PATHOLOGICAL CTG LEADING TO EMERGENCY CAESAREAN SECTION AND ITS PERINATAL OUTCOME IN HOSPITAL RAJA PEREMPUAN ZAINAB II, KOTA BHARU

BY

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ABSTRACT

Objective: To evaluate the perinatal outcomes of infants who had pathological CTGs resulting in emergency caesarean section as a mode of delivery.

Methods: A cross sectional study was conducted from the 1st of June 2006 to 31st of May 2007 in Hospital Raja Perempuan Zainab II , Kota Bharu. One hundred and forty five patients who had pathological CTGs in labour had emergency caesarean sections. The neonates were assessed in terms of their Apgar scores at 1 and 5 minutes of life and had their umbilical artery pH recorded. The type of anaesthesia used, duration between decision of caesarean section and delivery of neonates, appearance of liquor and the variability of the CTGs were also recorded.

Results: In this study only 25 (17.25%) out of 145 neonates had an umbilical artery pH of less than 7.2. Out of the 145 neonates, only 21 (14.49%) had an Apgar score of below 7 at 1 minute and only 1 (0.7%) neonate had an Apgar score of below 7 at 5 minutes of life. The mean umbilical artery pH was 7.26. Spinal anaesthesia was 3.4 times more commonly used than general anaesthesia. The mean duration between decision of caesarean section and delivery was 59.9 minutes. The most common variability seen was in the group of more than 25 which was 68 (46.9%), the commonest liquor observed was clear in nature which was 71 (49%) in number, the commonest baseline heart rate of 110-160 was seen in 116 (80%), the commonest deceleration was late deceleration which was seen in 62 (42.8%) CTGs and acceleration was absent in 129 (89%) CTGs.

There was no association between the time taken between decision and delivery of neonates with umbilical artery pH and Apgar scores at 1 and 5 minutes. There was an association between the different groups of baseline heart rate, different types of decelerations, different types of liquor and variabilities of the CTGs with umbilical artery pH and Apgar scores at 1 and 5 minutes. There is also an association between the presence and absence of acceleration with umbilical artery pH and Apgar score at 1 minute, but there was no association with Apgar score at 5 minutes.

Conclusion: CTG alone is a poor predictor of fetal hypoxia in labour resulting in an increase in caesarean sections.

ABSTRAK

Objektif: Untuk menilai kesan-kesan perinatal ke atas bayi-bayi yang mempunyai CTG "pathological" dan dilahirkan secara pembedahan caesarean section.

Kaedah: Kajian "cross section" dikendalikan daripada 1^{hb} Jun 2006 sehingga 31^{hb} Mei 2007 di Hospital Raja Perempuan Zainab II, Kota Bharu. Seramai 145 pesakit yang didapati mempunyai CTG yang berkeadaan "pathological" semasa proces kelahiran telah melalui pembedahan caesarean section. Bayi- bayi ini dinilai melalui keputusan Apgar pada minit pertama dan kelima dan darah dari umbilical arteri diperiksa untuk nilai pH. Jenis pembiusan yang digunakan, masa yang diambil dari keputusan untuk pembedahan sehingga bayi dilahirkan, jenis air ketuban dan variasi CTG telah juga diambil kira.

Keputusan: Dalam kajian ini, didapati hanya seramai 25 (17.25%) daripada 145 bayi yang dilahirkan didapati mempunyai nilai pH arteri umbilical kurang daripada 7.2, 21 (14.49%) daripada 145 bayi mempunyai keputusan Apgar di bawah 7 pada masa minit pertama dan 1(0.7%) daripada 145 bayi mempunyai keputusan Apgar di bawah 7 pada minit kelima. Bius secara spinal adalah 3.4 kali lebih kerap digunakan berbanding dengan cara bius secara penuh. Masa purata yang diambil dari keputusan untuk pembedahan sehingga kelahiran bayi adalah 59.9 minit. Jenis air ketuban yang paling kerap adalah jernih iaitu sebanyak 71 (49%) dan variasi CTG yang paling kerap adalah lebih daripada 25 denyutan per minit iaitu dengan kekerapan sebanyak 68 (46.9%). Kadar denyutan jantung yang terbanyak adalah di antara 110 – 160 dengan kekerapan sebanyak 116 (80%), penurunan denyutan jantung yang terbanyak

adalah penurunan lambat iaitu dengan kekerapan 62 (42.8%), tiada peningkatan denyutan jantung direkodkan di dalam 129 CTG. Tiada perkaitan dikenalpasti di antara tempoh keputusan dibuat dan masa kelahiran dengan nilai pH arteri umbilical dan nilai Apgar pada 1 dan 5 minit. Terdapat perkaitan di antara kadar denyutan jantung, penurunan denyutan jantung, jenis air ketuban dan variasi dalam CTG dengan nilai pH arteri umbilical dan nilai Apgar pada 1 dan 5 minit. Terdapat juga perkaitan di antara kadar peningkatan denyutan jantung dengan pH arteri umbilical dan nilai Apgar pada 1 minit, tetapi tidak pada 5 minit.

Kesimpulan: Penggunaan CTG sahaja tidak dapat mengenal pasti dengan tepatnya bayi-bayi yang berkeadaan "hypoxia" dan ini akan meninggikan kadar pembedahan caesarean section.

1. INTRODUCTION TO KELANTAN STATE

Kelantan Darul Naim is one of the nine states that make up Malaysia. It is situated on the north eastern part of Peninsula Malaysia. It is bounded by Thailand in the north, Terengganu at the east, Pahang at the south and Perak at the west. It covers a total area of 14,9204sq km. and is made up of 10 districts namely Kota Bahru, Bachok, Tumpat, Machang, Pasir Mas, Pasir Putih, Tanah Merah, Kuala Krai, Gua Musang and Jeli. Kelantan is home to about 1.4 million people in 2000.

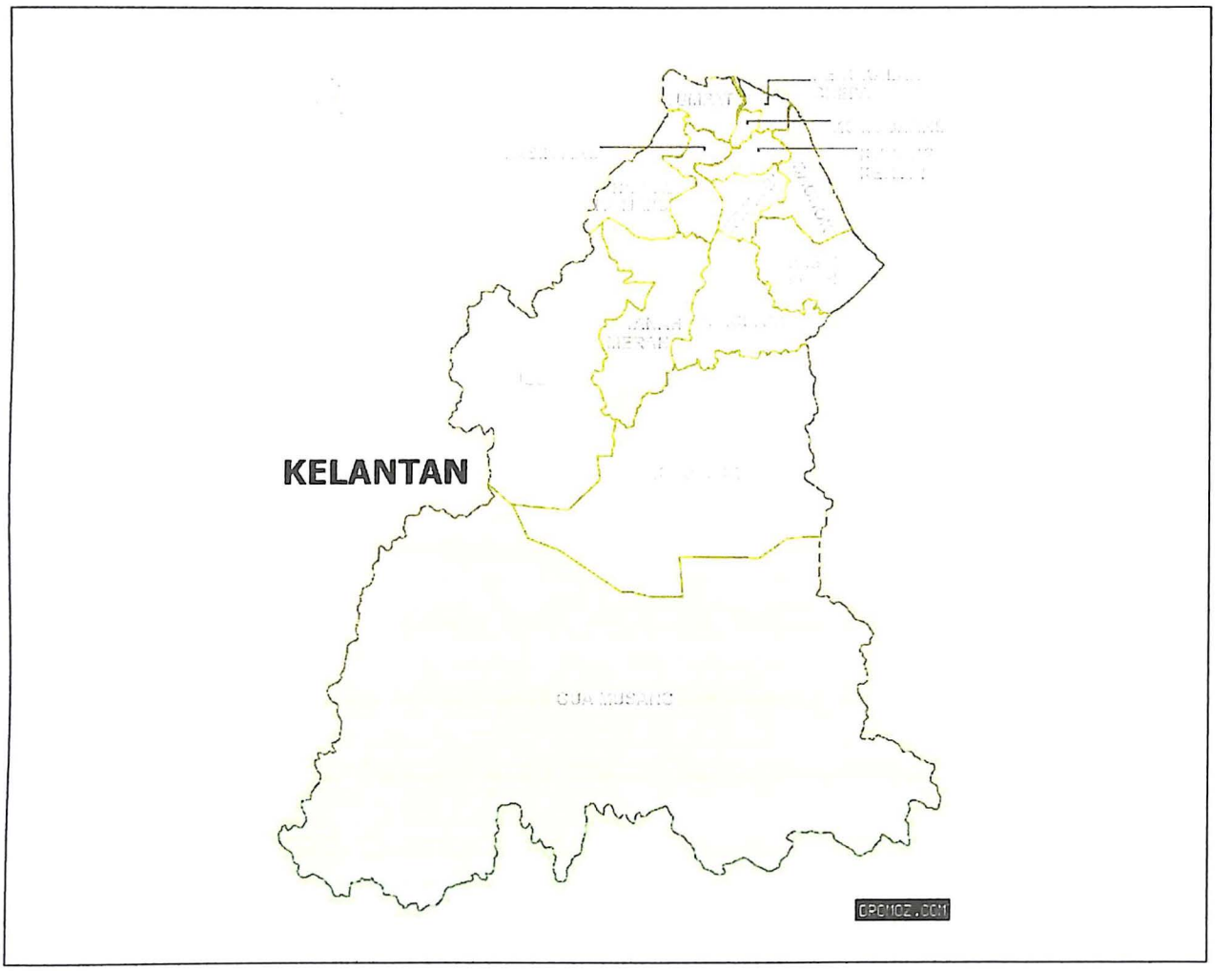

Figure 1 : Map of Kelantan state.

Kelantan has been in existence since 8000 and 3000BC. Chinese documents have recorded that Kelantan was at that time known as HO- LU-TAN, CHIN TU and TAN TAN. The territories of Kelantan came under Siam in the 14th century. Around 1411, Raja Kumar the ruler of Kelantan became independent of Siam. In 1499 Kelantan was conquered by the Malacca empire and became one of its states. With the fall of the Malacca empire, Kelantan was divided and ruled by chiefs.

With the conquest of the Siamese in 1603, most of the Kelantan chiefs became subjects to Pattani. In 1764 Long Yunus seized the throne and proclaimed himself as Raja of Kelantan. After his death, Kelantan came under the influence of Terengganu. In 1800, Raja Muhammad declared himself as the first Sultan of Kelantan. In 1812 he broke from Terengganu's influence and became a separate tributary state of Siam.

In 1909 Anglo Siamese treaty was signed and the British took its claim over Kelantan, Teregganu, Kedah and Perlis. Kelantan thus came under the control of the Straits settlement as one of the Unfederated Malay states. Kelantan was occupied by the Japanese on the 8th of December 1941. After the defeat of Japan in August 1945, Kelantan and the rest of Malaya came under the British Military Administration in September 1945. Kelantan became part of the Federation of Malaya on the 1st February 1948, and together with the other states attained independence on 31st August 1957. On the 16th September 1963, Kelantan became one of the states of Malaysia.

The weather in Kelantan is just like other parts of Malaysia, predominantly tropical. Towards the end of the year during the months of November till February it is pretty wet due to the monsoon season. Temperature here is between 21-32 °C where it is warm and dry. The humidity here is about 90%. Average rainfall is about 2000 mls per year.

Due to its location situated along the coast of the South China Sea, Kelantan is a very scenic state. Numerous fishing villages are seen dotted along the coastline. The fishing industry is one of the most important sources of income to the people here. It is famous all over Malaysia for its salted fish and "keropok". Kelantan is dependent on the agriculture industry, as most people in the interior are basically farmers. Paddy fields are seen all over the state as rice is the staple diet of most Malaysians here. The tobacco industry is also thriving here. Due to the governments' encouragement and subsidies, palm oil is also rapidly gaining in popularity due to its booming price and the support of the government in the biodiesel technology.

The people here are multi ethnic who live harmoniously among one another. The majority are the Malays, whom are Muslims followed by the Chinese Buddhists and the Siamese. The people here in their leisure time would be seen flying a kite, spinning the top and be engaged in bird singing. Kelantan is also famous for its shadow play known as 'Wayang Kulit'. The locals also practise their version of martial art which is known as 'Silat'.

Kelantan is a food lovers paradise. Due to its close proximity to Thailand, the influence of spices and chillies is seen in their food. Among the most famous dishes are the Nasi Kerabu which is rice in herbal salad, Ayam Perchik where pieces of chicken are barbequed on a bamboo skewer and steamed brownish tinged rice with coconut milk served with fish gravy known as Nasi Dagang.

2. HOSPITAL RAJA PEREMPUAN ZAINAB II

Figure 2 : Hospital Raja Perempuan Zainab II

Hospital Raja Perempuan Zainab II (HRPZ II) which was formerly known as the General Hospital of Kota Bharu is situated at the centre of Kota Bharu, the Islamic capital of the state of Kelantan Darul Naim. It provides treatment to the people of Kota Bharu and the state of Kelantan as it is the referral centre for the state.

The General Hospital of Kota Bharu was started in the 1920s. Its building was in the heart of the town which is currently being occupied by the local town council (MPKB). It consists of 2 buildings, one was called the 'European Ward" which was for the white community and the other ward was for the local community. At that time the hospital was providing basic surgical, medical and obstetric care to the people here.

The building of the new hospital was completed in 1938 at the present site and all the wards were slowly shifted here. It was made up of 8 wards at that time. The wards then were Medical, Surgical, Venereal diseases, Leprosy, a ward for prisoners, a Tuberculosis ward and the maternity ward. During 1938 the hospital obtained the services of a General Surgeon Dr. K.D.Fraser. In December 1938, during the 2nd world war, the Japanese invaded Kota Bharu and used the hospital as their base.

After the defeat of the land of the rising sun in 1943, the Japanese left Kota Bharu. In 1944 the administration of the hospital was taken over by Dr. Major Flowski of the British Medical Army. Under the administership of various directors both foreign and then local the hospital began to grow in stature and size. The General Hospital was awarded the MS ISO 9002 and was also accredited. In 2002 it received the Prime Ministers Quality award and the Health Ministry's special award. The hospital has also won some international awards like the COFRAC award from France and the BS EN ISO 9001 award from United Kingdom.

The general hospital is currently a 920 bedded hospital providing medical service to nearly 2 million people of Kelantan. It is manned by 2224 staff of various categories and grades. The departments that it houses are the Obstetrics and Gynecology, Medical, Surgery, Paediatrics, Orthopaedics, Anaesthesia, Psychiatry, Radiology, Ear Nose and Throat, Ophthalmology, Accident and Emergency Unit and Dermatology.

The hospital was renamed Hospital Raja Perempuan Zainab II in 2005 after the current Sultan's mother Raja Perempuan Zainab who was the Raja Perempuan of the state from 1960- 1976.

3. THE DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, HOSPITAL RAJA PEREMPUAN ZAINAB II

Figure 3 : Obstetrics and Gynaecology Clinic

In the year 2006, the department of Obstetrics and Gynaecology was staffed by 4 consultants and 5 clinical specialists, 9 medical officers and 12 house officers. The department is also an off campus training centre for the masters programme in Obstetrics and Gynaecology for students from University Science Malaysia and the National University of Malaysia.

The Obstetrics and Gynaecology department and clinic is located at a separate building opposite the state stadium and beside the Out Patient department. The labour room is located on the ground floor, just adjacent to the clinic. It was renovated in the year 2000 and is currently fully air conditioned. The labour room has 16 separate cubicles for labour. Along with its father friendly policy, it ensures privacy to all women in labour. The labour room is fully equipped to handle all kinds of emergency, as it is the state's referral centre. The labour room is headed by a sister and about 35 staff nurses who have completed their post basic training in maternity. Beside the labour room is the Maternity Operation Theater, which is functional from 9am till 9pm from Sundays till Thursdays. The operation theater is also led by a sister and 6 staff nurses.

Figure 4 : Labor room of HRPZ II

The maternity wards are 4 in number, one being the 1st and 2nd class ward, and the rest are the 3rd class wards. It also houses the post natal patients in the ward so that the mothers don't have to shift beds or wards after completing deliveries. The Gynecological ward is on the 4th floor of the new block. The management of each ward is handled by a consultant, 1 clinical specialist, 1 or 2 medical officers and 2 house officers.

There were 12,391 deliveries in the year 2006 in Hospital Raja Perempuan Zainab II, of this number 2586 were delivered by caesarean section thus giving it a caesarean section rate of 20.8%.

DAY	MORNING	AFTERNOON
Sunday	Booking clinic. Early Pregnancy Assessment clinic. Colposcopy	Grand ward rounds.
Monday	Antenatal clinic	Journal club.
Tuesday	Menopause clinic Gynecology OT	House officers teaching
Wednesday	Gynecology clinic	Oncology/ Molar/ Infertility
Thursday	Early Pregnancy Assesment Clinic Gynecology OT	

Table 1: Department of Obstetrics and Gynaecology Schedule.

4 . INTRODUCTION TO THE STUDY

4.1 LITERATURE REVIEW

Electronic Fetal Monitoring or CTG is used routinely in all labour rooms in our country. It is a screening tool used to assess the fetal well being during labour. Abnormalities of the CTG, at times severe enough to be described as pathological commonly indicates that the fetus is in distress. During this period we always assume that the fetus is in a state of hypoxia. This always leads to an increase in intervention and most of the time leads to an emergency caesarean section as the mode of delivery. However upon delivery majority of neonates are well and show no signs of hypoxia.

Various studies have been performed regarding the reliability of the CTG in detecting fetal hypoxia. This study is based on a study performed in Brno, Republic of Czech by Pellantova in 1997 where 100 women had emergency caesarean section for fetal hypoxia based on pathological or suspected pathological CTGs. Out of this group 68% of the babies were healthy with no signs of hypoxia. It was suggested that additional or better methods of fetal monitoring were needed to identify fetuses in hypoxia in order to reduce caesarean section rates.

The most famous study regarding the use of CTG as a method for intrapartum fetal monitoring is the Dublin Trial by MacDonald and Grant A (1985). This trial compared the use of continuous intrapartum fetal heart monitoring against intermittent

auscultation with the option to measure fetal scalp blood pH. It was concurred from the above trial that women with continous intrapartum fetal heart monitoring had shorter labours and required less analgesia. The caesarean section rate was slightly higher in this group (2.4% vs 2.2%). Forceps delivery was significantly higher in this group too (8.2% vs 6.3%). The number of stillbirths and neonatal deaths in both groups were similar (14). There was no difference in terms of low Apgar scores, need for resuscitation or transfer to neonatal intensive care. The number of neonatal seizures in the intermittent auscultation group were twice in number and was in relation to the duration of labour.

Alfirevic Z and Devane D (2006) using the Cochrane Database Systemic Review evaluated the effectiveness of continous CTG against intermittent auscultation. This randomized controlled trial involved more than 37 000 women. The results from this study showed no significant difference in perinatal death but a reduction of almost half in neonatal seizures though there were no significant difference in the number of cerebral palsy. This study also demonstrated a significant increase in caesarean section rates and instrumental vaginal deliveries in the continuous CTG monitoring group.

The reliability of the CTG was very much improved with the additional usage of fetal blood sampling. This was demonstrated in a retrospective study by Brandt-Niebelschultz S and Saliky E (1994) where 110 cases of operative delivery were performed due to prepathological and pathological CTGs. 93.6% of the operations were justified when umbilical artery pH < 7.25 was taken as the cut off point. This study showed that using CTG as a screening method and fetal blood sampling as a method of

differentiation , early stages of fetal acidosis could be reliably detected without having a high operative delivery rate.

The commonest type of anaesthesia used for caesarean sections are general anaesthesia, epidural anaesthesia and spinal anaesthesia. Popham (2001) conducted a 4-year review in the Royal Womens Hospital, Victoria, Australia and in the 444 emergency caesarean performed 206 were for fetal distress. In this audit the mean decision to delivery interval was 17 minutes for general anaesthesia, 19 minutes for epidural and 26 minutes for spinal anaesthesia. General anaesthesia was commonly used during the 7am till 5pm period. It was noted that a faster response time was available if facilities and equipment are in place. Administration of an epidural top up in an already established epidural would allow a time interval as short as general anaesthesia.

Holcroft (2005) in a retrospective review of 117 caesarean sections examined the relationship between umbilical arterial gas analysis and decision to delivery interval for non reassuring fetal status within 30 minutes. His study revealed that there was no deterioration in cord blood gas results for delivery after 30 minutes in non reassuring fetuses as most neonates delivered after 30 minutes have normal cord blood gases.

Becker (2007) demonstrated that the presence of meconium had a very small difference in regard to arterial pH and Apgar scores when compared with the non meconium group. The mean pH of both groups were 7.26. The 5 minute Apgar score < 6