

Child Safety Seat Fatality Investigation / Vehicle to Vehicle
Dynamic Science, Inc. / Case Number: DS05020
1998 Mitsubishi Eclipse
Colorado
July 2005

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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16. Abstract <p>This on-site investigation focused on the performance of two child seats that were installed in the rear of a 1998 Mitsubishi Eclipse. This crash occurred on a two-lane state highway in July 2005 at 1901 hours. The case vehicle is a 1998 Mitsubishi Eclipse that was being driven by a 20-year-old male. There were three additional occupants in the Mitsubishi. The front right seat was occupied by a 20-year-old male. The second row left seat was occupied by a 2-year-old male who was seated in a Cosco forward facing child safety seat. The second row right seat was occupied by an 8-month-old male seated in a convertible Graco Comfort Sport child safety seat. The other vehicle was a 2004 Dodge Ram pickup driven by a 62-year-old male. The Mitsubishi was traveling southbound. The Dodge pickup was traveling northbound. The Mitsubishi was approaching another southbound traveling vehicle. The driver of the Mitsubishi attempted to pass the non contact vehicle. The Mitsubishi crossed into the opposing lane of travel. The driver of Dodge pickup steered to the right to avoid the impact. The driver of the Mitsubishi steered in the same direction. The front of the Dodge pickup struck the right side of the Mitsubishi. The structure of the Mitsubishi was compromised and both rear seat occupants were ejected. The Mitsubishi rotated in a clockwise direction off road and struck a small sign pole and a fence before coming to rest. The front right occupant of the Mitsubishi and the two rear seat occupants were all fatally injured.</p>				
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Crash Investigation
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BACKGROUND

This on-site investigation focused on the performance of two child seats that were installed in the rear of a 1998 Mitsubishi Eclipse. This crash occurred on a two-lane state highway in July 2005 at 1901 hours. The case vehicle is a 1998 Mitsubishi Eclipse that was being driven by a 20-year-old male. There were three additional occupants in the Mitsubishi. The front right seat was occupied by a 20-year-old male. The second row left seat was occupied by a 2-year-old male who was seated in a Cosco forward facing child safety seat. The seat was not anchored to the vehicle and the child was not wearing the child seat harness. The second row right seat was occupied by an 8-month-old male seated in a convertible Graco Comfort Sport child safety seat. The seat was anchored to the vehicle and the child was wearing the child seat harness. The other vehicle was a 2004 Dodge Ram pickup driven by a 62-year-old male. The Mitsubishi was traveling southbound. The Dodge pickup was traveling northbound. The Mitsubishi was approaching another southbound traveling vehicle. The driver of the Mitsubishi attempted to pass the non contact vehicle. The Mitsubishi crossed into the opposing lane of travel. The driver of Dodge pickup steered to the right to avoid the impact. The driver of the Mitsubishi steered in the same direction. The front of the Dodge pickup struck the right side of the Mitsubishi. The structure of the Mitsubishi was compromised and both rear seat occupants were ejected. The Mitsubishi rotated in a clockwise direction off road and struck a small sign pole and a fence before coming to rest. The Dodge pickup rotated in a clockwise direction off road. The pickup tripped and rolled four quarter turns before coming to rest. The front right occupant of the Mitsubishi and the two rear seat occupants were all fatally injured.

This Child Safety Seat Fatality Investigation case was initially faxed to SCI offices on August 2, 2005. DSI was requested on August 18, 2005 to begin to locate the vehicle and to determine if the child seat was still available. DSI located the vehicle and the child seat and on October 21, 2005 obtained permission from the district attorney to conduct the inspections. The case vehicle and the child seats were inspected on November 3, 2005. The investigating officer was present during the inspections.



Figure 1. Right rear, 1998 Mitsubishi Eclipse



Figure 2. Front, 2004 Dodge Ram pickup

SUMMARY

Crash Site

This two-vehicle crash occurred in July, 2005 at 1901 hours. It was dark at the time of the crash but streetlights were present. The crash occurred on a two-lane undivided state highway. The travel lanes are separated by solid, double yellow lines. The roadway is bordered on the east by a 3 m (10 ft) gravel shoulder. The asphalt roadway is bordered on the west by a 3 m (10 ft) gravel shoulder, a 9 m (29 ft) grass embankment, and a chain link fence. There is a slight left hand curve for eastbound travel that straightens out 61 m (200 ft) prior to the impact area. There are no traffic signals for north and southbound traffic. The roadway was dry and there were no defects. The speed limit is 89 km/h (55 mph).

Pre-Crash

The case vehicle is a 1998 Mitsubishi Eclipse that was being driven by a 20-year-old male. There were three additional occupants in the Mitsubishi. The front right seat was occupied by a 20-year-old male. The second row left seat was occupied by a 2-year-old male who was seated in a Cosco forward facing child safety seat. The seat was not anchored to the vehicle and the child was not wearing the child seat harness. The second row right seat was occupied by an 8-month-old male seated in a Graco ComfortSport forward facing child safety seat. There was also a newly purchased Doberman puppy in the vehicle in an unknown location. The other vehicle was a 2004 Dodge Ram pickup driven by a 62-year-old male. The Mitsubishi was traveling southbound. The Dodge pickup was traveling northbound. The Mitsubishi was approaching another southbound traveling vehicle. The driver of the Mitsubishi attempted to pass the non contact vehicle. The Mitsubishi crossed into the opposing lane of travel. The driver of the Dodge pickup steered to the right to avoid the impact. The driver of the Mitsubishi steered in the same direction.

Crash

The front of the Dodge pickup struck the right side of the Mitsubishi. Both front air bags in the Mitsubishi Eclipse deployed at this time. Both front air bags in the Dodge ram pickup also deployed. The Eclipse was essentially penetrated at this point. The Eclipse left the roadway and began a sharp clockwise rotation and both rear seat occupants were ejected. The second row right occupant was ejected first and came to rest near the chain link fence and just north of



Figure 3. Case vehicle approach (south)



Figure 4. Area of impact (south). Struck pole and fence in background.

the initial point of impact. As the vehicle rotated the left front struck a small metal signpost. The vehicle continued to rotate and the rear bumper struck the chain-link fence. The second row left occupant was ejected at about this time and came to rest near the chain link fence and just south of the vehicle's final rest. The case vehicle came to rest off the roadway facing generally north. After impact, the Dodge ram pickup began a clockwise rotation, traveled approximately 20 m (64 feet) off road, and then began a left side leading rollover. The vehicle rolled approximately 15 m (49 feet), completing four quarter turns before coming to rest on its wheels.

Post-Crash

The 20-year-old driver of the case vehicle sustained moderate injuries. He was transported from the scene by ambulance to a local hospital where he was held until the following afternoon.

The 20-year-old male front right seat occupant was fatally injured. He sustained fractures to ribs 1-8 on the right side, fractures of the sternum and left sternoclavicular joint, left subdural and subarachnoid hemorrhages, a right pulmonary contusion, a liver laceration, and multiple external lacerations, contusions and abrasions. According to the coroner, the cause of death was from "multiple blunt trauma injuries." He was pronounced dead at 1925 hours.

The 2-year-10-month old male second row left occupant was fatally injured. He sustained hemoperitoneum, a right adrenal hemorrhage, extensive laceration to the right lobe of the liver, extensive fractures of the bilateral parietal skull and base of skull, subdural and subarachnoid hemorrhage with severe brain edema, frontal brain contusions, and multiple external lacerations, contusions and abrasions. According to the coroner, the cause of death was from "multiple blunt trauma injuries." He was pronounced dead at 2018 hours.

The 8-month-old male second row right occupant was fatally injured. He sustained blunt trauma to the abdomen, severe liver and spleen lacerations, a complete dislocation of the left sacroiliac joint, blunt trauma to the head, complete avulsion of the brain, blunt trauma to the chest, bilateral pulmonary contusions, and multiple external lacerations, contusions and abrasions. According to the coroner, the cause of death was from "multiple blunt trauma injuries." He was pronounced dead at 1925 hours.

VEHICLE DATA -1998 Mitsubishi Eclipse

The 1998 Mitsubishi Eclipse was identified by the Vehicle Identification Number (VIN): 4A3AK34Y4WExxxxxx. The Mitsubishi Eclipse was a two-door four passenger coupe that was equipped with a 2.0 liter 4 cylinder engine, a 5-speed manual transmission, disc brakes, and power-assisted rack-and-pinion steering. The Eclipse was configured with Mastercraft P794 P195/70R14 tires on the front and Yokohama Guardex P195/70R14 tires on the rear. The manufacture's recommended cold tire pressure was 221 kPa (32 psi) for the front and 200 kPa (29 psi) for the rear. The specific tire information is as follows:

Tire	Tread	Measured pressure	Restricted	Damage
LF	6 mm (8/32 in)	Flat	No	Rim chipped
LR	6 mm (7/32 in)	159 kPa (23 psi)	No	None
RR	6 mm (7/32 in)	172 kPa (25 psi)	No	Tire off
RF	6 mm (8/32 in)	Flat	No	None

The seating in the Mitsubishi Eclipse was configured with fabric covered front bucket seats with adjustable head restraints and a rear bench seat. The front seats were adjusted to the middle track position. Both front seat back were deformed by the impact and subsequent intrusion. The second row seat back was torn free during the impact and was no longer with the vehicle

VEHICLE DAMAGE

Exterior Damage - 1998 Mitsubishi Eclipse

Damage Description: The 1998 Mitsubishi Eclipse sustained major right side damage as a result of the impact with the Dodge pickup. Due to the height difference between the front bumper of the Dodge Ram pickup and the sill of the Mitsubishi Eclipse, the sill was overridden and the front of the Dodge penetrated the Eclipse. The exterior damage from this initial impact began at the front right passenger's door. During the impact, the front right passenger's door, the roof, the right rear quarter panel, the trunk lid, rear bumper, and the right rear tire assembly were all torn away from the vehicle. After the initial impact, the Eclipse went into rotation and struck a metal sign post with its left front fender and then struck a chain link fence with its rear end. There was also damage to the left side that measured 24.0 cm (9.4 in) wide and was located 50.0 cm (19.7 in) forward of the rear axle. This damage was possibly related to the chain link fence impact as the vehicle penetrated the fence.

CDC: Impact 1: 01RDAW9
Impact 2: 11LFEN1
Impact 3: 09BDES1

Delta V:	Total	Unknown
	Longitudinal	Unknown
	Latitudinal	Unknown
	Energy	Unknown



Figure 5. Left side, Mitsubishi Eclipse

Interior Damage - 1998 Mitsubishi Eclipse

The 1998 Mitsubishi Eclipse sustained major intrusion and integrity loss as a result of the impact with the Dodge pickup. There was intrusion along the entire right side. The integral right side structure, the right door, and the roof were all torn away during the crash.

MANUAL RESTRAINT SYSTEMS - 1998 Mitsubishi Eclipse

The 1998 Mitsubishi Eclipse was configured with manual 3-point lap and shoulder belts for each seating position. Both front seat safety belts were equipped with adjustable D rings. The driver's D ring was adjusted to the full down position. The front right passenger's D ring adjustment position is not known. The driver's seat belt was equipped with an Emergency Locking Retractor (ELR) and a sliding latch plate. The remaining safety belts were configured with sliding latch plates and switchable ELR/Automatic Locking Retractors (ALR).

The driver's seat belt was used during the crash. The front right passenger's seat belt was used during the crash. The seat belt webbing was torn during the impact.

The second row left seat belt was not in use at the time of the crash.

The second row right seat belt was used to anchor a forward facing child safety seat. The seat belt webbing was torn during the impact. The seat belt latchplate was still in the buckle at the time of the vehicle inspection. The child seat was ejected.



Figure 6. Overview of interior damage



Figure 7. Second row right seat belt

Supplemental Restraint System - 1998 Mitsubishi Eclipse

The 1998 Mitsubishi Eclipse was equipped with frontal air bags for driver and front right passenger positions. The frontal air bags deployed as a result of the longitudinal deceleration of the Eclipse during the impact with the truck.

The driver's air bag deployed from the center symmetrical module cover flaps. Each flap measured 17.0 cm (6.7 in) in width and 6.5 cm (2.5 in) in height. The deployed driver's air bag measured 54.0 cm (21.2 in) in its deflated state. The air bag was equipped with two internal tethers. There were no vent ports.



Figure 8. Driver's air bag

The front right passenger's air bag deployed from a top mount module with a rectangular cover flap that was hinged at the forward aspect. The module cover measured 35.0 cm (13.8 in) wide by 16.0 cm (6.3 in) high. The deployed front right passenger's air bag measured 45.0 cm (17.7 in) seam to seam and was approximately 60.0 cm (23.6 in) high and had an excursion of 64.0 cm (25.2 in) in its deflated state. There were no vent ports and no tethers.



Figure 9. Front right passenger's frontal air bag

Child Safety Seat

Cosco high-back booster seat - second row left

The Cosco high-back forward facing only seat was positioned in the left rear seat of the Mitsubishi Eclipse. The model number was 22-208. The date of manufacture was August 18, 2004. The seat was equipped with a five-point harness. The seat was being used in a forward facing fashion. The manufacture recommends that this child seat be used with children weighing between 9 and 18 kg (20 and 40 lbs) and who are between 74 and 102 cm (29 and 40 in) in height. The child seat harness was in the bottom slot. The seat was not anchored to the vehicle. The child was not using the child seat harness. There were no indications of stress to the child seat frame and no seatbelt loading. The locking clip was not used and was still attached to the seat. There was contact to the right side child seat back. This was caused by contact from the right rear child seat. There was blood found at the top seat back. The seat was equipped with a top tether and lower LATCH attachments which were not used.



Figure 10. Cosco high back booster seat



Figure 11. Cosco forward facing only seat

Graco ComfortSport - second row right

The convertible Graco ComfortSport child safety seat was positioned in the second row right seat position of the Mitsubishi Eclipse. The model number was 8639 BEU and the date of manufacture was May 9, 2005. The convertible child seat was configured with a five-point harness system and a two-piece locking harness retainer clip. The harness was threaded through the middle slot position. The chest clip was positioned 5.0 cm (1.9 in) from the harness straps latch plates. The manufacturer recommends that this convertible child seat be used rear facing for infants weighing up to 14 kg (30 pounds) and can be used forward facing for children between 9 and 18 kg (20 and 40 pounds) and up to 102 cm (40 in) tall. The manufacturer also recommends that the top of the child's ears must be below the top edge of the seat and the child's shoulders must not be above the top harness slots. The child seat was being used in the forward facing fashion. The child was belted in the child safety seat. The child seat was anchored to the vehicle using the available lap and shoulder belt. It is not know if the seat belt was in the ALR or ELR mode. There was a 3.5 cm (1.4 in) crack on the front face of the bottom of the child seat. The entire right side of the child seat base showed signs of stress and the seat was deformed. The right harness was torn 20.0 cm (7.9 in) above the latch plate. The child remained in the child seat throughout the crash. Both the child and the child seat were fully ejected from the vehicle. The seat was equipped with a top tether and lower LATCH attachments which were not used.



Figure 12. Graco ComfortSport child safety seat



Figure 13. Deformation to the right side of the Graco child safety seat

VEHICLE DATA - 2004 Dodge Ram 3500 pickup

Description:	2004 Dodge Ram 3500 quad cab 4x4 pickup	
VIN:	3D7LU38C94Gxxxxxx	
Odometer:	Unknown	
Engine:	5.9 liter, six cylinder	
Reported Defects:	None noted	
Cargo:	Unknown	
Damage Description:	Extreme damage to front right, according to police report	
CDC:	Impact 1: 12FZEW1 Impact 2: 00TYDO3	
Delta V:	Total	Unknown
	Longitudinal	Unknown
	Latitudinal	Unknown
	Energy	Unknown



Figure 14. Rollover damage



Figure 15. Front view, Dodge pickup

OCCUPANT DEMOGRAPHICS - 1998 Mitsubishi Eclipse

	Driver	Occupant 2
Age/Sex:	20/Male	20/Male
Seated Position:	Front left	Front right
Seat Type:	Fabric covered bucket seat, seat in middle track position	Fabric covered bucket seat, seat in middle track position
Height:	Unknown	175 cm (69 in)
Weight:	Unknown	75 kg (165 lbs)
Occupation:	Unknown	Unknown
Pre-existing Medical Condition:	None noted	None
Alcohol/Drug Involvement:	None	None, per autopsy report
Driving Experience:	Unknown	None, per autopsy report
Body Posture:	Upright	Upright
Hand Position:	Unknown, actively steering	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belt available, used	Lap and shoulder belt available, used
Air bag:	Driver's air bag available, deployed	Driver's air bag available, deployed

OCCUPANT DEMOGRAPHICS - 1998 Mitsubishi Eclipse

	Occupant 3	Occupant 4
Age/Sex:	2 year-10 month/Male	8 months/Male
Seated Position:	Second row left	Second row right
Seat Type:	Fabric covered bench seat	Fabric covered bench seat
Height:	91 cm (36 in)	91 cm (36 in)
Weight:	13 kg (29 lbs)	11 kg (25 lbs)
Occupation:	NA	NA
Pre-existing Medical Condition:	None	None
Alcohol/Drug Involvement:	NA	NA
Driving Experience:	NA	NA
Body Posture:	Upright, CSS	Upright, CSS
Hand Position:	Unknown	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belt available, not used. Child seated in child seat. Child seat harness not used.	Lap and shoulder belt used with child safety seat.

OCCUPANT DEMOGRAPHICS - 2004 Dodge Ram 3500

	Driver
Age/Sex:	62/Male
Seated Position:	Front left
Seat Type:	Unknown
Height:	Unknown
Weight:	Unknown
Occupation:	Unknown
Pre-existing Medical Condition:	None noted
Alcohol/Drug Involvement:	None
Driving Experience:	Unknown
Body Posture:	Unknown
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Lap and shoulder belt available, used. Steering wheel mounted air bag deployed.

OCCUPANT INJURIES -1998 Mitsubishi Eclipse

Driver: Sustained “moderate” injuries per police report.

Front right occupant (02): Injuries obtained from autopsy report.

<u>Injury</u>	<u>OIC Code</u>	<u>Injury Mechanism</u>	<u>Confidence Level</u>
Right posterior rib fractures, 1-8 ribs	450230.3,1	Door	Certain
Fracture, sternum	450804.2,4	Door	Probable
Fracture, left sternoclavicular joint	751299.1,2	Seat back	Probable
Fracture and transection of vertebral column at level C1	640246.5,6	Exterior of other vehicle	Possible
Left subdural and subarchnoid hemorrhage	140650.4,2 140684.3,2	Exterior of other vehicle	Possible
Right pulmonary contusion	441402.3,1	Door	Probable
Extensive stellate laceration of the liver	541826.4,1	Seat belt	Probable
Right side of forehead 2.54 cm (1.0 in) laceration deep into the scalp	290604.2,7	Door	Probable
Lateral aspect of the right eyelid - 5.1 cm (2.0 in) vertically oriented laceration	290602.1,1	Door	Possible
Right face, nose and lip, area of extensive abrasion	290202.1,1 290202.1,4 290202.1,8	Exterior of other vehicle	Possible
Overlying a substantial portion of the right lateral chest and abdomen is a 30.5 x 30.5 cm (12.0 x 12.0 in) area of abrasion	490202.1,1 590202.1,1	Door	Certain
Right arm has been completely transected 22.9 cm (9.0 in) below the shoulder (humerus)	711000.3,1	Exterior of other vehicle	Possible
Right anterior thigh, 25.4 x 10.2 cm (10.0 x 4.0 in) area of superficial abrasion	890202.1,1	Door	Probable
Right lower leg, 7.6 x 10.2 cm (3.0 in x 4.0 in) curvilinear abrasion	890202.1,1	Door	Probable
Overlying left anterior superior iliac crest, 15.2 x 5.1 cm (6.0 x 2.0 in) area of abrasion	890202.1,2	Seat belt	Possible

Abrasion, right sternum/clavicle	490202.1,1	Seat belt	Possible
Overlying left knee, 5.1 x 2.54 cm (2.0 x 1.0 in) area of abrasion	890202.1,2	Unknown	Unknown
Laceration, 15.2 cm (6.0 in), right index finger	790604.2,1	Unknown	Unknown

Second row left occupant (03): Injuries obtained from autopsy report.

<u>Injury</u>	<u>OIC Code</u>	<u>Injury Mechanism</u>	<u>Confidence Level</u>
Right adrenal hemorrhage	540299.1,1	Side interior surface	Possible
Extensive laceration, right lobe of the liver	541826.4,1	Side interior surface	Possible
Extensive fractures, bilateral parietal skull and base of skull	150404.3,1 150404.3,2 150200.3,8	Side interior surface	Possible
Subdural and subarachnoid hemorrhage	140650.4,9 140684.3,9	Side interior surface	Possible
Bilateral uncal contusions, Right frontal parietal convexity contusions	140611.3,9	Side interior surface	Possible
Right eyelid, 2.54 cm (1.0 in) contusion	290402.1,1	Side interior surface	Possible
Right cheek and temple abrasion, 10.2 cm (4.0 in)	290202.1,1 190202.1,1	Side interior surface	Possible
Abrasion, right shoulder 7.6 x 2.54 cm (3.0 x 1.0 in)	790202.1,1	Side interior surface	Possible
Right ventral lower arm 2.54 cm (1-inch) vertically oriented linear laceration	790602.1,1	Side interior surface	Possible
Laceration, right lateral wrist is a 5.1 x 2.54 cm (2.0 x 1.0 in)	790602.1,1	Side interior surface	Possible
Abrasion, medial aspect of right upper leg 10.2 x 5.1 cm (4.0 x 2.0 in)	890602.1,1	Side interior surface	Possible
Abrasion, medial aspect of right ankle 2.54 cm (1.0 in)	890202.1,1	Side interior surface	Possible
Overlying the left superior anterior iliac crest 7.6 x 2.54 cm (3.0 x 1.0) abrasion	890202.1,2	Unknown	Unknown
Abrasion, left ventral arm adjacent to the elbow 2.54 cm (1.0 in)	790202.1,2	Side interior surface	Possible

Abrasion, right and left cheeks, 7.6 x 5.1 cm (3.0 x 2.0 in)	290202.1,1 290202.1,2	Side interior surface	Possible
Posterior aspect of the scalp commencing at the midline and coursing to the right about 5.1 cm (2.0 in) posterior to the right external auditory canal orifice and 10.2 cm (4.0 in) above the right external auditory canal orifice is a 2.54 cm (1.0 in) laceration	190602.1,6	Side interior surface	Possible

Second row right occupant (04): Injuries obtained from autopsy report.

<u>Injury</u>	<u>OIC Code</u>	<u>Injury Mechanism</u>	<u>Confidence Level</u>
Severe liver laceration	541826.4,1	Side interior surface	Possible
Severe spleen laceration	544214.3,2	Side interior surface	Possible
Complete dislocation of the left sacroiliac joint	852800.3,6	Unknown	Unknown
Vault of skull has gaping fracture, the dura is disrupted consistent with complete avulsion of brain	140688.4,9	Side interior surface	Possible
Bilateral pulmonary contusions	441410.4,3	Unknown	Unknown
Mid portion of head (frontal and parietal portions), 10.2 x 5.1 cm (4.0 x 2.0 in) gaping skull defect beneath a 15.2 x 10.2 cm (6.0 x 4.0) gaping laceration of the scalp	190604.2,5	Side interior surface	Possible
Laceration, right temple, 10.2 cm (4.0 in)	190604.2,1	Side interior surface	Possible
Fracture, maxilla	250800.2,9	Side interior surface	Possible
Laceration, right cheek is a 3.8 cm (1.5 inch)	290602.1,1	Side interior surface	Possible
Abrasion, right cheek 3.8 x 12.7 cm (3.0x 5.0 in)	290202.1,1	Side interior surface	Possible
Abrasion, right ventral arm; adjacent to the elbow, 2.54 cm (1.0 in)	790202.1,1	Side interior surface	Possible
Abrasion, left ventral lower arm, 5.1 x 5.1 cm (2.0 x 2.0 in) area of abrasion	790202.1,2	Unknown	Unkown
Contusions, right knuckles, 1.3 cm (0.5 in)	790402.1,1	Side interior surface	Possible

Abrasion, medial aspect right upper and lower leg, 15.2 x 5.1 cm (6.0 x 2.0 in)	890202.1,1	Side interior surface	Possible
Abrasion, chest, 15.2 x 10.2 cm (6.0 x 4.0 in)	490202.1,9	Side interior surface	Possible
Laceration, right wrist, 2.54 cm (1.0 in)	790602.1,1	Side interior surface	Possible
Abrasion, left lower leg, 7.6 x 5.1 cm (3.0 x 2.0 in)	890202.1,2	Unknown	Unknown

OCCUPANT KINEMATICS - 1998 Mitsubishi Eclipse

Driver kinematics

The 20-year-old male driver was seated in an upright posture and restrained by the 3-point manual lap and shoulder belt. The seat was adjusted to the mid-track position. At impact, the frontal air bags deployed. The male driver initiated a sharp lateral and forward trajectory to the right. He loaded the safety belt and engaged the deployed driver's air bag. As the vehicle began its clockwise rotation, the driver likely loaded the seat back as the vehicle spun. The impacts with the pole and fence were negligible and had little effect on the vehicle dynamics or the occupant kinematics. The driver came to rest in his seat, still restrained. He was transported from the scene by ambulance to a local hospital where he was held until the following afternoon. The extent of his injuries are not known.

Front right occupant kinematics

The 20-year-old male front right seat occupant was seated in an upright fashion and was restrained by the 3-point manual lap and shoulder belt. The seat was adjusted to the middle track position. At impact, the front right passenger air bag deployed. This occupant initiated a lateral and forward trajectory to the right. This movement was interrupted by the intruding front right door. As the other vehicle and various components of the case vehicle intruded into the passenger compartment, this occupant was essentially being crushed and pushed toward the left rear of the vehicle. He sustained fractures to ribs 1-8 on the right side, fractures of the sternum and left sternoclavicular joint, left subdural and subarachnoid hemorrhages, a right pulmonary contusion, a liver laceration, and multiple external lacerations, contusions and abrasions. He also sustained a fracture and transection of the vertebral column at the C1 level and a complete transection of the right arm. These injuries appear to be more related to contact with the intruding vehicle. The webbing for this occupant's lap and shoulder belt was torn and came apart. The police investigator indicated that this occupant was found in the left rear of the vehicle. According to the coroner, the cause of death was from "multiple blunt trauma injuries." He was pronounced dead at 1925 hours.

Second row left occupant kinematics

The 2-year-10 month old male child was seated in the forward facing child safety seat in the second row left position. The child seat harness was not being used. The child seat was not anchored to the vehicle. At impact, this occupant initiated a lateral and forward trajectory to the right. He likely came out of his seat and engaged the back of the driver's seat. The case vehicle began a clockwise rotation. As the vehicle was near the end of its rotation, this occupant and the child seat were ejected through the rear/right side and came to rest south of the vehicle. He sustained hemoperitoneum, a right adrenal hemorrhage, extensive laceration to the right lobe of the liver, extensive fractures of the bilateral parietal skull and base of skull, subdural and subarachnoid hemorrhage with severe brain edema, frontal brain contusions, and multiple external lacerations, contusions and abrasions. He was transported by air to a local pediatric trauma center for treatment. He was pronounced dead at 2018 hours. According to the coroner, the cause of death was from "multiple blunt trauma injuries."

Second row right occupant kinematics

The 8-month-old male child was restrained in the forward facing child safety seat by the five-point harness. The child seat was anchored to the vehicle in the second row right seat position by the 3-point manual lap and shoulder belt. It is not known if the retractor was in the ELR or ALR mode. At impact, the child and the child seat initiated a lateral and forward trajectory to the right. At this same time, the child engaged the intruding right door and vehicle body structure. He was essentially crushed as the body structure gave way and passed through his seat position. The lap and shoulder belt webbing was torn and came apart. The child seat was no longer anchored to the vehicle and both the child seat and child were ejected from the vehicle during the early part of the vehicle's post-impact rotation. This occupant was fatally injured. He sustained blunt trauma to the abdomen, severe liver and spleen lacerations, a complete dislocation of the left sacroiliac joint, blunt trauma to the head, complete avulsion of the brain, blunt trauma to the chest, bilateral pulmonary contusions, and multiple external lacerations, contusions and abrasions. According to the coroner, the cause of death was from "multiple blunt trauma injuries." He was pronounced dead at 1925 hours.

Attachment 1. Scene Diagram

