Short reports

A review of injuries sustained by bus passengers

Travelling by bus is one of the safest ways to travel, only 0.57 fatalities occurring per 10⁹ km in public service vehicles compared with 5.5 in cars, 54 in bicycles and 130 in motorcycles.¹ Similarly there is less risk of serious or slight injury. Although serious accidents involving buses or coaches leading to multiple casualties will often make headline news or the pages of medical journals,² little is written on those injuries which occur sporadically throughout the year.

Injuries of bus passengers attending the accident and emergency (A&E) department of the Leicester Royal Infirmary over a 1-year period from 1 February 1991 to 31 January 1992 were noted and the circumstances and cause of injury examined.

Forty-six patients attended over the year as a result of injuries sustained on buses. This accounted for only 1% of the patients attending the department with injuries from road traffic accidents (RTAs). Information on the circumstances of the accident was available in 44 cases.

Fifteen patients were injured in 13 separate incidents where there was no impact (non-crash accident). Over half of these injuries were in standing passengers, a third of injuries occurring when the bus halted suddenly.

Another vehicle was involved or the bus hit a stationary object in 11 incidents injuring 29 patients (crash accidents). Multiple attendances occurred in only three out of 11 bus crashes. Most injuries which occurred were to the head and face (see Table 1), and they were commonly due to impact with the seat in front or metal fittings (usually hand rails).

Of unrestrained children in cars up to 12% receive injuries from non-crash accidents,³ and the problem

has been addressed by the introduction of legislation enforcing use of child safety restraints. It is likely that many injuries from non-crash accidents go unrecorded in government RTA statistics which are derived from police records and compiled for traffic planning and highway design, a problem which has been highlighted elsewhere in the case of pedestrian accidents.⁴

Undoubtedly, injuries on buses could be reduced by the use of restraints and the prohibition of standing passengers. Some attention could be paid to the design of hand rails on seats which appear to be the cause of many injuries, however this is unlikely to have much effect until buses of older design are replaced. Investment in public transport would benefit both the environment and add to the safety of passengers.

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Perimortem caesarean sections (PMCS)

In June 1990 in Hong Kong a 35-year-old woman, 36 weeks pregnant, developed pre-hospital cardiopulmonary arrest possibly resulting from acute coronary artery spasm of unknown aetiology. Pre-hospital basic life support (BLS) was delayed until 15 min after arrest when the ambulance crew arrived and advanced life support (ALS) was only available at the accident and emergency (A&E) department about 30 min post-arrest.

Table 1. Injuries received by bus passengers

Site of injury	Contusion	Sprain	Wound
Head and face	14	—	7
Neck	—	7	—
Chest	5	—	—
Upper limb	—	5	—
Lower limb	5	—	—
Back	2	—	—

A baby boy (Apgar score 1125) was delivered by emergency caesarean section in the A&E department about 30 min after arrival (about 60 min post-arrest). The baby died 24 h later as a result of perinatal asphyxia with multi-organ failure.

Continued ALS could not restore a spontaneous circulation in the mother. Clearly the chance of survival of both the mother and the baby would have been improved if:

- (1) BLS by the lay public was available and started early;
- (2) the activation of the emergency medical services was more speedy;
- (3) the transfer of the patient to the hospital for ALS was quicker, taking into consideration the traffic congestion of the Hong Kong city, or pre-hospital ALS by paramedics was available in Hong Kong; and
- (4) there was an earlier initiation and performance of the PMCS. The delay was due to emergency physicians waiting for the obstetricians to operate.

Over the past 100 years (1897–1985) approximately, 269 cases of PMCS have been reported.¹ Despite the rarity of this condition, front-line medical personnel who may potentially encounter fetomaternal resuscitation in their practice must be acquainted fully with PMCS if they are to save two lives.

Maternal resuscitation is particularly difficult for the following reasons: (1) the maternal threshold for anoxia is less than normal owing to a 20% reduction in the pulmonary functional residual capacity (FRC),² and a higher metabolic demand;³ and (2) in term pregnancy, cardiac stroke volume is only about 30% of normal due to the aortocaval compression by the gravid uterus.⁴

The four main factors to consider for a PMCS are as follows.

- (1) The gestational age of the fetus — more than 24 weeks of gestation is compatible with, extra-uterine survival⁵ and the gravid uterus is sizeable enough to cause the above mentioned haemodynamic, pulmonary and metabolic adverse effects in the mother.
- (2) The time interval between maternal cardiac arrest and the delivery of the baby — the shorter the interval, the higher the chance of survival and the better the neurological outcome of the baby¹ and the earlier the elimination of the gravid uterus, the more effective the maternal cardiopulmonary resuscitation (CPR).
- (3) The absence of detectable fetal cardiac pulsation

does not exclude a viable fetus.

- (4) The underlying or concomitant maternal diseases, which can carry poor prognostication for both the mother and baby.¹

PMCS is not a difficult operation, especially when of the typical presentation. The relaxed abdominal musculature and the virtually 'bloodless' operative field during cardiac arrest facilitate the procedure for the non-obstetrician. Though this is a perimortem procedure, every care must be taken to reduce infection and to protect the abdominal viscera from surgical trauma because the mother may be revived after the delivery.

We recommend PMCS as part of the management of maternal cardiac arrest after the gestational age of 24 weeks, if standard resuscitative measures should be instituted with external cardiac massage performed in a left lateral tilt position^{6,7} or in conjunction with manual displacement of the uterus⁷ to decrease the aorto-caval compression by the gravid uterus should this fail to restore spontaneous circulation quickly, PMCS must be initiated within 4 min and completed within 5 min to ensure the best outcome for the baby and to facilitate the CPR of the mother.^{1,6,7}

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