Drivers Wearing Arm Slings Shouldn’t Drive

Shoulder immobilization hinders reaction time, results in more crashes

Immobilization of the dominant arm in a sling may not have an adverse effect on everyday driving in normal conditions, but it does hinder a driver’s ability to perform evasive maneuvers when facing hazardous conditions, a study reports. As a result, patients should be counseled not to drive while the dominant arm is immobilized, reported Laith M. Jazrawi, MD, at the 2012 annual meeting of the Arthroscopy Association of North America.

Physicians have a central responsibility to assess physical and mental impairments that might adversely affect driving, according to an American Medical Association statement. The National Highway Traffic Safety Administration provides guidelines on return to driving and recommends not driving with any splint or immobilization device. Studies have shown, however, that patients often continue to drive despite extremity immobilization.

Evidence-based guidelines have been established for return to driving after certain lower extremity procedures. Two studies that examined upper extremity immobilization with either above-the-elbow or below-the-elbow splints found that splints do not affect driving performance in normal circumstances, but do result in unsafe driving practices when hazardous conditions are faced and the splint is on the dominant arm. This study examines the effects of shoulder immobilization with a sling on driving patterns.

Simulated driving experiences
The study, conducted at NYU Hospital for Joint Diseases department of orthopaedic surgery, involved 20 healthy volunteers and a custom-built driving simulator. The pedal assembly was connected to an analog-to-digital converter that transmitted positional information.

The simulated course had a number of hazards—barrels and traffic—and was designed to require the driver to use the dominant hand more than the nondominant hand. Participants served as both controls (while not wearing a sling) and test subjects (with the dominant arm immobilized with a shoulder sling).

Baseline tests established the participants’ ability to use their driving arm during a swerve and their brake reaction time. Researchers used this information to calibrate the simulation course, control for variability between trials, and isolate the effect of the sling on each volunteer. Speeds were computer-controlled during approaches to hazards to allow uniform analysis. Investigators measured the number of collisions, minimum distance the driver kept from either edge of the road, maximum steering angle, and minimum distance to collision when encountering a hazard.

When wearing a sling, drivers had significantly more collisions (3.65 versus 1.71, P < 0.01). No significant differences were found between immobilization and nonimmobilization in variables such as vehicle position, steering rate, acceleration, and distance to road objects if no collision ensued. Although the study indicates that immobilization has no effect on normal highway driving in normal circumstances, “we believe that sling immobilization impedes the driver’s ability to effectively perform evasive maneuvers,” said Dr. Jazrawi.

Both motor and cognitive components may contribute to the impairment. “In a purely motor sense, the contralateral extremity is not accustomed to reacting efficiently to a road hazard. But cognitively, immobilization of the ‘normal’ driving arm may result in altered processing.
of spatial information and decision making, resulting in impairment in a driver’s ability to efficiently react and control the vehicle,” he said.

The difficulty in establishing end points that can objectively and directly measure the effect of immobilization on driving performance is just one of the study’s limitations. The investigators attempted to address that challenge by customizing the course for each driver. “By creating controlled hazardous conditions in which the collision depends on effectively performing an evasive maneuver, we are confident that our results can be extrapolated to certain aspects of real-world driving,” said Dr. Jazrawi.

The study did not address complicated maneuvers such as parallel parking and three-point turns, and the relatively young mean age of participants (26 ± 3 years) may have had an impact on driving performance. For example, younger drivers might not perform evasive maneuvers in a way typical of the general population. It is also possible that the effects of immobilization may be more profound on the elderly when taking into account other variables such as comorbid conditions and medication use.

Dr. Jazrawi also pointed out that actual patients may be taking analgesics, including opioids, which can affect driving performance. Because the study participants did not use any stimulants, analgesics, or depressants before driving the circuits, “it is likely that the effect of immobilization would be more pronounced in patients using such substances.”

Guidelines needed
The authors called for additional research focused on the effect of shoulder immobilization on the nondominant driving arm and on return-to-driving guidelines.

“Given the ubiquitous use of immobilization devices in the context of musculoskeletal injury, it is imperative to develop clear evidence-based recommendations for driving with an immobilized extremity,” said Dr. Jazrawi. “Our results demonstrate that, although driving with the dominant arm immobilized in a sling may not adversely affect normal everyday driving, it does adversely affect the ability to effectively perform evasive maneuvers when facing hazardous driving conditions. Due to the significant medical, legal, and financial ramifications, we believe that driving with the dominant driving arm immobilized in a sling is unsafe and recommend that patients not drive during the duration of immobilization.”

Bottom Line
- Studies show many patients will continue to drive, despite wearing an arm sling or cast.
- In this study using a custom-built driving simulator, drivers wearing a sling had significantly more crashes in response to hazards, but both control and test groups of drivers performed similarly in normal conditions.
- The effect of immobilization may relate both to motor and cognitive functions in drivers.
- Patients whose dominant arm is immobilized should not drive.