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Seat-belt Injuries

SIR,-We readily accept Mr. J. B. Hamilton's opinion that car belts of approved design can cause hollow visceral abdominal injuries (23 November, p. 485). Many surgeons have experience of similar injuries from violence applied to the abdominal wall from other than road accidents. It is less clear that the neck injuries he described were caused by the wearing of car belts.

In our investigation of 522 fatalities to the occupants of cars we have related the necropsy evidence with the type of accident and the vehicle damage in an endeavour to establish the cause of the fatal injuries. The injuries were typically both severe and multiple; over half concerned damage to solid abdominal viscera, and 11% were injuries to hollow viscera. Only two of the victims were wearing safety belts, and the passenger compartments of their vehicles were so grossly deformed following collisions with heavy lorries that we have attributed their injuries to car deformation, against which belts offer little or no protection. Incidentally, in this study around 10% of non-beltwearers suffered fracture or fracture-dislocation of their necks from head or facial impacts against which well-fitting belts offer a very large measure of protection.

Special Investigation

Study of complete samples of fatal accidents thus provide little information on injuries to belt wearers. We therefore mounted a special investigation in which various authorities now notify us of injuries and deaths to belt wearers. In this special study, in addition to our usual investigations, we also record the type of belt worn, its anchorage, and a note on the belt's probable performance in the crash sequence. So far we have investigated over 50 injuries in addition to 13 deaths in belt wearers. For reasons of space only the deaths are noted here.

Six of these we have attributed to the deformation of the passenger compartment on to the car occupant. Two were due to car/lorry collisions, one to a car/armoured military vehicle collision, one to a collision between a car and heavy roadside furniture, one to a collision between a small car and a much heavier car, and one when an open two-seater overturned and its metal windscreen frame collapsed and crushed the retained driver's head against the top of his door.

The remaining seven cases contained evidence of need for improved belt design, and more important, how belts of the present design should be worn. Three of the victims were wearing single diagonal belts, two had pillar anchorages, and one was floor mounted. The cars of the two victims wearing pillar-mounted belts went through overturning gyrations during which the door at the victim's side opened. In one case the passenger slipped out of her belt and was completely ejected and crushed by the overturning car. A similar sequence occurred to the driver of another car, but he was only partly ejected, as his neck was caught in the belt near the pillar, resulting in a high cervical fracture-dislocation with cord division. The anchorage of the floormounted single diagonal belt was too far forward to provide maximum protection, and it is likely that the passenger was wearing the belt far too loosely, so that she made violent contact with the dash, which was indented many inches.

The other victims were all wearing lap and diagonal belts with the diagonal component pillar-mounted. One accident resulted in the deaths of the driver and front-seat passenger in the same car. As far as we know the belts were correctly worn and mounted according to present regulations. Before its crash the car went into a very tight right-hand turn at speed, and was then over-corrected with a tight left-hand turn still at speed. Finally it left the road to go down a steep embankment and collide headon with some roadside trees. The circular bruises just under the rib-cage and transversely around the flank of the front-seat passenger indicated that these were caused by the lap component of the belt riding high. The mounting of the belts was such that the lap components might have been wrongly adjusted to fit over the abdomen rather than the pelvis. It is further possible that on the initial sharp right-hand turn of the car she slipped out of the pillar-mounted diagonal component of her belt, allowing slack in the lap component sufficient for it to ride high. Similarly we suspect

that the subsequent sharp left-hand turn caused the driver to slip out of the diagonal component of his belt and then the lap component rode high on his abdomen. Both suffered fatal intra-abdominal injuries. The driver had a rupture of the anterior surface of a stomach remnant left after a previous partial gastrectomy.

Surgical Unit in the Shetlands

Unintentioned Impact

Freedom to Prescribe

S. F. Szanto, M.R.C.P.I. Agranulocytosis of Unknown Origin Gillian Shenfield, B.M., and C. J. F. Spry,

M.R.C.P. Present State of S.H.M.O. Grade

 Freedom to Prescribe

 Philip Freeman, L.R.C.P.

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 Freedom of Individual Consultants

 J. J. Shipman, F.R.C.S.

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 Payments for Designated Areas

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 Payments for Designated Areas

 A. S. Russell, M.B.

 Refresher Courses

 N. D. Wayne, M.R.C.S.

 Mazard of Discount Trading

 A. E. R. Campbell, L.R.C.P.ED.

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 Christmas Gifts Fund

 G. H. Bateman, F.R.C.S.

From the evidence of the injuries and the damage to the interior of the vehicles from the impacts of the other two victims we are of the opinion that their belts were being worn far too loosely. If belts are to fit snugly and comfortably and give maximum protection they could with advantage be designed with a more intimate relationship to car seats. The term "seat belt" should in this context be confined to belts that are actually attached to the seats. When designed in this manner-as Cox, of Watford, demonstrated some years ago-they fit their wearers snugly over the convexity of the clavicle -yet well away from the neck-and over the middle of the sternum and around the bony pelvis—structures best fitted to withstand the forces of deceleration. When the diagonal com-ponent of such belts is mounted on an inertia reel the fit of the whole belting system is selfadjusting. With a snubber bar between the lap and diagonal components the lap belt loses its tendency to ride high on the abdomen. All other belts with anchorages to pillars and floors (at various permitted positions) are really "car belts." Their obvious disadvantages are their belts." variable fits on the wearer's body according to the position of the seat and the difficulties they present to their wearers in the correct adjustment of the belting system.

Our evidence confirms that of others, that the present design of lap and diagonal belts offers very good protection, for we have found it really difficult to find examples of their failures, even during the last 12 months when the wearing of belts has become more common. Perhaps "seat belts" that offer the greatest protection will only be available when car manufacturers accept the need, for they must be designed and built as part of the car and seat structure. We are in little doubt that during the next few years the evidence of this need will become apparent. -We are etc.,

WILLIAM GISSANE.

JOHN P. BULL.

Directors, Road Injuries Research Group. Birmingham Accident Hospital, Birmingham