

# Timing of Operations and Outcomes for Patients With Hip Fracture—It's Probably Not Worth the Wait

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**In this issue of JAMA**, Pincus and colleagues<sup>1</sup> address an age-old question: How quickly must a patient with a hip fracture be taken to the operating room to provide fixation and repair? Their



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retrospective cohort study included 42 230 adults with hip fracture who underwent surgical repair at 72 hospitals in Ontario, Canada, and examined both the association of the elapsed time (in hours) from hospital arrival until surgery with the primary outcome of mortality at 30 days and the secondary complications: a composite of mortality or other medical complications (myocardial infarction, deep venous thrombosis, pulmonary embolism, and pneumonia).

Using risk-adjusted restricted spline modeling to estimate the probability of each complication according to wait time, the authors also sought to identify an inflection point (in hours from presentation to surgery) when complications began to increase to define *early* and *delayed* surgery.

Many patients were older (mean age, 80.1 years; 70.5% women), and had significant comorbidities (such as hypertension, 75%; diabetes, 27%; and dementia, 30%) and perceived high operative risk. The mean (SD) time from hospital presentation to surgery was 38.8 (28.8) hours, and overall mortality at 30 days was 7%. Adjusted splines modeling identified an area of inflection of about 24 hours before the risk of complications began to increase, regardless of the outcome or follow-up period assessed.

In a propensity matched analysis (to control for the likelihood that patients with greater severity of illness would be more likely to have surgery delayed), the 13 731 patients who received surgery after 24 hours vs 13 731 matched patients who received surgery within 24 hours had a higher risk of 30-day mortality (898 [6.5%] vs 790 [5.8%]; absolute risk difference, 0.79%; 95% CI, 0.23%-1.35%) and the composite outcome (1680 [12.2%] vs 1383 [10.1%]; absolute risk difference, 2.16%; 95% CI, 1.43%-2.89%).

This study adds to the growing body of evidence supporting the importance of early surgical stabilization of hip fractures. The question is how much evidence is necessary to drive change in the system. The timing of hip fracture surgery has been studied extensively but not conclusively. The bulk of evidence has been from observational cohort studies,<sup>2-4</sup> which have been limited by confounding in that patients with hip fracture had greater comorbidities or severity of illness (ie, the ones most likely to die or experience complications) are also the most likely to have surgery delayed for medical optimization. Pincus et al provide analyses that convincingly address this issue, such as adjusting for numerous variables in their restricted cubic spline, and propensity score models, as well as

demonstrating the robustness of their findings with several sensitivity and post hoc analyses. However, the authors also acknowledge potential limitations of unmeasured factors, potential misclassification, and failure to include patients with hip fractures who did not undergo surgery.

Other cohort studies with far fewer patients with hip fracture (n = 2660) but with more rigorously collected prospective data, such as by Moran et al,<sup>5</sup> have failed to demonstrate an association between surgical delays and increased mortality except in patients delayed more than 4 days. Given the relatively small absolute increase in 30-day mortality noted by Pincus et al, the study by Moran et al may have been underpowered to detect the difference. Orosz et al<sup>6</sup> found that early surgery (ie, <24 hours) was not associated with reduced mortality in a cohort of 1178 patients with hip fracture, but the investigators also reported that patients who underwent early surgery had fewer days of severe pain and fewer major complications. Even with the absence of definitive proof of harm, delaying surgery for no good reason is suboptimal care.

Several factors affect the timing of hip fracture surgery. Many patients who sustain hip fracture are older and have multiple comorbidities that require medical evaluation to ensure that their conditions are stable. A smaller subgroup of patients with hip fracture have decompensation of their health status and require medical treatment prior to surgery. This process may involve evaluations by multiple consultants, performance of diagnostic testing, and ongoing medical management. The logistics of this process and the lack of consensus on what is required prior to surgery frequently add days to the patient's preoperative course. Even when the patient is stabilized and the health conditions are optimized, operating rooms and surgeons are not consistently available, leading to further delays. In an evaluation of the reasons for delay in 571 patients with hip fracture, Orosz et al<sup>7</sup> found that 123 had surgery delayed beyond 48 hours, of which 43 (35%) required medical stabilization; however, 78 (63%) were still awaiting completion of multiple medical evaluation and 55 (44%) were delayed because of operating room or surgeon availability.

Although risk stratification of patients undergoing elective surgery has been extensively studied, few guidelines exist to help physicians with the specific preoperative preparation for patients with hip fractures. Even when guidelines do exist, they are often not followed. For example, the 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery<sup>8</sup> indicates that the routine evaluation of left ventricular function is not recommended except for some patients with new or worsening heart

failure and that stress testing is only recommended if it will lead to some intervention that will change the management of the patient's disease. Despite this guideline, echocardiography, pharmacological stress testing, or both are often part of the routine preoperative evaluation. For example, Ricci et al<sup>9</sup> examined a cohort of 235 patients undergoing operations for hip fracture and found that 35 patients (15%) had cardiac testing prior to surgery. No patient had cardiac surgery or coronary angioplasty resulting from the testing. For 17 patients (48%) cardiac testing did not change the medical management. For 18 patients (52%), recommendations were made only for medical management of a previously known condition.

To address the complex medical needs and better coordinate the care of older patients with hip fractures, several centers have developed comanagement teams. Unlike the common situation in which patients with hip fracture are admitted by the orthopedic surgeon and whose care is managed by the primary care physician and multiple consultants, these comanagement models involve a consistent team that includes orthopedic surgeons and geriatric or medical specialists. This approach has led to decreased complication rates, delays, and lengths of stay.

Friedman et al<sup>10</sup> compared hip fracture outcomes at 2 hospitals staffed by the same orthopedic and anesthesia departments. At one hospital, 193 patients older than 60 years with hip fractures were admitted to an orthopedic-geriatric comanagement service whereas 121 patients at the other hospital continued to receive usual care. Patients admitted for comanagement were older, had more comorbidities and dementia, and were less likely to dwell in the community. Despite this, the patients in the comanaged group were operated on sooner (24.1 vs 37.4 hours), had fewer infections (2.3% vs 19.8%), fewer overall complications (30.6% vs 46.3%), and shorter lengths of stay. Given the increased up-front cost involved with establishing a comanagement model, Swart et al<sup>11</sup> performed a breakeven analysis and found that a dedicated comanagement approach would be cost-effective for hospitals that treated more than 54

patients with fractures a year. Despite these encouraging results, traditional fragmented care persists at many hospitals.

Economic incentives maintain the status quo. In-hospital consultations are a source of revenue for physicians, and hospitals prefer to keep their operating rooms filled with elective cases. Hospitals would benefit from decreased length of stay, but few are willing to jeopardize alienating surgeons by forcing them to operate off hours and weekends. This is changing with the move to value-based care and bundled payments but risk and gainsharing arrangements must be created. The planned extension of mandatory bundles by the Centers for Medicare & Medicaid Services to include hip fractures has been put on indefinite hold.<sup>12</sup> Nevertheless, the study by Pincus et al and other reports emphasize the importance of acting now to improve care.

An important policy consideration is that the study by Pincus et al was carried out in Ontario, Canada, which has a provincial health budget, shared medical records, and a culture that generally is less litigious than that in the United States. Many US clinicians may contend that delays for "medical clearance" are due to the need for defensive medicine and multiple levels of cardiopulmonary evaluation, even when there is little, if any, evidence that this evaluation positively affects outcomes. The availability and willingness of surgeons to work nights and weekends require incentive alignment, which tends to be enhanced in single-payer models that have physicians and surgeons as employees.

As the report by Pincus et al<sup>1</sup> demonstrates, for patients with hip fracture, sooner appears to be better when it comes to timing of operative repair because a wait time of more than a 24-hour threshold was associated with a greater risk of 30-day mortality and other complications. Optimizing care for patients with hip fractures will require development of systems with more efficient preoperative patient evaluation and stabilization, more flexibility of scheduling and surgical workforce capacity, and effective approaches to ensure surgical repair as early as possible, ideally within 24 hours as the standard rather than the exception. When it comes to improving care for patients with hip fracture, timing appears to be important.

#### ARTICLE INFORMATION

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