Cervical spine motion during vehicle extrication of healthy volunteers

**Supplementary Material for Online Publication**

The vehicle used was a Toyota (Toyota Carina™, Toyota Motor Corporation, Toyota, Japan) that was modified by the fire fighters of Verona according to instructions given by the researchers (Figure S1). The rear half of the car was removed along with the roof, doors, windshield, engine and wheels. Thus, the experimental car presented two front seats, the console, the steering wheel and the gear stick (Figure S1). The subject in the starting position (“Pre”) was seated on the driver’s side with the seat (and hence the torso) inclined at about 110° with respect to the horizontal. In this position the cervical spine angle was of about 75°.

**Supplemental Figure S1.** The experimental setting.



In Figure S2, typical tracings of the cervical spine angle in the four conditions (“Autonomous Exit” (AE); “Instructed Exit” (IE); “Cervical Collar” (CC); “Cervical Collar and XT extrication device” (CC+XT)) are reported for a representative subject. The shaded areas in light grey indicate the exit phase, those in dark grey the maneuver. The time taken to exit the vehicle was longer in the instructed exit (IE) compared to the autonomous exit (AE) and the duration of the exit phase with CC+XT was the longest; the duration of the maneuver is greater when positioning CC+XT than CC alone. This figure also shows that the time course of the cervical spine angle is smoother for AE and IE, compared to the CC and CC+XT conditions and that the greater variations in the cervical spine angle occur in AE and IE. During exit in CC+XT, an abrupt change in cervical spine angle is apparent; this corresponds to the moment in which the subject is positioned on the ground after the extrication procedure.

**Supplemental Figure S2.** Typical tracings of the cervical spine angle (alpha) in the four experimental conditions.

