

## MATERNAL CARDIAC ARREST: PERIMORTEM CAESAREAN DELIVERY FAVOURING BETTER OUTCOME FOR BOTH MOTHER AND FETUS

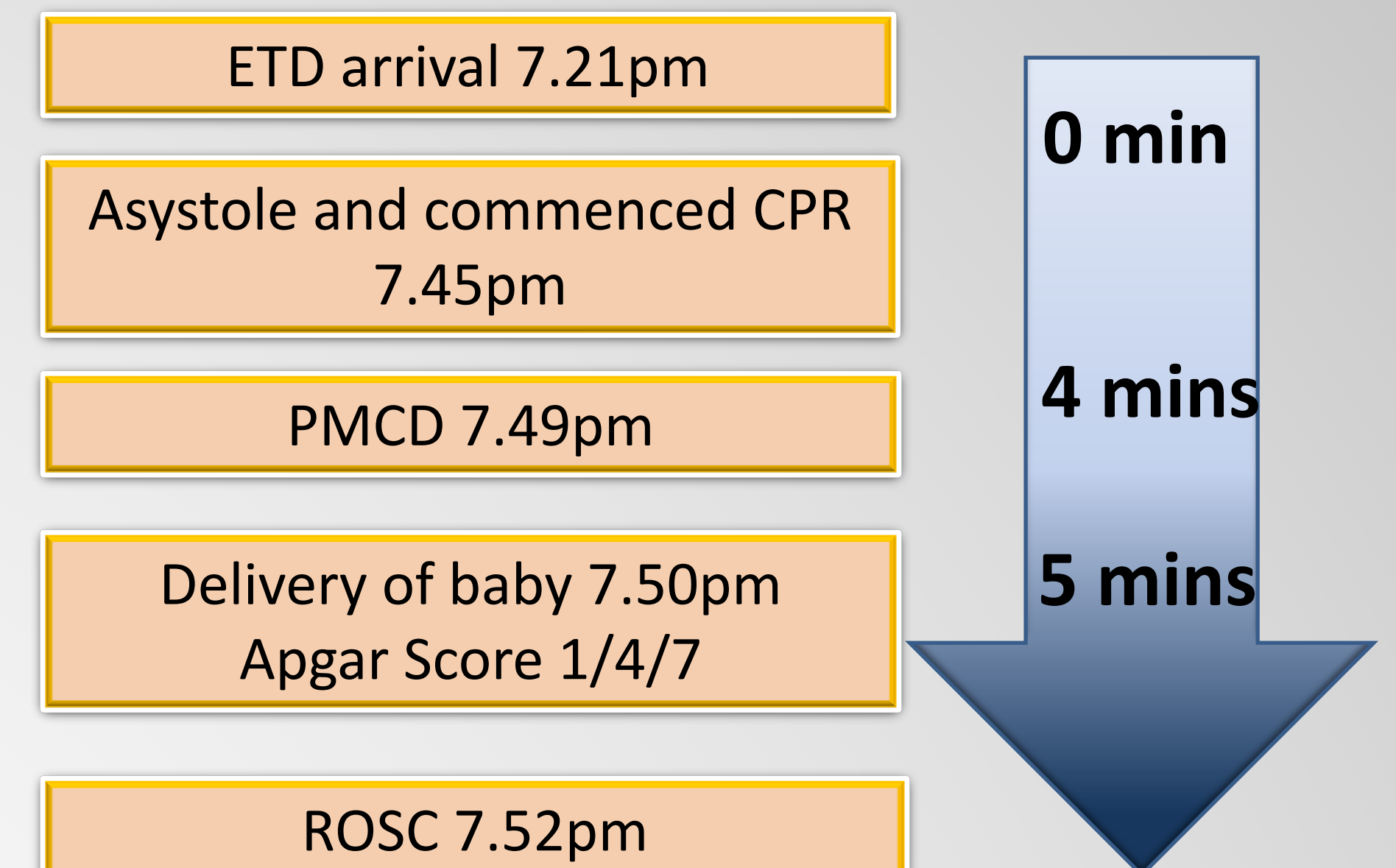
NR Siti, V. Seelah, KK Gan, CS Lee, M. Md Saed  
Emergency and Trauma Department, Hospital Sultanah Aminah, Johor, Malaysia

### Introduction

Perimortem Caesarean Delivery (PMCD) and the 4-Minute rule was first introduced by Katz, Dotters and Droegemueller back in 1986 as a resuscitative measure to improve survival for both the mother and the fetus in maternal cardiac arrest<sup>1</sup>. Since then it has influenced multiple international guidelines and has been the stand of maternal resuscitation and fetal survival.

### Case Summary

A 31 year old gravida 3 para 2 woman at 39<sup>th</sup> week of gestation with background of essential hypertension presented to Emergency and Trauma Department (ETD) with severe respiratory distress precipitated by Hypertensive Crisis with Acute Pulmonary Oedema. She developed cardiac arrest after arrival to ETD and Cardiopulmonary Resuscitation (CPR) performed immediately. Red alert for maternal cardiac arrest was activated. A joint decision between Emergency Physician (EP) leading the resuscitation and Obstetrician in charge was made to perform PMCD within 4 minutes and a female infant, birth weight of 3300 g, was delivered within 1 minute post-incision with Apgar score of 1<sup>4</sup>5<sup>7</sup>10. She was resuscitated by Paediatrics team in ETD and was admitted to neonatal intensive care unit. She underwent cooling therapy for 72 hours and subsequently discharged in well condition on day 16 of life. Mother achieved return of spontaneous circulation (ROSC) following PMCD and was transferred to intensive care unit for continuation of critical care. Mother was subsequently discharged home on day 50 post-PMCD.



### Discussion

Timely intervention in regards to maternal physiological changes during pregnancy is crucial in improving the outcome of both mother and fetus during maternal cardiac arrest. Maternal physiological changes resulting in difficulty in maternal resuscitation including the following:

- Aortocaval compression by gravid uterus leading to reduce venous return in supine position
- Reduce chest compliance and increase intra-abdominal pressure resulting in reduce efficacy of chest compression and increase risk of aspiration
- Increase oxygen consumption and reduce functional residual capacity leading to difficulty in ventilation

PMCD can relieve the aortocaval compression by gravid uterus thus improving venous return and efficacy of CPR as well as increase chest compliance to optimise CPR<sup>3</sup>.

From the previous case reports done from year 2010 – 2019 (Table 1) showed that cases with reduced time interval between delivery and onset of maternal arrest have higher chance of survival<sup>5,6,7,8,9</sup>. Recommendation from American Heart Association is that when ROSC was not achieved following normal CPR in more than 20 weeks of gestation, the PMCD decision should be made within 4 minutes from the onset of cardiac arrest<sup>3</sup>. One of the factors that cause significant delay in PMCD is transferring a patient to a theatre suite. Therefore, it is suggested that in maternal cardiac arrest, PMCD should be performed at the site of the arrest<sup>4</sup>. Performing PMCD in our ETD has avoided the potential complication of unacceptable delay and interruption of CPR and has definitely contributed to the excellent prognosis of both mother and fetus as well. In our case, midline vertical incision was used instead of Joel-Cohen or Pfannenstiel incision.

Year	Author	Site of Occurrence	Cardiac arrest to PMCD	Cardiac arrest to Delivery	Outcome of Mother	Outcome of baby
2010	Engels et al. <sup>5</sup>	Emergency Room	Unknown	8 minutes	Died day 11 in ICU	Died 18 hours after delivery
2016	DeSilva et al. <sup>6</sup>	Emergency Room	43 minutes	45 minutes	Died in Emergency Room	Died 20 minutes after delivery
2016	DeSilva et al. <sup>6</sup>	Emergency Room	9 minutes	10 minutes	Died 3 hours after ICU admission	Survival to discharge
2017	Goto et al. <sup>7</sup>	Emergency Room	38 minutes	43 minutes	Died in Emergency Room	Unknown
2017	Goto et al. <sup>7</sup>	Emergency Room	4 minutes	20 minutes	Survival to discharge	Survival to discharge
2018	Lee et al. <sup>8</sup>	Emergency Room	35 minutes	39 minutes	Died 4 hours after ICU admission	Died 73 minutes after delivery
2019	Alzahrani A.J. <sup>9</sup>	Emergency Room	8 minutes	Unknown	Survival to discharge	Survival to discharge

Table 1

### Conclusion

PMCD in maternal cardiac arrest of more than 20 weeks of gestation, which has been recommended and supported by various international guidelines and literature reviews can improve both the maternal and fetal survival rate. If maternal ROSC has not been achieved within 4 minutes, PMCD should be initiated and to achieve this extremely narrow time frame require establishment for a rapid response from a coordinated team within the facility and readily available basic equipments for emergency cesarean delivery.

### References:

- Katz V, Balderston K, DeFreest M. Perimortem Cesarean Delivery: were our assumptions correct? *Am J Obstet Gynecol.* 2005; 192(6):1916-20
- Einav S, Kaufman N, Sela HY. *Maternal cardiac arrest and perimortem caesarean delivery: evidence or expert-based?* *Resuscitation.* 2012;83:1191-1200.
- Jeejeebhoy F. M. et al. *Cardiac Arrest in Pregnancy (A Scientific Statement From the American Heart Association).* *Circulation,* 2015; 132(18), 1747-1773.
- Eldridge A. J., Ford, R. *Perimortem caesarean deliveries.* 2016; *International Journal of Obstetric Anesthesia,* 27, 46-54.
- Engels, P. T., Caddy, S. C., Jiwa, G., & Matheson, J. D. *Cardiac arrest in pregnancy and perimortem cesarean delivery: case report and discussion.* *CJEM,* 2010; 13(06), 399-403.
- De Silva, P. H., Maharaj, D., & Langdana, F. *Perimortem caesarean section: Two cases performed in New Zealand hospitals.* *Australian and New Zealand Journal of Obstetrics and Gynaecology,* 2016; 56(6), 662-665.
- Goto, M., Watanabe, H., Ogita, K., & Matsuoka, T. *Perimortem cesarean delivery and subsequent emergency hysterectomy: new strategy for maternal cardiac arrest.* *Acute Medicine & Surgery,* 2017;4(4), 467-471.
- Lee, C. *Perimortem caesarean section: A case report of an out-of-hospital arrest pregnant woman.* *World Journal of Emergency Medicine,* 2018; 9(1), 70.
- Alzahrani A. J. "Perimortem Cesarean Section Case Report". *EC Gynaecology* 8.7 (2019): 522-523