

Clinical Decision Making: Doctor, When Can I Drive?

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Abstract

The orthopedic surgeon has little evidence-based literature to refer to when deciding when a patient is “safe” to drive a car. Current advice is derived from several empirical reports on soft-tissue and bone healing. Using the terms surgery and driving, I searched Pubmed and Medline to review the relevant English-language research literature published between 1960 and the present. Of the 975 studies found and examined—all studies, surveys, and case reports involving the extremities were considered—35 had orthopedic relevance. Recommendations for return to driving are presented here. Orthopedic surgeons should find this review an aid when they use the literature to make informed decisions about patients’ return to driving and when they conduct further evidence-based investigation to determine orthopedic fitness to drive.

Although evidence-based medical practice has become the standard of care, the literature on readiness to return to automobile driving is sparse. Patients are concerned that insurance companies can refuse coverage to motorists who drive against medical advice.¹ In addition, surgeons must remain aware that they open themselves to liability claims for third-party injuries when they fail to warn a patient to avoid driving while taking impairment-causing prescription medications.² With many states relying on the medical community to determine the functional limitations that may prevent safe operation of a vehicle,³ patients rely on orthopedic surgeons’ driving recommendations to determine when they can regain their independence.

Clinicians need guidelines to help determine the minimum functional ability required by patients to drive. According to Von Arx and colleagues,⁴ 81% of 126 orthopedic surgeons surveyed were unaware of specific guidelines for determining fitness to drive, yet 97% gave specific advice when questioned by patients. Recent

studies have addressed driving after operative fixation of ankle fractures, and previous studies have examined total hip arthroplasty (THA), total knee arthroplasty (TKA), knee arthroscopy, and anterior cruciate ligament (ACL) reconstruction⁵⁻¹² in this regard. The vast number of musculoskeletal injuries treated by orthopedic surgeons are closely related to the many functionalities involved in safe driving. Variables such as injury severity or recovery rate may contain definable parameters to determine safe operation of a vehicle.

A literature review was performed and used in creating a strategy that orthopedic surgeons can use to make decisions regarding their patients’ driving and to determine areas in need of further investigation. This strategy focuses on postoperative and immobilized fractures and does not include factors such as cognitive ability and psychological states, as these are beyond the scope of this review.

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POSTOPERATIVE PATIENTS Scientific Studies

According to my literature search, 8 studies have directly addressed the ability to drive after orthopedic surgery (THA, TKA, knee arthroscopy, ACL reconstruction, operative ankle fractures).⁵⁻¹² Given that an essential requirement for safe operation of a vehicle is being able to stop in an emergency situation, these studies concentrated on brake pedal use. Using various driving simulators, they compared postoperative patient reaction times and braking times with preoperative values or with American Automobile Association (AAA), Traffic Safety Department control data.¹³ After reaction times were sequentially measured, operation of the brake pedal was used as the primary variable to determine the recommendations for postoperative patients to safely return to driving (Table).

These studies recommended return to driving 4 to 8 weeks after THA, 6 to 8 weeks after TKA, 1 week after right knee arthroscopy, 4 to 6 weeks after right ACL reconstruction, and 9 weeks after right ankle open reduction and

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Table. Evidence-Based Postoperative Driving Recommendations

Surgery*	Extremity Tested	N	Recommendation to Drive	Year & Authors
THA	Bilateral	25	8 weeks	1988, MacDonald & Owen ⁷
THA	Bilateral	90	4-6 weeks	2003, Ganz et al ⁶
TKA	Bilateral	29	8 weeks for right Comfort for left	1994, Spalding et al ⁸
TKA	Bilateral	31	6 weeks	2003, Pierson et al ⁹
Knee arthroscopy	Right	30	1 week	2000, Hau et al ¹⁰
ACL reconstruction	Right	14	4-6 weeks	2000, Gotlin et al ¹²
ACL reconstruction	Bilateral	73	6 weeks for right 2 weeks for left	2000, Nguyen et al ¹¹
Ankle ORIF	Right	31	9 weeks	2003, Egol et al ⁵

*THA indicates total hip arthroplasty; TKA, total knee arthroplasty; ACL, anterior cruciate ligament; ORIF, open reduction and internal fixation.

internal fixation (ORIF). Although there was some variability in study protocols, most of these results were based on transferring the right leg from the gas pedal to the brake pedal. Given the prevalence of automobiles with automatic transmissions in the United States, this study design may be more applicable in the United States than in other countries.¹⁴ It is unclear whether these results would be consistent for automobiles with manual transmissions or for drivers who use both feet, one for each pedal. Of note, the analysis of variance conducted by Pierson and colleagues⁹ showed no significant difference in TKA laterality. Their patient instructions were to, “as quickly as possible, step on the brake pedal with the foot with which you normally brake, left or right.” The number of 2-footed drivers in their

steering. Scientific evidence to determine postoperative driving safety for patients who sustained upper extremity injuries does not exist in the orthopedic literature. Patient self-reported quality of life, however, has been examined. Wang and colleagues¹⁶ found that most of the 20 patients who had undergone bilateral carpal tunnel release reported driving to be the second most difficult activity of daily living after opening a jar. Although patients reported driving to be difficult, there is no way to assess the safety of their performance from this study.

A complete algorithm that could guide orthopedic surgeons in safely returning patients to driving would require studies of reaction in steering a vehicle—similar to previous studies of braking. With shoulder procedures increas-

“Hau et al¹⁰ and Nguyen et al¹¹ found a strong correlation between stepping and standing tests and driving reaction time after knee arthroscopy and ACL reconstruction.”

study was not reported, necessitating further study of this variable. Subsequent investigation may involve identical protocols for different surgical procedures as well as larger samples for sufficient power to test for time to return to driving among these subgroups.

Knowing the correlation of driving simulator performance to clinical examinations, written assessments, or clinical rating systems would be helpful. Hau and colleagues¹⁰ and Nguyen and colleagues¹¹ found a strong correlation between stepping and standing tests and driving reaction time after knee arthroscopy and ACL reconstruction. Unfortunately, Short Form Musculoskeletal Assessment scores¹⁵ did not correlate with lower extremity driving function after ankle fractures.⁵ A useful guideline would provide orthopedic surgeons with a validated outcome measure that could easily be used for assessment in the clinic.

Upper Extremity. The ability to control a vehicle in an emergency involves not only use of the lower extremities for braking but also use of the upper extremities for

ing in number, determining when a shoulder patient can safely return to operating a motor vehicle would be helpful for treating physicians.

Provider Surveys

Rees and Sharp¹⁷ attempted to establish a majority opinion with a questionnaire addressing common limb fractures at different stages of treatment. They reported 66 orthopedic surgeons' agreement that any patient with a lower limb fracture requiring external fixation or immobilization after surgery should not be allowed to drive. Patients who are treated with intramedullary nails, plates, or external fixation that are then removed could be allowed to drive given that they are fully weight-bearing and not in pain. A majority of orthopedic surgeons believed that an automobile with automatic transmission could be operated by patients with a left lower extremity injury when they are “relatively pain-free.”

Upper Extremity. The body of opinion regarding upper extremities is less decisive. The only guidance regarding surgically treated upper extremities is from a single survey

of 66 surgeons reporting on patients treated with plates or external fixation; these surgeons recommended that these patients, having poor grip strength, should not be allowed to drive, nor should patients with bridging external fixators across the wrist.¹⁷ This variability in orthopedic opinion regarding fitness to drive suggests the need for further research on return to safe driving.

PATIENTS WITH IMMOBILIZED FRACTURES

According to the state of Michigan,³ determination of the ability to operate a motor vehicle safely with a cast or brace is left to the physician or other health consultant. Orthopedic surgeon opinion supports the view that patients with cast immobilization on the lower extremity should not be allowed to drive.¹⁷ The literature suggests uncertainty among orthopedic surgeons in determining fitness to drive for other immobilized patients.

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Upper Extremity. For immobilization of the upper extremity distal to the metacarpophalangeal joints or proximal to the elbow, a recommendation not to drive is supported.¹⁷ When the upper extremity is immobilized in short-arm fashion, the body of opinion supports the view that good grip strength makes a patient fit to drive.¹⁷ Blair and colleagues¹⁸ examined driving ability in short-arm casts and concluded that a simple short-arm cast on the right arm had no effect on ability to drive but that any form of spica cast had significant effects on driving ability. As with surgical patients, it is difficult to draw conclusions from the literature with such limited investigation into this topic, and the physician is left with little guidance.

CONCLUSIONS

With patients eager to return to their daily activities, surgeons' proper guidance regarding return to safe driving is of significant legal and socioeconomic importance. Surgeons must weigh injury, surgery, and functional ability when determining whether a patient is likely to be a danger on the road. They should be familiar with state laws regarding driving impairment and should remind the patient to adhere to these laws. The literature offers few evidence-based guidelines for determining when a patient is “road-ready.” This review has provided some guidance on return to driving for certain postoperative patients.

Additional evidence-based research needs to be performed for other orthopedic conditions. It is unrealistic to expect that each patient be tested on a driving simulator, but, just as states established guidelines for impaired driving with alcohol and other drugs, a functional baseline for when postoperative patients can drive safely ought to be created. Patients should be counseled preoperatively about a time line for return to safe driving. Studying patients' driving ability with simulators and closed-course evaluations designed for a varied population will allow orthopedic surgeons to better understand the minimal functional ability required to operate an automobile safely and will help patients to return to their previous independence.

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This paper will be judged for the Resident Writer's Award.