A 5-YEAR REVIEW OF ANAESTHETIC TECHNIQUES FOR CAESAREAN SECTION IN PARTURIENTS WITH HEART DISEASES

by

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ABBREVIATIONS

NMRR	National Medical Research Register
MREC MOH	Medical Research and Ethics Committee
CRC	Clinical Research centre
WHO	World Health Organization
ASA	American Society of Anaesthesiologists
NYHA	New York Heart Association
ICU	Intensive Care Unit
CSE	Combine Spinal Epidural

ABSTRAK

(BAHASA MELAYU)

Ulasan 5 Tahun Teknik Bius Untuk Pembedahan Caesarean Bagi Ibu Mengandung Yang Menghidap Penyakit Jantung di Hospital Serdang Tahun 2011-2015

Latar Belakang: Rawatan dan pengendalian ibu hamil yang mempunyai penyakit jantung merupakan suatu cabaran yang besar buat pakar dan pengendali perubatan yang bertanggungjwab termasuk pakar obstetrik,bius dan kardiologi terutamanya semasa mereka tampil untuk bersalin. Objektif kajian ini adalah untuk mengkaji kadar kekerapan dan ciri-ciri ibu hamil yang mengalami masalah jantung menjalani pembedahan Caesarean di Hospital Serdang.

Kaedah: Kaedah deskriptif dan regresi logistik berganda digunakan untuk menjawab objektif kajian. Seramai 84 orang ibu hamil terlibat dalam kajian ini. Analisis regresi logistik berganda menunjukkan tiada faktor yang berkaitan dengan pesakit dengan penyakit jantung yang menjalani pembedahan Caesarean di bawah anestesia separa. Dari jumlah ini,peratusan yang menjalani pembedahan Caesarean menggunakan bius separa adalah 89.3% (95% CI: 83.3, 95.3). Purata umur mereka ialah 30.9 (5.38) tahun. Manakala purata kehamilan dan minggu kehamilan masing-masing ialah 1.6 (0.87) dan 36.9 (1.42) minggu.

Keputusan: Bius separa masih teknik yang menjadi pilihan bagi pembiusan untuk pembedahan Caesarean bagi ibu hamil dengan penyakit jantung yang mengalami masalah jantung.

Kesimpulan : Bius separa masih teknik yang menjadi pilihan bagi pembiusan untuk pembedahan Caesarean bagi ibu hamil dengan penyakit jantung yang mengalami masalah jantung.

ABSTRACT

Background : Parturients with heart diseases that presents for delivery possess challenges to anaesthetists, cardiologists and obstetricians. The objectives of study are to study the prevalence and characteristics of parturients underwent Caesarean section in Hospital Serdang.

Methods : This is a retrospective study where the data for five years was collected in Hospital Serdang between 1st January 2011 till 31st December 2015. Data of the cases selected was retrieved from the computerized patient data system which is the electronic data bases, Lab Information System (LIS) via Medicomm and E His Live of Hospital Serdang, Selangor. Demographic, types of anaesthesia and postoperative care were recorded.

Results : The descriptive methods and multiple logistic regression were applied to answer the objectives of the study. Total of 84 parturients involved in this study. Multiple logistic regression analysis showed that no factor was significantly associated with parturients with heart diseases that underwent Caesarean section under regional anaesthesia that underwent Caesarean section in Hospital Serdang. The proportion of parturients underwent Caesarean section using regional anesthesia was 89.3% (95% CI: 83.3, 95.3). Mean age of them was 30.9 (5.38) years old. Meanwhile, mean (SD) parity and gestational weeks were 1.6 (0.87) and 36.9 (1.42) weeks, respectively.

Conclusion : However based on descriptive analysis, it was found that regional anaesthesia is still the most preferable techniques for Caesarean section among parturients with severe heart conditions

CHAPTER 1

INTRODUCTION

1.1 Background

Over worldwide, cardiovascular disease has been the main cause of death, representing 31% of all global deaths in 2015 where three quarters of these deaths take place in low- and middle-income countries [1].

In Malaysia, cardiovascular diseases has been one of the major cause of parturients mortality and morbidity. The National Obstetrics Registry reported that prevalence of cardiovascular diseases in pregnancies are common which is about 0.45 and 0.55% in 2013 and 2014 respectively [2].

Based on report of the Confidential Enquiries into Maternal Death Report, cardiovascular diseases encountered for 51% and 70% of indirect deaths in the period 2009-2011[2]. The most common heart diseases during pregnancy include rheumatic heart diseases, valvular heart diseases and congenital heart diseases.

Cardiovascular diseases refers to group of structural disorders of the heart and blood vessels that include coronary vascular diseases, cerebrovascular disease, rheumatic heart disease, congenital heart disease, pulmonary embolism and peripheral arterial disease[1].

There are multiple challenges in managing these patients which needs thorough understanding of physiological changes in pregnancy and pathophysiological changes in the underlying diseases. Changes in normal physiology in pregnancy especially in

cardiovascular system constitute an additional risk factor for parturients having co-morbid heart diseases that might lead to decompensated state [3]. This makes managing parturients with heart diseases challenging, that requires involvement of multidisciplinary teams involving anaesthesiologists, cardiologists, obstetricians, and intensivists.

Parturients can either be delivered via normal vaginal delivery or Caesarean section. In parturients with underlying co-morbidity such as heart diseases, the mode of delivery will be decided after discussion with multidisciplinary team. Generally regional anaesthesia is more preferable and superior over general anaesthesia for conduct of Caesarean section due to less risks and complications. However due to certain circumstances some cases need to be done under general anaesthesia.

Decision regarding types of anaesthesia will be guided by the nature and severity of the cardiac lesions as well as urgency of the surgical delivery. Both regional and general anesthesia have been described in most cardiac conditions[4, 5]. Although there is no evidence to support any particular technique, cardiovascular stability remains the main goal.

This study is conducted to review the severity of heart diseases and the current anaesthetic practice in managing parturients with heart diseases that underwent Caesarean section.

1.2 Literature review

Over worldwide, cardiovascular disease has been the main cause of death, representing 31% of all global deaths in 2015 where three quarters of these deaths take place in low- and middle-income countries[1].

A large prospective multicenter study by Siu et al[5] involving 562 pregnant women with heart disease (aged 28±6 years) receiving care in 13 Canadian cardiac and obstetric teaching hospitals found that cardiac complications during pregnancy and certain neonatal events could be predicted from maternal functional class and history of cardiac failure or arrhythmias.

A retrospective study done in Ege University Faculty of Medicine Hospital in Turkey[3] to evaluate the effects of anaesthetic technique on mother and newborn. The data was collected over five years from 2006-2016. From this study, regional anaesthesia was preferred compared to general anaesthesia (50.5% vs 49.5%,p=0.05). Based on risk classification of heart diseases, it was found that ratio of general anaesthesia increased as the stage in NYHA classification increased (p=0.001). Otherwise there was no significant relationship was detected between existing heart disease of patients and anaesthetic technique (p=0.28).

This study also compared hemodynamic effects on both regional and general anaesthesia. From the study, 4 patients who had been exposed to regional anaesthesia in the peroperative period (3 spinal anaesthesia, 1 epidural anaesthesia) developed hypotension and was treated with vasopressor therapy (p=0.1). For patients that underwent general anaesthesia, 1 patient with NYHA III developed pulmonary oedema

after extubation. In terms of duration of stay in postoperative care unit, there was no difference between the 2 groups(p=0.48).

The Registry On Pregnancy And Cardiac disease (ROPAC) enrolled patients underwent pregnancy from 2007 till June 2011. Sixty hospitals in 28 countries enrolled 1321 pregnant women with structural heart disease (valvular or congenital heart disease (CHD) or cardiomyopathy) or IHD[6]. Of the 1321 enrolled patients, 173 (13.1%) developed heart failure during pregnancy or after delivery. In total, 71 patients with heart failure had congenital heart disease, 64 had valvular heart diseases and 36 had cardiomyopathy[6].

For anaesthetists, there has been a move towards more Caesarean sections being performed under regional anaesthesia compared to general anaesthesia. New techniques for regional anaesthesia, such as the combined spinal epidural (CSE) anaesthesia and the continuous spinal anaesthesia, offer specific advantages. However there certain limitations that refrained from regional anaesthesia.

There will be remarkable physiological changes during pregnancy, delivery and immediately post partum period to compensate uteroplacenta especially cardiovascular and respiratory system.

Cardiovascular changes during pregnancy and delivery

Progesterone hormone that is secreted initially by corpus luteum, then placenta plays important role for cardiovascular changes in pregnancy[7].The changes in cardiovascular system begins as early as by the 4^{th} weeks of gestational age where there is increase in heart rate. By 8^{th} weeks,there will be marked cardiovascular changes. The

hormonal effects of oestradiol and vasodilatory prostaglandins (PGI2) cause peripheral vasodilation that leads to reduction in systemic vascular resistance. As a compensatory mechanism to maintain the mean arterial pressure(MAP), cardiac output is increases progressively, extends to peak of 50% during 32nd and 36th week of pregnancy[8].

MAP = CO (SV x HR) x SVR

where MAP is mean arterial pressure, CO is cardiac ouput, SV is stroke volume, HR is heart rate and SVR is systemic vascular resistance.

However, despite of compensatory mechanism of increased cardiac output, vasodilatory effect causes decrease in systolic and diastolic blood pressure. Renin angiotensin aldosterone system will be activated leading to sodium and water retention, thus increased in plasma volume[8].

Total blood volume are also gradually increase from 6 to 8 weeks gestation to a maximum volume at 32 weeks, consequently increased end diastolic volume and by obeying the Starling law this leads to increase in stroke volume, thus contributing to raise in the cardiac output[9].

Anatomical changes of gravid uterus causes compression of inferior vena cava and aorta in supine position. This causes reduction in venous return subsequently leads to fall in stroke volume and cardiac output by 25-30% by 38th weeks of pregnancy[8, 9]. The fall in cardiac output will compromise the uteroplacental circulation as there is no autoregulation properties. There will be reduction in uterine blood flow and reduce placental perfusion, therefore lead to fetal acidaemia[9]. Thus it is important to reduce

compression of uterus on the aorta and vena cava by positioning parturients on left lateral side or tilting right pelvic so that uterus drop on the side off from the inferior vena cava.

During labour, uterine contractions contributes to autotransfusion of 300-500ml of blood into circulation leads to further increases in cardiac output. Simultaneously, in response to stress and pain,sympathetic response is activated causes increase in blood pressure and heart rate[9].Immediately after fetus is delivered, the aortacaval compression are released causing sudden rise in venous return and cardiac output(60-80%).

The hyperdynamic changes that occurs during pregnancy and delivery might not be well tolerated by parturients with fixed cardiac output such as valvular heart disease (e.g., aortic or mitral stenosis). In patients with coronary artery diseases, there will be sudden increase in myocardium workload causing imbalance between coronary supply and myocardium demand[10] that further leads to myocardial ischemia.

RISK ASSESMENT PARTURIENTS WITH HEART DISEASES

Other than routine history and assessment parturients need to be asses in particularly regarding cardiopulmonary reserve. The most common tools that are widely used to assess functional status in patients with heart diseases are New York Heart Association(NYHA status) and Canadian Cardiac Score.

The New York Heart Association status was introduced in 1928 ,with the latest released on 14th March 1994, revised by the Criteria Committee of the American Heart Association, New York City Affiliate. The classisification is based on symptom severity and the amount of exertion needed to provoke symptoms as shown in Table 1.

The maternal risk classification by World Health Organization (WHO) intergrates all maternal cardiovascular risk factors including the associated cardiac diseases and other co-morbiditiesn into assessing risks, prognosis including contraindications for pregnancy[1] as presented in Table 2.

Based on NYHA & WHO classification, the severity of heart diseases are classify into low,intermediate and high risks to predict outcome of maternal and fetal[2].

Table 1 : The New York Heart Association Classification

	FUNCTIONAL CAPACITY
I	Patients with cardiac disease but without resulting limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or anginal pain.
II	Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.
III	Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea, or anginal pain.
IV	Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure or the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased.

Table 2 : WHO risk classification[11]

I	Uncomplicated, small or mild - pulmonary stenosis - patent ductus arteriosus - mitral valve prolapse • Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage). • Atrial or ventricular ectopic beats, isolated
II	Unoperated atrial or ventricular septal defect • Repaired tetralogy of Fallot • Most arrhythmias
II-III	• Mild left ventricular impairment • Hypertrophic cardiomyopathy • Native or tissue valvular heart disease not considered WHO I or IV • Marfan syndrome without aortic dilatation • Aorta <45 mm in aortic disease associated with bicuspid a ortic valve • Repaired coarctation
III	• Mechanical valve • Systemic right ventricle • Fontan circulation • Cyanotic heart disease (unrepaired) • Other complex congenital heart disease • Aortic dilatation 40–45 mm in Marfan syndrome • Aortic dilatation 45–50 mm in aortic disease associated with bicuspid aortic valve
IV	• Pulmonary arterial hypertension of any cause • Severe systemic ventricular dysfunction (LVEF <30%, NYHA III–IV) • Previous peripartum cardiomyopathy with any residual impairment of left ventricular function • Severe mitral stenosis, severe symptomatic aortic stenosis • Marfan syndrome with aorta dilated >45 mm • Aortic dilatation >50 mm in aortic disease associated with bicuspid aortic valve • Native severe coarctation

Table 3 : Maternal cardiovascular risk classification[2]

Maternal cardiovascular risk	WHO class	NYHA functional class
Low	I & II	I & II
Moderate	II-III & III	-
High	IV	III & IV

1.3 Research Objectives

1.3.1 General Objectives

To study the proportion and factors associated with parturients with heart diseases that underwent Caesarean section using regional anesthesia in Hospital Serdang.

1.3.2 Specific Objectives

Objective 1

To determine the proportion of parturients with heart diseases that underwent Caesarean section under regional anesthesia in Hospital Serdang from 1st January 2011 till 31st December 2015.

Objective 2

To determine the factors associated with parturients with heart diseases that underwent Caesarean section under regional anesthesia in Hospital Serdang from 1st January 2011 till 31st December 2015.

1.3.3 Operational Definition

1.3.3.1 Caesarean section

This is a surgical procedure whereby a surgical insicion is made through maternal's abdomen and uterus to deliver fetus[12].

1.3.3.2 Anaesthetic techniques

General anaesthesia is a state of unconsciousness which are characterised by inarousable by painful stimuli and patients are induced with anaesthetetic medications either by intravenous or inhalational agents[13].

Regional anaethesia is an anaesthetic technique that will numb certain parts of the body that will relief pain or allow surgical procedure to be done. Types of regional nerve block includes spinal anaesthesia(also known as subarachnoid block), epidural anaesthesia and peripheral nerve block[14].

Spinal anesthesia is done by injecting local anaesthetic drugs with a special needle into intervertebra space below L2 to avoid trauma to spinal cord.

Epidural anaesthesia is done by threading a small catheter through the needle into intervertebral epidural space. Then the needle is removed,leaving only catheter in place. The local anaesthetic drugs are given through the catheter either periodically or continuous infusion[15].

Combined spinal epidural anaesthesia is when spinal and epidural anaesthesia is done simultaneously. This combine technique improve the rapidity, density, and reliability of the subarachnoid block [16].

1.4 Justification of the Study

Currently there were few published data regarding anaesthetic techniques for parturients with heart diseases that require delivery via Caesarean section in Malaysia.Most studies that have been conducted were from overseas in a different healthcare facilities and patient population. It is essential to explore this area as it is commonly encountered nowadays and related to quality of care that the parturients received. The result of this research can add to the intellectual value to field the voids in the database. It can be used as a benchmark and references in the future study in the same field.

1.5 Methodology

1.5.1 Method

This was a retrospective study conducted in Hospital Serdang. Data was collected from the maternity operation theatre cases from 1st January 2011 till 31st December 2015. Emergency cases were excluded from this study.Data of the cases selected will be retrieve from the computerized patient data system which is the electronic data bases, Lab Information System (LIS) via Medicomm and E His Live of Hospital Serdang, Selangor. Sample size was calculated using PS software, dichomotous, independent, two proportion and uncorrected chi-square test, alpha 0.02, power 0.8 giving estimated sample size of 88. With estimated dropout rate of 10%, minimum sample size will be 80 and maximum size will be 88.

1.5.2 Inclusion criteria

All parturients with heart diseases that underwent elective caesarean section in Hospital Serdang with complete medical records including all clinical notes and perioperative documentations.

1.5.3 Exclusion criteria

Cases that underwent emergency caesarean section.

1.5.4 Ethical issue

This study had obtained ethical approval from Clinical Research Centre (CRC) Hospital Serdang, National Medical Research Register (NMRR) & The Human Research Ethics Committee of USM [USM/JEPeM/17010060].

1.6 References

1. Cardiovascular diseases (CVDs). 2015; Available from: http://www.who.int/mediacentre/factsheets/fs317/en/
2. al, D.G.K.e., Heart Disease in Pregnancy. Malaysia Clinical Practice Guidelines, 2016. **2th edition**: p. 6.
3. Yıldırım, Ö.İ., et al., The evaluation of applied anaesthetic techniques for caesarean in parturients with cardiac diseases: retrospective analysis. Turkish journal of anaesthesiology and reanimation, 2014. **42**(6): p. 326.
4. Dob, D. and S. Yentis, Practical management of the parturient with congenital heart disease. International journal of obstetric anesthesia, 2006. **15**(2): p. 137-144.
5. Siu, S.C., et al., Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation, 2001. **104**(5): p. 515-521.
6. Johnson, P.M., Registry of Pregnancy and Cardiac Disease. 2015.
7. Kumar, P. and N. Magon, Hormones in pregnancy. Nigerian medical journal: journal of the Nigeria Medical Association, 2012. **53**(4): p. 179.
8. Bedson, R. and A. Riccoboni, Physiology of pregnancy: clinical anaesthetic implications. Continuing Education in Anaesthesia Critical Care & Pain, 2014. **14**(2): p. 69-72.
9. Soma-Pillay, P., et al., Physiological changes in pregnancy: review articles. Cardiovascular journal of Africa, 2016. **27**(2): p. 89-94.
10. Datta, S., Obstetric Anesthesia Handbook. 2006.
11. Care, A.C., ESC Guidelines on the management of cardiovascular diseases during pregnancy. European Heart Journal, 2011. **32**: p. 3147-3197.

12. FREQUENTLY ASKED QUESTIONSLABOR, DELIVERY, AND POSTPARTUM CARE. American College of Obstetricians and Gynecologists.
13. Jeffrey B. Gross, M.D.C.e.a., Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists. The Journal of the American Society of Anaesthesiologists, 2002. **Vol.96**(Anesthesiology 4): p. 1004-1017.
14. Torpy, J.M., C. Lynm, and R.M. Golub, Regional Anesthesia. Jama, 2011. **306**(7): p. 781-781.
15. Epidural Anaesthesia. 2017, American Pregnancy Association.
16. Rawal, N., et al., The combined spinal-epidural technique. Anesthesiology Clinics of North America, 2000. **18**(2): p. 267-295.

CHAPTER 2

STUDY PROTOCOL

2.1 Study Protocol For Ethical Approval

UNIVERSITI SAINS MALAYSIA
KUBANG KERIAN

Dissertation Proposal

A 5 YEAR REVIEW OF ANAESTHETIC TECHNIQUES FOR CAESAREAN SECTION IN PARTURIENTS WITH HEART DISEASES IN HOSPITAL SERDANG YEAR 2011-2015

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2.1.0 INTRODUCTION

Heart diseases in women are as common as in men. They can suffer from coronary artery diseases, congenital malformations, valvular heart diseases as well as rhythm disorders. Over time they will get pregnant and due to modern and vast advancements in health care, many parturients with cardiac disease can be safely delivered naturally or surgically.

The incidence of ischaemic heart disease (IHD) is rising due to the later age at which women are conceiving and an increase in those with IHD risk factors, including diabetes, obesity, and smoking[19]. In Malaysia, Report of Confidential Enquiry into Maternal Deaths in 1997-2000 showed that the commonest cause of death is due to medical disorders in pregnancy which consists of 20.6%[20].

There are multiple challenges in managing these patients which needs thorough understanding of physiological changes in pregnancy and pathophysiological changes in underlying diseases. Physiological changes, especially in the cardiovascular system, associated with pregnancy constitute an additional risk factor for women having co-morbid heart disease and increase peripartum morbidity and mortality by leading to decompensation[3]. It requires involvement of multidisciplinary team. Communication and discussion with the patient is also important in providing the best treatment.

Decision regarding type of anesthesia for this particular patient will be guided by the nature and severity of the cardiac lesion of patient as well as by the urgency of the surgical delivery. Both regional and general anesthesia have been described in most cardiac conditions[4]. Although there is no evidence to support any particular technique,

cardiovascular stability is the goal[21]. The aim is for gradual, careful introduction of general or regional anesthesia with minimal effects on cadiovascular stability.

2.0 JUSTIFICATION OF THE STUDY

Currently there were few published data regarding anaesthetic techniques for parturients with heart diseases that require delivery via Caesarean section in Malaysia.Most studies that have been conducted were from overseas in a different healthcare facilities and patient population. It is essential to explore this area as it is commonly encountered nowadays and related to quality of care that the parturients received. The result of this research can add to the intellectual value to field the voids in the database. It can be used as a benchmark and references in the future study in the same field.

3.0 LITERATURE REVIEW

Worldwide, the numbers of women who have a pre-existing cardiovascular disease or develop cardiac problems during pregnancy are increasing and, due to the lack of evidenced-based data, this provides challenges for the treating physician[21].
In some cases it was not detected until pregnancy reach third trimester where the patients will come in failure.

The Registry On Pregnancy And Cardiac disease (ROPAC) enrolled patients underwent pregnancy sometime between 2007 and June 2011. Sixty hospitals in 28 countries enrolled 1321 pregnant women with structural heart disease (valvular or congenital heart disease (CHD) or cardiomyopathy) or ischemic heart disease(IHD). Of the 1321 enrolled patients, 173 (13.1%) developed heart failure during pregnancy or after delivery. In total, 71 patients with heart failure had congenital heart disease, 64 had valvular heart diseases and 36 had cardiomyopathy[6].

For anaesthetists, there has been a move towards more Caesarean sections being performed under regional anaesthesia compared to general anaesthesia. New techniques for regional anaesthesia, such as the combined spinal epidural (CSE) anaesthesia and the continuous spinal anaesthesia, offer specific advantages. However there are certain limitations that refrained from giving regional anaesthesia.

From previous study done by R.K Boyle, five-year review in Australian tertiary hospital at the Royal Women Hospital, Queensland, between 1993 and 1997 there were 56 vaginal and 22 caesarean deliveries involving 68 women with heart disease. The

NYHA class is stated at the time of each delivery, rather than for each deliveries, 32 (41%) were recorded with a worst NYHA class I, 22 (28%) class II, 17 (22%) class III and 7 (9%) class IV. Deliveries associated with NYHA classes III and IV were associated with longer duration of in-hospital stay and were at earlier gestation, the mothers had more complex heart conditions and more admissions to the ICU/CCU and more often required management by an anaesthetist (NYHA I-II 3.6% vs NYHA III-IV 29.3% with $p<0.05$) [22].

A retrospective study done by Ozlem Ilhan et al in Ege University Faculty of Medicine, Izmir, Turkey. Data was collected from 2006-2012. The results showed that overall regional is preferred compared to general anaesthesia (49.5% vs 50.5%,$p=0.05$). However, general anaesthesia had been preferred for patients with more severe heart disease (high NYHA class) compared to regional ($p=0.001$). The patients with cardiac surgery or medical treatment history had higher rates ($p=0.009$)[3].

However in other study, a prospective study by E. Langestaeter et al in Oslo University Hospital, Oslo, Norway concluded that pregnant women with a high risk cardiac disease may safely deliver by Caesarean section under regional anaesthesia [23].

4.0 OBJECTIVES

This study is aim to determine prevalence and characteristics of parturients and also review the current management of parturients with heart diseases that underwent Caesarean section in Hospital Serdang.

SPECIFIC OBJECTIVES :

Objective 1

To determine the proportion of parturients with heart diseases that underwent Caesarean section under regional anesthesia in Hospital Serdang from 1st January 2011 till 31st December 2015.

Objective 2

To determine the factors associated with parturients with heart diseases that underwent Caesarean section under regional anesthesia in Hospital Serdang from 1st January 2011 till 31st December 2015.