



West Middlesex University Hospital

Postpartum Maternal Bradycardia

Overview:

Bradycardia in pregnancy:

- Pathological bradycardia in pregnant women is rare.
- Rarely, symptomatic bradycardia has been attributed to supine hypotensive syndrome of pregnancy, which is a result of compression of the inferior vena cava by the gravid uterus and responds to maternal changing of position.
- Congenital heart block (CHB) is rare and does not usually pose a problem during the pregnancy.
- Temporary pacing wire is usually not required during delivery.
- Spinal anaesthesia for caesarean section (CS) can be associated with a higher incidence of all grades of bradycardia (up to 13%).
- In the rare cases of a pregnant woman requiring a permanent pacemaker (PPM), try and avoid inserting in the first trimester and use minimal radiation.

Source: Adamson, Dawn L., Mandish K. Dhanjal, and Catherine Nelson-Piercy. "Arrhythmias." In *OSH Heart Disease in Pregnancy*. Oxford, UK: Oxford University Press, 2011-03-17.

<http://oxfordmedicine.com/view/10.1093/med/9780199574308.001.0001/med-9780199574308-chapter-009>

According to the ESC Guidelines on the management of cardiovascular diseases during pregnancy (2011) Section 8.5 (p. 3179):

Bradyarrhythmias and conduction disturbances are rare during pregnancy. Asymptomatic bradyarrhythmias may become symptomatic due to demands of higher heart rate and CO in patients with structural heart disease. However, bradyarrhythmias usually

have a favourable outcome in the absence of underlying heart disease.

Sinus bradycardia may appear as a reflex cardiac slowing (Valsalva manoeuvre) during delivery. Rare cases of sinus bradycardia have been attributed to the supine hypotensive syndrome of pregnancy, caused by uterine compression of the inferior vena cava blood return with paradoxical sinus slowing. In the rare instance that symptomatic bradycardia occurs, it should be managed by changing the position of the mother to a left lateral decubitus position. For persistent symptoms, a temporary pacemaker may be necessary.

Source: Eur Heart J. 2011 Dec;32(24):3147-97. doi: 10.1093/eurheartj/ehr218.
Epub 2011
Aug 26.

ESC Guidelines on the management of cardiovascular diseases during pregnancy: the Task Force on the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC).

URL:

https://www.escardio.org/static_file/Escardio/Guidelines/publications/PREGN%20Guidelines-Pregnancy-FT.pdf

Date of Search: 09/05/2016 to 10/05/2016

Sources Searched:

MEDLINE

EMBASE

CINAHL

Google scholar

Oxford Medicine Online

DynaMed

Search History:

1. Medline; (maternal adj2 bradycardia*).ti,ab; 47 results.
2. Medline; exp BRADYCARDIA/; 9936 results.

3. Medline; bradycardia*.ti,ab; 18297 results.
4. Medline; 2 OR 3; 23288 results.
5. Medline; (postnatal* OR "post natal*" OR postpartum OR "post partum").ti,ab; 137038 results.
6. Medline; exp POSTPARTUM PERIOD/; 53743 results.
7. Medline; 5 OR 6; 175019 results.
8. Medline; 4 AND 7; 267 results.
9. Medline; maternal.ti,ab; 185986 results.
10. Medline; exp MOTHERS/; 31791 results.
11. Medline; 9 OR 10; 207401 results.
12. Medline; 4 AND 11; 543 results.
13. Medline; 4 AND 10; 13 results.
14. Medline; exp OBSTETRIC LABOR COMPLICATIONS/; 57996 results.
15. Medline; 4 AND 14; 194 results.
16. Medline; Peripartum.ti,ab; 3188 results.
17. Medline; exp PERIPARTUM PERIOD/; 555 results.
18. Medline; 16 OR 17; 3407 results.
19. Medline; 4 AND 18; 16 results.
20. EMBASE; (maternal adj2 bradycardia*).ti,ab; 37 results.
21. EMBASE; bradycardia*.ti,ab; 22868 results.
22. EMBASE; exp BRADYCARDIA/; 40045 results.
23. EMBASE; 21 OR 22; 47525 results.
24. EMBASE; (postnatal* OR "post natal*" OR postpartum OR "post partum").ti,ab; 165043 results.
25. EMBASE; 23 AND 24; 522 results.
26. EMBASE; exp PUERPERIUM/ OR exp PERINATAL PERIOD/; 72719 results.
27. EMBASE; exp PUERPERAL DISORDER/; 37157 results.
28. EMBASE; 26 OR 27; 105838 results.
29. EMBASE; 23 AND 28; 416 results.
30. EMBASE; *BRADYCARDIA/; 6489 results.
31. EMBASE; 28 AND 30; 29 results.
32. EMBASE; 22 AND 28; 394 results.
33. EMBASE; (postnatal adj2 bradycardia*).ti,ab; 6 results.
34. EMBASE; (postpartum adj2 bradycardi*).ti,ab; 3 results.
35. EMBASE; *PERINATAL PERIOD/; 3215 results.
36. EMBASE; 30 AND 35; 1 results.
37. EMBASE; *PUERPERIUM/; 11206 results.
38. EMBASE; 30 AND 37; 3 results.
39. EMBASE; exp OBSTETRIC PATIENT/; 1045 results.
40. EMBASE; 30 AND 39; 0 results.

41. EMBASE; 23 AND 39; 8 results.
42. EMBASE; exp DELIVERY/; 132722 results.
43. EMBASE; 30 AND 42; 112 results.
44. EMBASE; (postnatal* OR "post natal*" OR postpartum OR "post partum").ti; 41962 results.
45. EMBASE; 23 AND 44; 100 results.
46. EMBASE; 23 AND 44; 100 results.
47. EMBASE; *HEART ARRHYTHMIA/; 39400 results.
48. EMBASE; 28 AND 47; 56 results.
49. EMBASE; 21 AND 48; 7 results.
50. Medline; parturient*.ti,ab; 6331 results.
51. Medline; 4 AND 50; 74 results.
52. EMBASE; exp PERIPARTUM CARDIOMYOPATHY/; 902 results.
53. EMBASE; 23 AND 52; 22 results.
54. EMBASE; bradyarrhythmia*.ti,ab; 1891 results.
55. EMBASE; 24 AND 54; 19 results.
56. CINAHL; (maternal adj2 bradycardia*).ti,ab; 4 results.
57. CINAHL; exp BRADYCARDIA/; 1271 results.
58. CINAHL; bradycardia*.ti,ab; 1495 results.
59. CINAHL; 57 OR 58; 2242 results.
60. CINAHL; (postnatal* OR "post natal*" OR postpartum OR "post partum").ti,ab; 14349 results.
61. CINAHL; exp POSTPARTUM PERIOD/; 0 results.
62. CINAHL; 60 OR 61; 14349 results.
63. CINAHL; 59 AND 62; 0 results.
64. CINAHL; exp POSTNATAL PERIOD/; 5842 results.
65. CINAHL; 60 OR 64; 17210 results.
66. CINAHL; 59 AND 65; 17 results.
67. CINAHL; "PERIPARTUM CARDIOMYOPATH*".ti,ab; 154 results.
68. CINAHL; 59 AND 67; 0 results.
69. Medline; "PERIPARTUM CARDIOMYOPATH*".ti,ab; 815 results.
70. Medline; 4 AND 69; 3 results.
71. EMBASE; exp SINUS BRADYCARDIA/; 3746 results.
72. EMBASE; 24 AND 71; 45 results.
73. EMBASE; 27 AND 71; 3 results.
74. EMBASE; exp DELIVERY/; 132722 results.
75. EMBASE; 71 AND 74; 42 results.
76. EMBASE; exp VALSALVA MANEUVER/; 6752 results.
77. EMBASE; 23 AND 76; 155 results.
78. EMBASE; 28 AND 77; 2 results.

79. EMBASE; 52 AND 77; 0 results.
 80. EMBASE; 23 AND 39 AND 76; 0 results.
 81. EMBASE; exp LABOR/; 36076 results.
 82. EMBASE; 23 AND 76 AND 81; 2 results.
 83. EMBASE; (Valsalva adj2 bradycardia*).ti,ab; 5 results.
 84. Medline; exp VALSALVA MANEUVER/; 3696 results.
 85. Medline; "VALSALVA MANEUVER".ti,ab; 2051 results.
 86. Medline; 84 OR 85; 4682 results.
 87. Medline; 4 AND 7 AND 86; 0 results.
 88. Medline; 14 AND 86; 19 results.
 89. Medline; 4 AND 86; 92 results.
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Bradycardia/arrhythmias in peripartum/postpartum period:

Title: Incidence and risk factors of hypotension and bradycardia after spinal anesthesia for cesarean section

Citation: Journal of the Medical Association of Thailand, February 2008, vol./is. 91/2(181-187), 0125-2208;0125-2208 (February 2008)

Author(s): Somboonviboon W., Kyokong O., Charuluxananan S., Narasethakamol A.

Language: English

Abstract: Background: Hypotension or bradycardia after spinal anesthesia for cesarean section remain common and are serious complications. The current study evaluated factors associated to the incidences of hypotension or bradycardia in this context. Material and Method: A prospective cross sectional study from November 1, 2004 to July 31, 2005 was conducted on 722 parturients undergoing cesarean section under spinal anesthesia. T-test and Chi-square test were used in univariate analysis to compare continuous data and categorical data respectively. Multivariate logistic regression was performed on the variables hypotension (systolic pressure decrease > 30% of baseline value) and bradycardia (heart rate < 60 bpm) p-value < 0.05 was considered significant. Results: Incidence of hypotension and bradycardia were 52.6% and 2.5%. The probability of hypotension increased with estimated

blood loss 500-1000 mL (odds ratio [OR] = 1.86; 95% CI 1.30-2.67, p = 0.001), estimated blood loss > 1000 mL (OR = 5.31; 95% CI 1.47-19.19, p = 0.011), and analgesia level > T₄ (OR = 1.94; 95% CI 1.18-3.19, p = 0.009). Hypotension occurred despite left uterine displacement (OR = 1.56; 95% CI 1.11-2.19, p = 0.01). Risk factors associated with bradycardia were adding intrathecal morphine 0.2 mg (0.2 mL) (OR = 4.61; 95% CI 1.31-16.19, p = 0.017) to local anesthetics. Conclusion: The present results indicated that the incidence of hypotension after spinal anesthesia for cesarean section increased with amount of estimated blood loss > 500 mL and analgesic level > T₄. Adding intrathecal morphine 0.2 mg (0.2 mL) to local anesthetics increased incidence of bradycardia.

Publication Type: Journal: Article

Source: EMBASE

Title: Frequency and outcome of arrhythmias complicating admission during pregnancy: experience from a high-volume and ethnically-diverse obstetric service.

Citation: Clinical cardiology, Nov 2008, vol. 31, no. 11, p. 538-541, 0160-9289 (November 2008)

Author(s): Li, Jian-Ming, Nguyen, Carol, Joglar, Jose A, Hamdan, Mohamed H, Page, Richard L

Abstract: Arrhythmias are reported during pregnancy, although hospitalization for these infrequent events is not fully characterized. The frequency and outcome of arrhythmias during pregnancy are unknown. Between 1992 and 2000, there were 136,422 pregnancy-related admissions to Parkland Memorial Hospital (Dallas, TX, USA). Using the discharge diagnosis data bank and the International Classification of Disease, 9th revision, Clinical Modification (ICD-9-CM) coding system, we identified 226 admissions (218 patients) where cardiac arrhythmias and intrauterine pregnancy were both reported. The most common rhythm disturbances during pregnancy were sinus tachycardia (ST), sinus bradycardia (SB), or sinus arrhythmia (SA) (104 episodes/100,000 pregnancies). This was followed by paroxysmal supraventricular tachycardia (PSVT) and premature beats, with a frequency of 24/100,000 and 33/100,000, respectively. Paroxysmal supraventricular tachycardia occurred most

frequently in the third trimester or peripartum. All episodes terminated spontaneously or were safely terminated with medical therapy. Advanced heart block or lethal arrhythmias were exceedingly rare during pregnancy. Most frequently reported cardiac arrhythmias in pregnancy are benign and do not require intervention. Supraventricular tachycardia (SVT), being one of the most common complicated cardiac arrhythmias during pregnancy, can be treated effectively and safely with standard medical therapy. Ventricular arrhythmias or high-degree atrioventricular block (AVB) during pregnancy are extremely rare. Cardiac arrest is also rare, and is often caused by a different etiology from the conventional ones for sudden cardiac death. Copyright 2008 Wiley Periodicals, Inc.

Source: Medline

Full Text:

Available from *Wiley Online Library Open Access 2013 NHS* in [Clinical Cardiology](#)

Available from *Wiley Online Library Open Access 2012 NHS* in [Clinical Cardiology](#)

Title: Incidence and characteristics of maternal cardiac arrhythmias during labor

Citation: American Journal of Cardiology, April 2004, vol./is. 93/7(931-933), 0002-9149 (01 Apr 2004)

Author(s): Romem A., Romem Y., Katz M., Battler A.

Language: English

Abstract: There is an assumption that pregnancy and labor are prone to a higher incidence of maternal cardiac arrhythmias. We assessed the incidence and characteristics of maternal cardiac arrhythmias during labor and compared the findings with corresponding studies of healthy nonpregnant women and pregnant women not in labor. A high incidence of cardiac arrhythmias during labor (93%) was found among 30 healthy pregnant women; however, other than atrial premature beats, the rate was no higher than among nonpregnant women. © 2004 by Excerpta Medica, Inc.

Publication Type: Journal: Article

Source: EMBASE

Title: Acquired Post Partum Bradycardia: Clinical Features Associated with Mutations in the hyperpolarization-activated nucleotide-gated channel 4 Cardiac Ion Channel

Citation: Europace, June 2011, vol./is. 13/(no pagination), 1099-5129 (June 2011)

Author(s): Nof E., Miller L., Kuperstein R., Eldar M., Glikson M., Luria D.

Language: English

Abstract: Background: The hyperpolarization-activated nucleotide-gated channel-HCN4 plays a major role in the diastolic depolarization of sinus node cells. Mutant HCN4 channels have been found to be associated with inherited sinus bradycardia (SB). We sought to investigate the clinical and genetic features of patients developing post partum SB. Methods: Clinical evaluation included 24- hr ECG holter recording and echocardiogram at baseline (immediate post partum period) and 24- hr ECG holter and exercise testing 6-12 month later. Genetic analysis included segregation analysis and direct sequencing of all exons encoding HCN4. Results: Between 2008- 2010, 15 women were referred to arrhythmia service due to unexplained SB with an average heart rate (HR) of 42+/- 5 on ECG after uneventful pregnancy and delivery of a healthy child. All were mildly symptomatic, hemodynamically stable and recovered gradually without any therapy. None of them were known to have bradycardia before or during pregnancy. All but one had a negative family history of bradycardia. All had a normal echocardiogram. Holter recording demonstrated a minimum HR of 40+/-4, average HR of 54+/-9 and maximal HR of 96+/- 17. Three patients (20%) were found to have missense mutation in HCN4. Two had a newly described M1113V mutation and one had an A485V mutation found previously by our group to cause an HCN4 loss of function. Six patients were followed up (avg: 7+/- 2 months). None of them were symptomatic. Average, maximal and minimal HR respectively increased on holter recording (72+/-9 and 134+/-24 vs. baseline; p< 0.05 and 48+/-7 vs. baseline; p= 0.2). Exercise testing (n=4) demonstrated normal

chronotropic competence. Conclusions: We describe a new clinical entity of post partum SB. These patients had benign clinical course with rapid recovery. Around 20% were found to carry HCN4 mutations. Post partum hormonal changes may accentuate predisposing factors such as HCN4 loss of function mutations resulting in SB.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *Highwire Press* in [Europace](#)

Available from *Oxford University Press* in [Europace](#); Note: ; Collection notes: To access please select Login with Athens and search and select NHS England as your institution before entering your NHS OpenAthens account details.

Title: Maternal arrhythmias of normal labor and delivery

Citation: Gynecologic and Obstetric Investigation, 2001, vol./is. 52/2(128-131), 0378-7346 (2001)

Author(s): Berlinerblau R., Yessian A., Lichstein E., Haberman S., Oruci E., Jewelewicz R.

Language: English

Abstract: Labor and delivery are associated with significant hemodynamic changes, as well as pain and anxiety, all of which could be fertile ground for arrhythmias. In order to establish whether cardiac arrhythmias occur more frequently during labor and delivery in healthy parturients and whether it clinically affects the mother or the newborn, 100 pregnant women admitted for delivery had Holter monitoring before, during, and up to 1 h postpartum. Our results show that, excluding sinus rhythm variations, only a slight majority of the study subjects had arrhythmia at all, while only 2% had more complex arrhythmias, none of which required any therapeutic intervention. We conclude that cardiac arrhythmias occurring during labor, delivery, and postpartum in the healthy parturient are no more frequent than in the general

female population of the same age and are without clinical consequences for the mother and the newborn. Copyright © 2001 S. Karger AG, Basel.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *ProQuest* in [Gynecologic and Obstetric Investigation](#)

Title: Maternal arrhythmia: A case report and review of the literature

Citation: Obstetrical and Gynecological Survey, May 2012, vol./is. 67/5(298-312), 0029-7828;1533-9866 (May 2012)

Author(s): Moore J.S., Teefey P., Rao K., Berlowitz M.S., Chae S.H., Yankowitz J.

Language: English

Abstract: Pregnant patients with maternal arrhythmias can be challenging and difficult to treat. Medication choices may be limited in patients who are pregnant. Pregnancy carries with it a unique and complex physiology, coupled with fetal concerns. We describe a pregnant patient with an arrhythmia to illustrate treatment thought process and options. We also present a comprehensive review of the literature in regard to treatment of maternal arrhythmias and their potential adverse fetal and maternal outcomes. These treatments include antiarrhythmic medications, electrical cardioversion, and radiofrequency ablation. Antepartum and intrapartum monitoring will also be addressed along with delivery planning and postpartum considerations. The most important aspect in treating these patients is the use of a multidisciplinary approach. The decision of what therapy to use must be addressed on a case-by-case basis with special attention to the patient's individual issues and concerns. Target Audience: Obstetricians and gynecologists, family physicians, emergency room physicians Learning Objectives: After completion of this educational activity, the obstetrician/gynecologist should be better able to assess and counsel patients on the risks and complications of maternal arrhythmias in pregnancy. Evaluate the current treatment options available for health care providers caring for pregnant patients with maternal arrhythmia, and manage the antepartum

course, labor, and delivery in these patients. © 2012 Lippincott Williams & Wilkins.

Publication Type: Journal: Review

Source: EMBASE

Full Text:

Available from *Ovid* in [Obstetrical & gynecological survey.](#)

Available from *Ovid* in [Obstetrical and Gynecological Survey](#)

Title: Hypertensive crisis during pregnancy and postpartum period

Citation: Seminars in Perinatology, August 2013, vol./is. 37/4(280-287), 0146-0005;1558-075X (August 2013)

Author(s): Too G.T., Hill J.B.

Language: English

Abstract: Hypertension affects 10% of pregnancies, many with underlying chronic hypertension, and approximately 1-2% will undergo a hypertensive crisis at some point during their lives. Hypertensive crisis includes hypertensive urgency and emergency; the American College of Obstetricians and Gynecologists describes a hypertensive emergency in pregnancy as persistent (lasting 15. min or more), acute-onset, severe hypertension, defined as systolic BP greater than 160. mmHg or diastolic BP >110. mmHg in the setting of pre-eclampsia or eclampsia. Pregnancy may be complicated by hypertensive crisis, with lower blood pressure threshold for end-organ damage than non-pregnant patients. Maternal assessment should include a thorough history. Fetal assessment should include heart rate tracing, ultrasound for growth and amniotic assessment, and Doppler evaluation if growth restriction is suspected. Initial management of hypertensive emergency (systolic BP >160. mmHg or diastolic BP >110. mmHg in the setting of pre-eclampsia or eclampsia) generally includes the rapid reduction of blood pressure through the use of intravenous antihypertensive medications, with goal systolic blood pressure between 140. mmHg and 150. mmHg and diastolic pressure between 90. mmHg and 100. mmHg. First-line intravenous drugs include labetalol and hydralazine, but other agents may be used, including esmolol, nicardipine,

nifedipine, and, as a last resort, sodium nitroprusside. Among patients with hypertensive urgency, slower blood pressure reduction can be provided with oral agents. The objective of this article is to review the current understanding, diagnosis, and management of hypertensive crisis during pregnancy and the postpartum period. © 2013 Elsevier Inc.

Publication Type: Journal: Review

Source: EMBASE

Title: Management of peripartum cardiomyopathy

Citation: Current Treatment Options in Cardiovascular Medicine, December 2012, vol./is. 14/6(622-636), 1092-8464;1534-3189 (December 2012)

Author(s): Stewart G.C.

Language: English

Abstract: Peripartum cardiomyopathy is diagnosed in women who develop systolic heart failure in the last month of pregnancy or within 5 months of delivery. This diagnosis should not be made in women with pre-existing cardiac disease or another cause of cardiac dysfunction. To prevent delay in diagnosis and treatment, a high index of suspicion is required given the overlapping symptoms of late pregnancy and heart failure. Traditional heart failure medical therapies are indicated, although drugs must be carefully reviewed for safety during pregnancy and lactation. Long-term prognosis is largely determined by the degree of ventricular recovery. Patients with acute or persistent hemodynamic compromise despite medical therapy should be considered for mechanical circulatory support and evaluated promptly for cardiac transplantation. A multidisciplinary team is required to care for patients with peripartum cardiomyopathy through parturition and beyond. All peripartum cardiomyopathy patients should be counseled that repeat pregnancy can negatively impact cardiac function and lead to recurrent heart failure or even death. Patients with persistent ventricular dysfunction should be strongly advised against another pregnancy.

Publication Type: Journal: Review

Source: EMBASE

Full Text:

Available from *Springer Link Journals* in [Current Treatment Options in Cardiovascular Medicine](#)

Title: Management of Cardiovascular Diseases During Pregnancy

Citation: *Current Problems in Cardiology*, April 2014, vol./is. 39/4-5(85-151), 0146-2806;1535-6280 (April 2014)

Author(s): Regitz-Zagrosek V., Gohlke-Barrwolf C., Iung B., Pieper P.G.

Language: English

Abstract: The prevalence of cardiovascular diseases (CVDs) in women of childbearing age is rising. The successes in medical and surgical treatment of congenital heart disease have led to an increasing number of women at childbearing age presenting with problems of treated congenital heart disease. Furthermore, in developing countries and in immigrants from these countries, rheumatic valvular heart disease still plays a significant role in young women. Increasing age of pregnant women and increasing prevalence of atherosclerotic risk factors have led to an increase in women with coronary artery disease at pregnancy. Successful management of pregnancy in women with CVDs requires early diagnosis, a thorough risk stratification, and appropriate management by a multidisciplinary team of obstetricians, cardiologists, anesthesiologists, and primary care physicians. The following review is based on the recent European guidelines on the management of CVDs during pregnancy, which aim at providing concise and simple recommendations for these challenging problems. © 2014 Elsevier B.V.

Publication Type: Journal: Article

Source: EMBASE

Title: Bradyarrhythmias in pregnancy: a case report and review of management

Citation: International Journal of Obstetric Anesthesia, April 2007, vol./is. 16/2(165-170), 0959-289X (April 2007)

Author(s): Adekanye O., Srinivas K., Collis R.E.

Language: English

Abstract: We present a case of un paced pre-existing congenital heart block in pregnancy, diagnosed for the first time in labour. Our patient was asymptomatic and was managed conservatively with temporary pacing equipment on standby. She had a post-partum cardiology follow-up and was paced in the puerperium. We discuss the aetio-pathogenesis and the variable presentation patterns of bradyarrhythmia in pregnancy and the multidisciplinary approach to their management. Our recommendations combine the Advanced Life Support algorithm for treatment of bradycardia and the successful management strategies of several documented case reports in the literature. © 2006 Elsevier Ltd. All rights reserved.

Publication Type: Journal: Article

Source: EMBASE

Title: Postpartum bradycardia and hypotension

Citation: Hospital Practice, 1991, vol./is. 26/9 A(20+22), 8750-2836 (1991)

Author(s): Patel A., Isber N., Weiner B.

Language: English

Publication Type: Journal: Article

Source: EMBASE

Title: Examining the influence of maternal bradycardia on neonatal outcome using automated data collection

Citation: International Journal of Obstetric Anesthesia, July 2007, vol./is. 16/3(208-213), 0959-289X (July 2007)

Author(s): Brenck F., Hartmann B., Jost A., Rohrig R., Obaid R., Bruggmann D., Harbach H., Junger A.

Language: English

Abstract: Background: Due to the increasing number of caesarean sections, we investigated the influence of maternal bradycardia during general and regional anaesthesia on seven standard paediatric outcome parameters using our online recorded data. Methods: Data from 1154 women undergoing caesarean section were investigated prospectively. Bradycardia was defined as a heart rate below 60 beats/min. The matched-pairs method was used to evaluate the impact of bradycardia on Apgar scores at 1, 5, and 10 min, umbilical artery pH and base excess, admission to paediatric intensive care unit, and seven-day mortality. Matched references were automatically selected among all patients from the data pool according to anaesthetic technique, sensory block height, urgency, maternal age and body mass index. Stepwise regression models were developed to predict the impact of intra-operative bradycardia on outcome variables with differences between matched pairs assessed using univariate analysis. Results: Bradycardia was found in 146 women (12.7%) for whom a control could be matched in 131 cases (89.7%). Mean 5-minute Apgar score was 9.2 +/- 1.1 for study patients and 9.3 +/- 1.1 for controls. pH and base excess were not significantly different between groups. In cases of urgent surgery, neonates had an increased risk of 1.8 (95% CI 1.36-2.44, P < 0.01) for an Apgar score <8 at 1 min and a 2.6-fold risk (95% CI 1.64-4.06, P < 0.01) of umbilical arterial pH of <7.2 compared to infants undergoing non-urgent procedures. Conclusions: Using matched-pairs analysis we were unable to demonstrate that episodes of maternal bradycardia below 60 beats/min were associated with a poorer neonatal outcome regardless of anaesthetic technique. © 2007 Elsevier Ltd. All rights reserved.

Publication Type: Journal: Article

Source: EMBASE

Title: Arrhythmias in peripartum cardiomyopathy

Citation: Cardiac electrophysiology clinics, June 2015, vol./is. 7/2(309-317), 1877-9190 (01 Jun 2015)

Author(s): Honigberg M.C., Givertz M.M.

Language: English

Abstract: Peripartum cardiomyopathy (PPCM) is a complication of late pregnancy and the early postpartum period characterized by dilated cardiomyopathy and heart failure with reduced ejection fraction. Approximately half of women fail to recover left ventricular function. Standard management of heart failure is indicated, with some exceptions for women who are predelivery or breastfeeding. Atrial and ventricular arrhythmias are reported in PPCM, but the frequency of arrhythmias in this condition is not well characterized. Management of PPCM-associated arrhythmias may include antiarrhythmic drugs, catheter ablation, and wearable or implantable cardioverter-defibrillators. Further research is needed on the prevalence, natural history, and optimal management of arrhythmias in PPCM.

Publication Type: Journal: Review

Source: EMBASE

Title: Peripartum cardiomyopathy

Citation: World Heart Journal, 2014, vol./is. 6/2(139-147), 1556-4002 (2014)

Author(s): Neki N.S., Singh R., Vargova V., Mechirova V.

Language: English

Abstract: Peripartum cardiomyopathy (PPCM) is rare disorder of unknown etiology. It causes significant mortality. Proposed mechanisms of PPCM are

prolactin mediated, myocarditis, autoimmunity, genetic, nutritional. Diagnosis is based on clinical and echocardiographic findings. Subsequent pregnancy should be avoided, because it increases chances of relapse. Newer treatment modalities include bromocriptine, cabergolin, pentoxifylline, intravenous immunoglobulin, showing promising results. Heart transplantation is last option for treatment of PPCM.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *ProQuest* in [World Heart Journal](#)

Other Etiologies:

Title: Peripartum cardiac chest pain and troponin rise.

Citation: International journal of obstetric anesthesia, Oct 2010, vol. 19, no. 4, p. 453-455, 1532-3374 (October 2010)

Author(s): Tatham, K, Hughes-Roberts, Y, Davies, S, Johnson, M, Ashpole, K, Cox, M

Abstract: The incidence of myocardial ischaemia is increasing in the obstetric population. This has been attributed to several factors including greater maternal age, the increasing incidence of obesity and diabetes, and the growing population of patients with grown-up congenital heart disease who now reach adulthood and become pregnant. A number of cases of myocardial ischaemia in pregnant women have been documented, during and after delivery, for which no cause has been established. We present a case of a nulliparous woman who developed cardiac chest pain, bradycardia, hypertension and a raised troponin I after vaginal delivery of twin boys at 36 weeks of gestation. Ischaemic electrocardiogram changes were noted. Detailed investigations demonstrated a normal coronary circulation. A patent foramen ovale was found on bubble echocardiography. Copyright © 2010 Elsevier Ltd. All rights reserved.

Source: Medline

Title: Near fatal bradycardia during cesarean section under spinal anesthesia: "High spinal" may not be only risk factor

Citation: Saudi Journal of Anaesthesia, November 2014, vol./is. 8/5 Supplement(S118-S119), 1658-354X;0975-3125 (01 Nov 2014)

Author(s): Maitra S., Baidya D.K., Bhattacharjee S.

Language: English

Publication Type: Journal: Letter

Source: EMBASE

Full Text:

Available from *National Library of Medicine* in [Saudi Journal of Anaesthesia](#)

Available from *Free Access Content* in [Saudi Journal of Anaesthesia](#)

Available from *National Library of Medicine* in [Saudi Journal of Anaesthesia](#)

Available from *ProQuest* in [Saudi Journal of Anaesthesia](#)

Title: Postpartum severe sinus bradycardia following methylergonovine administration

Citation: Journal of International Medical Research, 2008, vol./is. 36/5(1129-1133), 0300-0605 (2008)

Author(s): Ibrahim S.M., Mustafa E., Louon A.

Language: English

Abstract: The case is reported of a 30-year-old multigravida, with insignificant history and stable vital signs, admitted to the labour room for normal vaginal delivery of twins. She received combined spinal epidural analgesia (bupivacaine plus fentanyl) for 3 h. Following uneventful delivery she received 0.2 mg methylergonovine maleate, intramuscularly. Nausea and vomiting

occurred 70 min after placenta delivery, heart rate decreased, arterial blood pressure increased and there was chest pain. After excluding cardiac ischaemia, 0.5 mg atropine sulphate was administered intravenously. Chest pain improved but heart rate and blood pressure increased more than expected. The patient had mild headache and nausea, and antiemetic 4 mg ondansetron was given intravenously. Continuous monitoring for 4 h showed spontaneous chest pain relief and blood pressure improvement. In conclusion, serious delayed side-effects arising from methylergonovine maleate can occur in young, normal patients and close monitoring is required. Intravenous atropine sulphate following methylergonovine maleate administration may lead to severe hypertension and tachycardia. Copyright © 2008 Field House Publishing LLP.

Publication Type: Journal: Article

Source: EMBASE

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Title: Severe maternal bradycardia and asystole after combined spinal-epidural labor analgesia in a morbidly obese parturient.

Citation: *Journal of clinical anesthesia*, Sep 2004, vol. 16, no. 6, p. 461-464, 0952-8180 (September 2004)

Author(s): Pan, Peter H, Moore, Charles H, Ross, Vernon H

Abstract: Serious maternal bradycardia and asystole in laboring parturients after combined spinal-epidural labor analgesia are rare. We report such a case in a morbidly obese laboring parturient after receiving combined spinal-epidural labor analgesia. The differential diagnosis, risk factors, potential contributing factors, and the successful management of the complications with our positive patient outcome are discussed. Even with the low dose of

neuraxial drugs commonly administered in combined spinal-epidural labor analgesia, this case underscores the importance of vigilance, frequent monitoring, proper positioning, and rapid resuscitation with escalating doses of ephedrine, atropine, and epinephrine, all of which are essential in the presence of bradycardia or asystole in these patients.

Source: Medline

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Available from *ProQuest* in [Journal of Clinical Anesthesia](#)

Title: Cardiovascular alterations in the parturient undergoing cesarean delivery with neuraxial anesthesia

Citation: Expert Review of Obstetrics and Gynecology, January 2012, vol./is. 7/1(59-75), 1747-4108;1747-4116 (January 2012)

Author(s): Arendt K.W., Muehlschlegel J.D., Tsen L.C.

Language: English

Abstract: During cesarean delivery with neuraxial anesthesia, maternal hemodynamic changes occur with prehydration of intravenous fluid, block onset and delivery of the fetus. The direction and degree of these hemodynamic changes is influenced by multiple interacting variables including the physiologic and anatomic alterations of pregnancy, maternal and fetal characteristics, comorbid conditions, the neuraxial technique, the amount of blood loss and fluid and drug administration. In this review, the influences of each of these variables, as well as the techniques used to evaluate, prevent and treat hypotension, are discussed to provide a comprehensive overview of the cardiovascular alterations in the parturient undergoing cesarean delivery with neuraxial anesthesia.

Publication Type: Journal: Review

Source: EMBASE

Full Text:

Available from ProQuest in [Expert Review of Obstetrics and Gynecology](#)

Title: Woman with postpartum ventricular tachycardia and hypomagnesemia

Citation: Journal of Obstetrics and Gynaecology Research, April 2003, vol./is. 29/2(92-95), 1341-8076 (April 2003)

Author(s): Onagawa T., Ohkuchi A., Ohki R., Izumi A., Matsubara S., Sato I., Suzuki M., Minakami H.

Language: English

Abstract: A 28-year-old Japanese woman who had received continuous intravenous infusion of magnesium sulfate from 24 weeks of pregnancy until delivery underwent cesarean section at 30 weeks and gave birth to twins. Serum magnesium sharply declined to a subnormal level of 1.5mg/dL on postpartum day 4. The patient exhibited sinus bradycardia (48 b.p.m.) with intermittent supraventricular contraction on postpartum day 2, intermittent ventricular bigeminy on postpartum day 3, and frequent self-terminated polymorphic ventricular tachycardia on postpartum day 4. The electrocardiogram (ECG) disclosed that the patient had prolonged QTc of 0.45-0.67. Correction of serum magnesium improved ECG findings promptly, resulting in the disappearance of arrhythmias. Hypomagnesemia due to postpartum diuresis may have played a role causing ventricular tachyarrhythmia in this patient.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from Wiley in [Journal of Obstetrics and Gynaecology Research](#)
Available from Wiley in [Journal of Obstetrics and Gynaecology Research](#)

Title: Epidural anaesthesia during labour for a patient with congenital complete heart block: A case report

Citation: Journal of the Pakistan Medical Association, November 2007, vol./is. 57/11(565-566), 0030-9982 (November 2007)

Author(s): Monem A., Chohan U., Ali M.

Language: English

Abstract: We report labour pain management in a full term pregnant patient with Congenital Complete Heart Block. She delivered uneventfully under routine monitoring with facilities for pacing at hand. She previously had an uneventful normal delivery and a D&E, both outside our hospital. Only findings were a low heart rate of 45-50 beats per minute. She never had syncopal attacks. She had a good effort tolerance on ETT. Her ejection fraction was 60% on Echocardiogram. She was given a single shot low dose spinal with fentanyl followed by epidural insertion. She successfully delivered through mid-cavity forceps in about 2.5 hours. The only problem encountered was a transient bradycardia of 40 per minute with a systolic blood pressure of 70 mmHg, which settled with ephedrine. Pace maker insertion is recommended early in case the patient is symptomatic or has a prolonged Q-T interval or left atrial enlargement on ECG. Regional anaesthesia is recommended to prevent valsalva induced bradycardia or cardiac arrest during expulsive efforts by the patient.

Publication Type: Journal: Article

Source: EMBASE

Title: Perioperative vasovagal syncope with focus on obstetric anesthesia.

Citation: Taiwanese journal of obstetrics & gynecology, Sep 2006, vol. 45, no. 3, p. 208-214, 1875-6263 (September 2006)

Author(s): Tsai, Pei-Shan, Chen, Chih-Ping, Tsai, Ming-Song

Abstract: Vasovagal syncope refers to a reflex cardiovascular depression that gives rise to loss of consciousness with bradycardia and profound vasodilatation. This response commonly occurs during regional anesthesia, hemorrhage or supine inferior vena cava compression in pregnancy. The changes in circulatory response from the normal maintenance of arterial pressure to parasympathetic activation and sympathetic inhibition may cause severe hypotension. This change is triggered by reduced cardiac venous return as well as episodes of emotional stress, excitement or pain. Occasionally, these

vasovagal responses may be unpredictable and may dramatically proceed to asystole with circulatory collapse, and may even result in death. In these circumstances, hypotension may be more severe than that caused by bradycardia alone, because of unappreciated vasodilatation. Regional anesthesia, decreased venous return, hemorrhage and abnormal fetal presentation cumulatively increase the risk of vasovagal syncope in cesarean section patients. When a vasovagal response occurs, ephedrine is the drug of first choice because of its combined action on the heart and peripheral blood vessels. Epinephrine must be used early in established cardiac arrest, especially after high regional anesthesia.

Source: Medline

Full Text:

Available from *Free Access Content* in [Taiwanese Journal of Obstetrics and Gynecology](#)

Title: Maternal hypothermia: an unusual complication of magnesium sulfate therapy.

Citation: American journal of obstetrics and gynecology, Feb 1987, vol. 156, no. 2, p. 435-436, 0002-9378 (February 1987)

Author(s): Rodis, J F, Vintzileos, A M, Campbell, W A, Deaton, J L, Nochimson, D J

Abstract: Reported is a case of maternal hypothermia associated with magnesium sulfate therapy for treatment of preterm labor. Hypothermia was accompanied by fetal and maternal bradycardia. After discontinuation of magnesium sulfate infusion, maternal temperature, pulse, and fetal heart rate gradually returned to normal. No adverse effects were noted on either maternal or fetal outcome.

Source: Medline

Title: Transient bradycardia associated with extradural blood patch after inadvertent dural puncture in parturients.

Citation: British journal of anaesthesia, Oct 1992, vol. 69, no. 4, p. 401-403, 0007-0912 (October 1992)

Author(s): Andrews, P J, Ackerman, W E, Juneja, M, Cases-Cristobal, V, Rigor, B M

Abstract: We have studied prospectively 10 ASA I or II postpartum patients after inadvertent dural puncture during labour. An extradural blood patch (autologous blood 15 ml) was performed within 18 h of delivery, with continuous EEG, upper facial EMG (Datex: Anesthesia and Brain Activity Monitor), pulse oximetry and heart rate measurement before, during and for 30 min after extradural injection. Non-invasive arterial pressure measurements (Dinamap) were recorded at 5-min intervals. After extradural blood patch, a statistically significant (Student's t test, $P < 0.05$) decrease in heart rate, from a mean baseline of 88.6 (SD 7.31) beat min⁻¹ to 51.3 (7.6) beat min⁻¹, occurred within 122.6 (16.9) s from the time of the EBP. Bradycardia was observed for a mean duration of 12.4 (1.1) s. Upper facial EMG, EEG, SpO₂ and arterial pressure did not change.

Source: Medline

Title: A case of maternal bradycardia at therapeutic doses of magnesium sulphate in preeclampsia.

Citation: The Australian & New Zealand journal of obstetrics & gynaecology, May 1999, vol. 39, no. 2, p. 256-257, 0004-8666 (May 1999)

Author(s): Hennessy, A, Hill, I

Source: Medline

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Available from *Wiley* in [Australian and New Zealand Journal of Obstetrics and Gynaecology](#)

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Title: Bradycardia as a presenting feature of late postpartum eclampsia

Citation: Nephrology Dialysis Transplantation, 1994, vol./is. 9/8(1174-1175), 0931-0509 (1994)

Author(s): Korzets Z., Ben-Chitrit S., Bernheim J.

Language: English

Publication Type: Journal: Article

Source: EMBASE

Title: Cardiac output and spinal anesthesia: An echocardiographic study

Citation: British Journal of Anaesthesia, March 2012, vol./is. 108/(ii116-ii117), 0007-0912 (March 2012)

Author(s): Cabrera C., Herve M., De La Maza J., Semertzakis I., Labbe M.

Language: English

Abstract: Introduction: Spinal anesthesia produces hemodynamic changes, like hypotension (described in up to 30% of patients) and bradycardia. The physiology of these changes has been studied years ago in experimental animal models and humans. At present transthoracic echocardiography (TTE) can be a useful modern non-invasive monitor to study what happens to the cardiac output (CO) after a subarachnoid block in patients during real clinical practice. Objective: To evaluate the performance of the CO with the use of TTE after the installation of a spinal anesthesia. Methods: ASA I patients proposed for surgery under spinal anesthesia were prospectively studied. The basal CO was studied using the left paraesternal window where the diameter of the outflow tract of the left ventricle was measured and its area was calculated. Then, from

the apical fivechamber window with continuous Doppler the velocity time integral from the outflow tract (VTI) was measured. Multiplying VTI by the area, the stroke volume (SV) was obtained, which again multiplied by the heart rate (HR), determined CO. After this basal examination, a spinal anesthesia was started using a standardized mixture with Chirocaine 0.5% and fentanyl 20 micrograms in a volume between 2.5 and 3 ml. The same echocardiographic examination was performed to measure CO after verifying the installation of the spinal block. Results: We studied 68 patients, in only 4 echocardiographic windows were not satisfactory. The average age was 42.6+/-10 years. All patients underwent surgery with spinal block. The block level was T6 achieved a 34.26% of the cases and 31.11% in T4. Variations in systolic, diastolic and heart rate had a statistically significant decrease. There was no significant difference in the GC before (4.41+/-0.34 l min⁻¹) and after spinal anesthesia (4.22+/-0.36 l min⁻¹). Maximum height of sensory subarachnoid block was not correlated with the decrease in MAP and the echocardiographic parameters. Conclusions: Spinal anesthesia decreased hemodynamic parameters, but not the CO. The intraoperative use of transthoracic echocardiography allowed direct and real study of cardiovascular physiology and demonstrates that despite low blood pressure, and heart rate, CO tended to remain normal, probably because of offset by other mechanisms such as increased myocardial contractility and improvement diastolic function. In the future, the TTE may be a study tool to evaluate what happens with different anesthetics and different types of patients like obstetric patients, patients having abnormal myocardium and hypertensive patients.

Publication Type: Journal: Conference Abstract

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Title: Postpartum complete heart block in a healthy patient

Citation: Journal of Obstetrics and Gynaecology, April 2010, vol./is. 30/3(314), 0144-3615;1364-6893 (April 2010)

Author(s): Joseph R., Coker M.

Language: English

Publication Type: Journal: Article

Source: EMBASE

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