



A Near Fatal Miss - Airbag Related Polytrauma in a Child Presenting as Multiple Air Leaks and odontoid Fracture

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Abstract

Airbags have changed the pattern of fractures seen in road traffic accidents, reducing morbidity and mortality. However in younger patients and patients of short stature who are sitting in front seat, severe spinal injuries can still occur even with deployment of airbags. Airbags related injuries can occasionally present with unusual presentations. The majority of airbags associated injuries are minor. We present a rare fatal manifestation of airbag related polytrauma in a 3 year old male child presenting as lung contusion, air leaks and odontoid fracture presented as respiratory failure and unstable spine.

Keywords: Seat Belt; Air Bag; Neck Injuries; Air Leaks; Fatal; Child

Introduction

Airbags are inflatable sacs made up of nylon and aimed to provide a cushion to prevent the passenger hitting the steering wheel or any hard structure. During collision they expand within 0.5 seconds at speeds approaching 200mph [1]. This can cause contusions and lacerations. Though airbags have reduced mortality and morbidity, severe spinal injuries can occur even with deployment of airbags. The majority of airbag associated injuries are minor. Wearing of seat belt have reduced serious injuries by 45% [2]. Together with seatbelt, airbags are now fitted as standard in many modern cars. Recent reports indicate that basic safety features such as airbags were not made mandatory on all cars in India until 2015 [3]. Nonetheless, despite increase airbag implementation,

there are complications. Many reports implicate airbags as the cause of injury. There is a zone of deployment for airbags, smaller 30-40 liters deploy with much less force than larger (70lbs) available [4-6]. Timing is also crucial with the aim being for the passenger to strike the airbags once it is fully expandable and not in zone of deployment.

Case Report

3 year old male child presented with alleged airbag associated injury while patient being front seat unrestrained occupant and being hit by a electronic autoriksha on the nondriver front door when car was standing at traffic signal. Patient suffered injuries from airbag and complained of neck pain and breathing difficulty. Patient went to nearby hospital where patient was intubated for respira-

tory failure (spO₂ 50% on NRM). CT thorax done which showed no tracheal injury, bilateral pneumothorax, pneumomediastinum and surgical emphysema. (Figure 1). Thereafter patient was brought to our hospital emergency on Bain circuit with surgical emphysema over face, neck, thorax and upper abdomen, Heart rate of 170/min, Temperature 97.6F, poor perfusion, spo₂ 70% on Bain circuit, diminished air entry bilaterally, soft abdomen, S1, S2 muffled and agitated. Chest x ray showed pneumomediastinum with surgical emphysema (Figure 1). In view of air leak with desaturation even on Positive pressure ventilation, bilateral intercostals drainage inserted and air drained. Post ICD insertion spo₂ increased to 99%. Patient resuscitated with fluid bolus for obstructive shock and hemodynamic monitoring started, x-ray pelvis and USG for trauma was normal, Functional echo showed limited window due to surgical emphysema. CT brain was done, which showed no signs of abnormalities. CT thorax showed bilateral lung contusion, pneumopericardium, surgical emphysema in chest wall and moderate pneumothorax. MRI orbits were normal. Patient was started on sedation, paralysis, PRVC control mode of ventilation along with broad spectrum antibiotics and other supportive care. For anemia due to pulmonary hemorrhage patient treated with multiple aliquots of PRBC. For pulmonary hemorrhage optimal PEEP, vitamin K and inline closed suction used. After hemodynamic resuscitation vitals improved, patient neck examined for injuries. Hard age appropriate Cervical collar was placed around neck for suspected cervical injury and MRI neck done which showed fracture in base of odontoid process (Figure 2) and grade 1 anterolisthesis, Atlantoaxial joint normal, Prevertebral hematoma is seen anterior to odontoid process, Edematous changes are seen in Prevertebral space with no spinal canal compression is seen and Spinal cord is normal in signal intensity and morphology. After stabilization of hemodynamic, neurosurgeon did reduction of odontoid process with posterior fixation on day 6th of hospitalization (Figure 3) along with Tracheostomy in view of anticipated prolonged intubation and unstable neck. Cervical collar continued and immobilization of neck was advised. Serial chest x-ray showed resolution of airleaks. Enteral feed was started, tolerated well and increased gradually. Patient weaned from ventilator and decannulated on day 21 of hospitalization. Chest and limb physiotherapy added. Intercostalstubes were gradually removed as child was stable and no drainage or air leak was seen. As child improved, limb physiotherapy was started and supervised mobilization was done. Parents taught physiotherapy and neck movement precaution to be taken. Oral feed was started which child accepted well. Since child was clinically stable, accept-

ing orally well, child discharged on day 25th day of hospitalization. Patient came after 3 month of injury walking with optimal range of movement over cervical spine.



Figure 1



Figure 2

Traumatic # Odontoid with AAD
Posterior C1-C2 fixation using lateral mass and transpedicular screw and rod



Figure 3

Discussion

Life threatening Head and neck injuries resulting solely from airbag deployment are rare. However in children they are more common. Children under 10 sitting in the front seat have a 10-34% increased risk of fatality when an airbag is deployed [7,8,14]. Age due to flexibility of atlanto occipital joint in addition to height is the determining factors. They have 87% increase of non fatal injuries, many of these injuries occurred at low speeds. In study [8], a fully restrained 7 year old sitting in the front seat, involved in a low speed collision. He sustained a 21mm atlantooccipital dislocation [8]. Children are more at risk of atlanto-occipital dislocation. During precrash braking, the child head is flexed forward into the inflating airbag. The combination of hyperextension and lateral flexion and anatomy of pediatric atlanto-occipital joint lead to increased susceptibility. In a study [9], 4 year old sustained fatal injuries as a result of airbag deployment. The inflating airbags impacted the patient chin and face leading to hyperextension and complete dislocation of vertebral body at C2. There has been no case reported, of airbag associated air leak with odontoid fracture being reported in literature. Our patient presented with multiple air leak leading to obstructive shock and respiratory failure requiring prolong ventilation, tracheostomy, cervical collar and definitive surgery for odontoid fixation.

Conclusion

Airbags alone have reduced morbidity and mortality by 19-50% [6,11,12]. Children under age of 13 years should be restrained in

the back seat as it reduces their mortality rate [7-9,13-15]. Thus airbag gives maximum safety with restraining. In unrestrained and front seat occupant, children are bound to have spinal injuries sometimes fatal. Severe damage can happen with slow speeds [8,9,16]. The pattern of injuries depend on type of air bag, velocity of impact, zone of deployment, height of patient, position of occupant and use of restraints [16].

Bibliography

1. Globalpiasa. "Airbags are supplemental restraints and work best in combination with seatbelts" (2009).
2. World Health Organisation. "Global status report on road safety 2015" (2015).
3. Moushumi Das Gupta and Sumant Banerjee. "Coming soon: New norms to make air bags must for all cars" (2014).
4. Pearlman JA, et al. "Airbags and eye injuries: epidemiology, spectrum of injury, and analysis of risk factors". *Survey of Ophthalmology* 46.3 (2001): 234-242.
5. K Cunningham, et al. "Airbag associated fatal head injury: case report and review of the literature on airbag injuries". *Journal of Accident and Emergency Medicine* 17.1 (2000): 139-142.
6. Christopher Noel Brookes. "Maxillofacial and ocular injuries in motor vehicle crashes". *Annals of The Royal College of Surgeons of England* 86.3 (2004): 149-155.
7. Danne P. "Serious injuries from airbags". *ANZ Journal of Surgery* 71.9 (2001): 507-508.
8. Saveika JA and Thorogood C. "Airbag-mediated pediatric atlanto-occipital dislocation". *American Journal of Physical Medicine and Rehabilitation* 85.12 (2006): 1007-1010.
9. Y Buruk, et al. "Air bag-mediated fatal craniocervical trauma: a case report". *Ulusal Travma Ve Acil Cerrahi Dergisi* 16.4 (2010): 379-381.
10. Francis DO, et al. "Air bag-induced orbital blow-out fractures". *Laryngoscope* 116.11 (2006): 1966-1972.
11. Zaglia E, et al. "Occipital condyle fracture: an unusual airbag injury". *Journal of Forensic and Legal Medicine* 14.4 (2007): 231-234.

12. Francis D., *et al.* "Sodium azide-associated laryngospasm after air bag deployment". *Journal of Emergency Medicine* 39.3 (2010): 113-115.
13. J D Stein., *et al.* "Air bags and ocular injuries". *Transactions of the American Ophthalmological Society* 97.1 (1999): 59-86.
14. Braver ER., *et al.* "Reductions in deaths in frontal crashes among right front passengers in vehicles equipped with passenger air bags". *JAMA* 278.17 (1997): 1437-1439.
15. Perez J and Palmatier T. "Air Bag-Related Fatality in a Short, Forward-Positioned Driver". *Annals of Emergency Medicine* 28.6 (1996): 722-724.
16. Boyd BC. "Automobile supplemental restraint system-induced injuries". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology* 94.2 (2002): 143-148.

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