A Case Study Analysis of Perimortem Caesarean Section Survivability in Maternal Traumatic Cardiac Arrest

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Introduction

Perimortem Caesarean Section (PMCS) is rarely undertaken with few reported cases in the prehospital environment. Current guidelines do not advocate performing PMCS prehospitally with ambulance crews encouraged to stabilise pregnant women for rapid hospital transfer, preferably with an obstetric unit or emergency department where the procedure can be safely performed, undertaken primarily to save the mother.

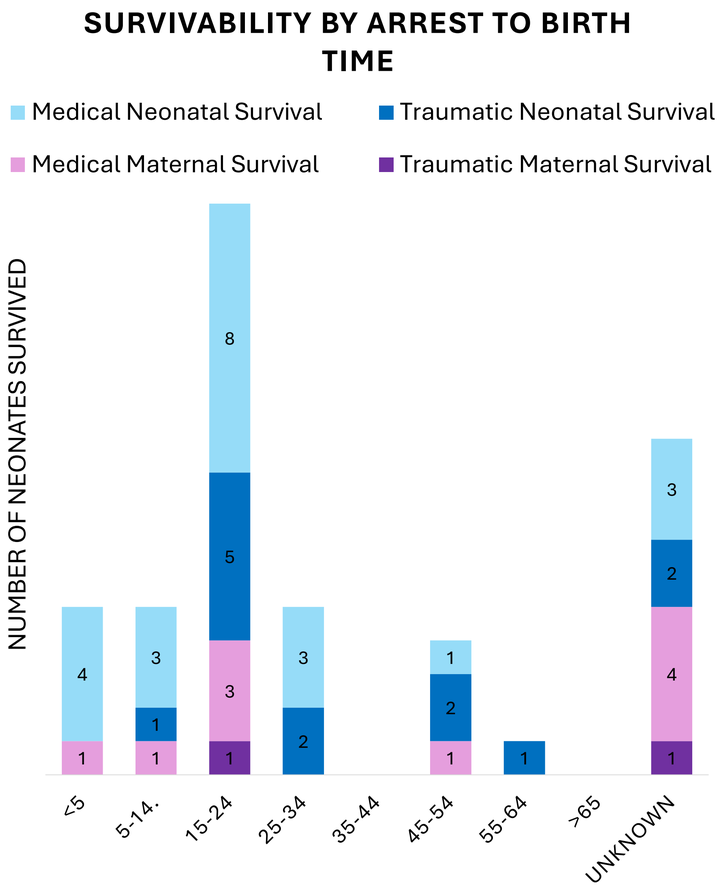
Case analysis aimed to review survivability following maternal traumatic cardiac arrest with PMCS, assessing the influence of mode of trauma, gestational age, time to delivery and clinical location of PMCS.

An international review of all available case reports allowed temporal analysis of all women who were over 20 weeks pregnant and collapsed in the prehospital environment resulting in cardiac arrest and PMCS.

Physiology & Literature

There are significant maternal physiological changes in pregnancy altering cardiorespiratory physiology and affecting resuscitation management. Past 20 weeks gestation the gravid uterus has a large pressure effect on the IVC; with hypotension, uterine vascular burden, laryngeal oedema and decreased lung capacity reducing intubation, oxygenation and CPR efficacy. (1, 5) PMCS aims to relieve aortocaval and diaphragmatic compression, thus improving cardiac output and the chance of ROSC. (4, 5)

Current British & European guidelines agree that PMCS is indicated for maternal survival from 20 weeks' gestation and for fetal survival from a gestational age of >24 weeks, PMCS should be initiated within 4 minutes of arrest and take no longer than 5 minutes, utilising the fastest incision. (1-3) PMCS is undertaken primarily to promote maternal resuscitation or to save the fetus if maternal death has absolutely occurred. It is never contraindicated and should not be delayed for any reason including hospital transfer, senior assistance or advanced surgical equipment. (1, 4)



Survivability by arrest to birth time showed greater or equal neonatal survival compared to maternal. All traumatic neonatal survival was greater than maternal at all time points. Medical modes of arrest showed greater survivability than traumatic at all time points.

Discussion

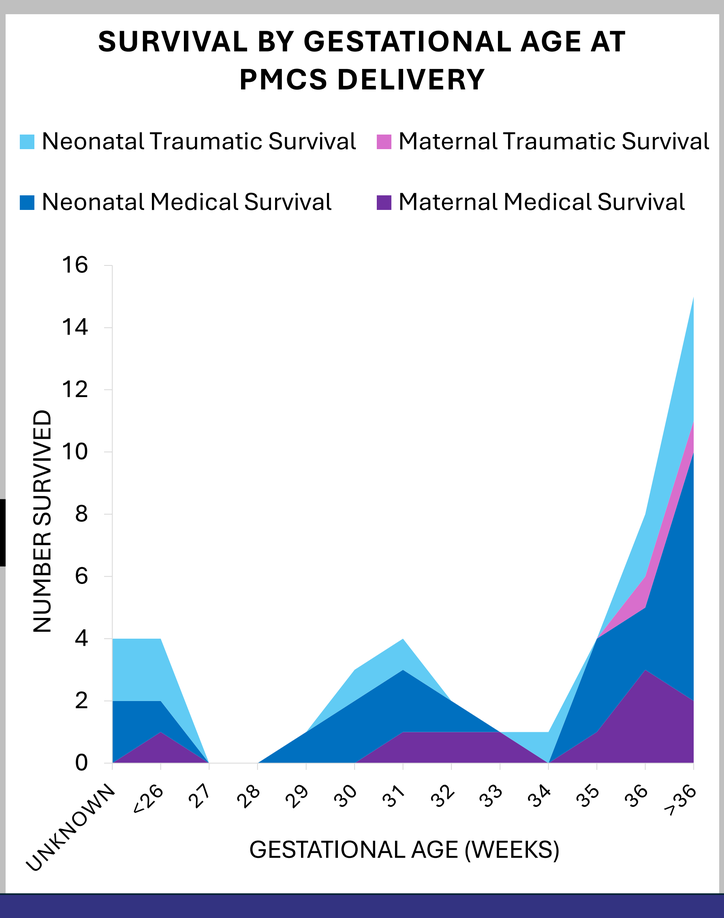
- Traumatic arrest neonatal mortality was 43% with maternal 91%, compared to medical arrest neonatal mortality of 57% and maternal 78%
- Midline vertical incisions showed greater or equal deployment in all arrests, with greater survivability in medical arrest when utilising alternative incisions (low transverse, Pfannenstiel, Joel-Cohen)
- Total traumatic arrest delivery time was 2 minutes faster than medical (23.6 compared to 25.6)
- Traumatic arrests showed a 64% intact neurological outcome, compared to 36% in medical

Conclusion

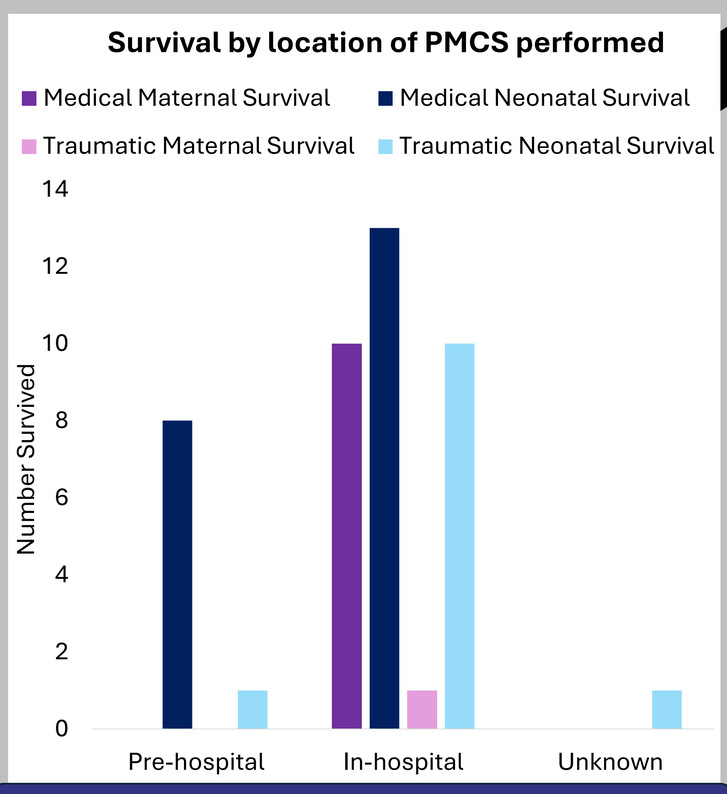
With respect to current PMCS guidelines (>20wks within 4 minutes of arrest taking no longer than 5 minutes by fastest incision prioritising maternal survival irrespective of location performed) several observations can be made;

- **Survival appeared to rise with increasing gestational age.**
- **Majority of survival in times from arrest to birth were up to 34 minutes.**
- **Vertical incisions were faster than PF/LT/JC, with equal neonatal survival in both bar 1 survived in medical.**
- **PMCS performed in-hospital showed higher survival than prehospital.**
- **Neonatal survival outweighed/matched maternal in all parameters measured.**

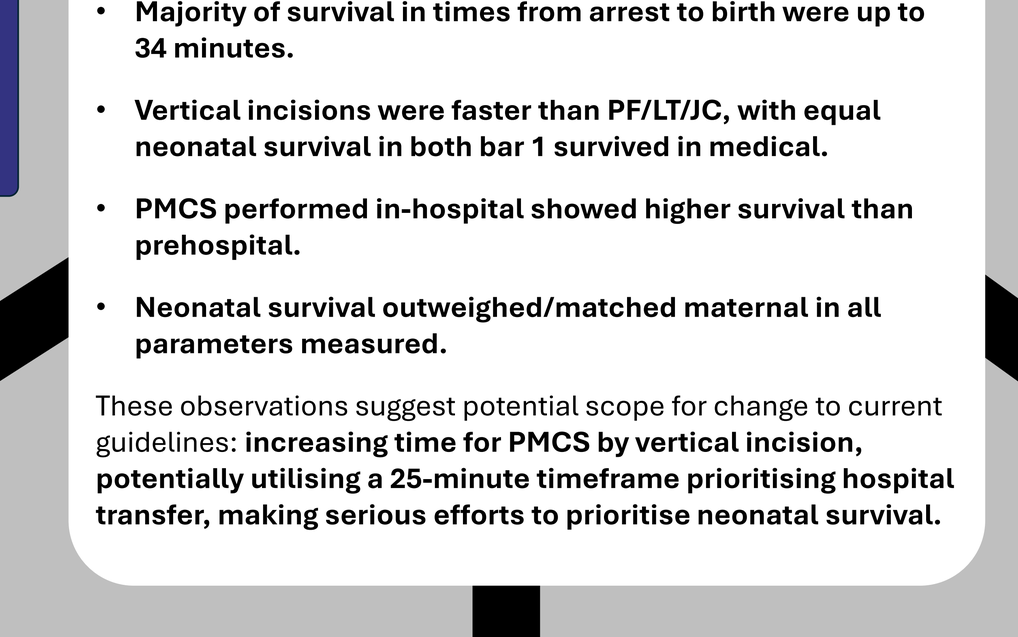
These observations suggest potential scope for change to current guidelines: **increasing time for PMCS by vertical incision, potentially utilising a 25-minute timeframe prioritising hospital transfer, making serious efforts to prioritise neonatal survival.**



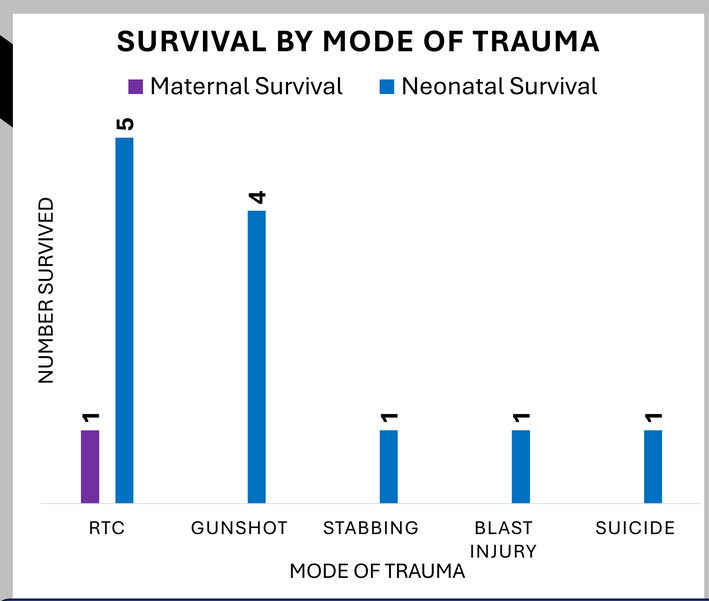
Survivability by gestational age showed greater or equal total neonatal survival compared to maternal at all ages except 33 weeks. Medical arrest survivability was greater than or equal to traumatic at all ages. Total neonatal survivability improved as age increased, however survival volume equal to as late as 36 weeks were similarly high at 30 weeks with survival noted at <26 weeks.



Survivability by location of PMCS performed showed greater in-hospital survival, with greater survival in medical causes of arrest when compared to traumatic.



Survival by traumatic arrest rhythm showed neonatal survival outweighed maternal regardless of rhythm. RTCs and gunshots resulted primarily in asystole, which made up the majority of noted rhythms.



Survivability by mode of trauma showed neonatal survivability outweighed maternal regardless of mode of trauma.