. 62(9): p. 682. https://doi.org/10.4103/ija.IJA_474_18. PMid:30237593 PMCid:PMC6144557
2. Ioscovich, A., et al., Peripartum anesthetic management of patients with aortic valve stenosis: a retrospective study and literature review. International journal of obstetric anesthesia, 2009. 18(4): p. 379-386. https://doi.org/10.1016/j.ijoa.2009.02.019. PMid:19733057
3. Chohan, U., G. Afshan, and A. Mone, Anaesthesia for caesarean section in patients with cardiac disease. J Pak Med Assoc, 2006. 56(1): p. 32-8.
4. Ismail, S. and S. Urooj, Anaesthetic Management and Peripartum Outcomes for Parturients With Valvular Heart Disease in a Tertiary Care Hospital of Pakistan. Cureus, 2023. 15(4). https://doi.org/10.7759/cureus.37666.
5. Roos-Hesselink, J., et al., Pregnancy outcomes in women with cardiovascular disease: evolving trends over 10 years in the ESC Registry Of Pregnancy And Cardiac disease (ROPAC). European Heart Journal, 2019. 40(47): p. 3848-3855. https://doi.org/10.1093/eurheartj/ehz136 PMid:30907409 PMCid:PMC8301645
6. Iluz-Freundlich, D., et al., Peripartum anesthesia management and outcomes of patients with congenital heart disease: a single-center retrospective analysis (2009-2023). International Journal of Obstetric Anesthesia, 2024. 60: p. 104241. https://doi.org/10.1016/j.ijoa.2024.104241 PMid:39227290
7. Chumpathong, S., et al., Predictors for complications in pregnant women with heart disease, a retrospective study. J Med Assoc Thai, 2014. 97(7): p. 730-5.
8. Siu, S.C., et al., Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation, 2001. 104(5): p. 515-521. https://doi.org/10.1161/hc3001.093437 PMid:11479246
9. Langesaeter, E., M. Dragsund, and L.A. Rosseland, Regional anaesthesia for a Caesarean section in women with cardiac disease: a prospective study. Acta Anaesthesiol Scand, 2010. 54(1): p. 46-54. https://doi.org/10.1111/j.1399-6576.2009.02080.x PMid:19764910
10. Goldszmidt, E., et al., Anesthetic management of a consecutive cohort of women with heart disease for labor and delivery. Obstetric Anesthesia Digest, 2011. 31(3): p. 184-185. https://doi.org/10.1097/01.aoa.0000400331.03077.73.
11. Shatalin, D., et al., Outcome of peripartum anesthesia in women with valvular disease. Romanian Journal of Anaesthesia and Intensive Care, 2020. 27(1): p. 11.
12. Hamlyn, E.L., et al., Low-dose sequential combined spinal-epidural: an anaesthetic technique for caesarean section in patients with significant cardiac disease. Int J Obstet Anesth, 2005. 14(4): p. 355-61. https://doi.org/10.1016/j.ijoa.2005.01.001 PMid:16139497
13. Gerber, C., et al., Method of anesthesia and perioperative risk factors, maternal anesthesia complications, and neonatal mortality following cesarean delivery in Africa: a substudy of a 7-day prospective observational cohort study. Anesthesia & Analgesia, 2024. 138(6): p. 1275-1284. https://doi.org/10.1213/ANE.0000000000006750 PMid:38190343
14. Butwick, A., What's new in obstetric anesthesia in 2011? Reducing maternal adverse outcomes and improving obstetric anesthesia quality of care. Anesthesia & Analgesia, 2012. 115(5): p. 1137-1145. https://doi.org/10.1213/ANE.0b013e31826af982 PMid:22984153
15. De Backer, J., et al., 2025 ESC Guidelines for the management of cardiovascular disease and pregnancy: Developed by the task force on the management of cardiovascular disease and pregnancy of the European Society of Cardiology (ESC) Endorsed by the European Society of Gynecology (ESG). European Heart Journal, 2025. 46(43): p. 4462-4568. https://doi.org/10.1093/eurheartj/ehaf193 PMid:40878294 PMCid:PMC12875883

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Original Article

16. Maxwell, B., et al., Peripartum outcomes and anaesthetic management of parturients with moderate to complex congenital heart disease or pulmonary hypertension. Anaesthesia, 2013. 68(1): p. 52-59. https://doi.org/10.1111/anae.12058 PMid:23121251

17. Ouyang, D.W., et al., Obstetric outcomes in pregnant women with congenital heart disease. International journal of cardiology, 2010. 144(2): p. 195-199. https://doi.org/10.1016/j.ijcard.2009.04.006 PMid:19411123

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