

Development of a Perioperative Hip Fracture Protocol: Expediting Medical Optimization in a High-Risk Surgical Population

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Introduction

Elderly patients presenting with hip fracture have a significantly increased risk of morbidity and mortality. This is due to the old age and high frequency of comorbidities present in this population as well as fracture related complications. Poorly controlled pain and perioperative delirium can be particularly challenging and linked to the time it takes to safely plan and surgically repair the fracture. The American Academy of Orthopedic Surgery recommends surgical repair within 24-48 hours, with evidence showing increased mortality and morbidity with longer delays.

Methods

Given these important challenges, our institution developed a perioperative protocol for the medical optimization of hip fracture patients with the goal of safely expediting surgery. This protocol was produced by consensus with faculty from the Departments of Anesthesiology, Internal Medicine, Cardiology, and Orthopedic Surgery. A focal point during protocol development was discussion of expedited cardiac optimization; more specifically, which patients need a transthoracic echocardiogram (TTE) before surgery? As it is often challenging to obtain a time-sensitive preoperative TTE, we set out to specify which category of hip fracture patients requires a TTE and why and to develop a clinical pathway to expedite the optimization process. As per Columbia University policy this QI project is IRB exempt since there is no identifiable patient information in this report.

We developed a set of clinical criteria and expedited workflow for obtaining a preoperative transthoracic echocardiogram in patients presenting for hip fracture repair.

Figure 1. Indications for Expedited Preoperative TTE

Criteria for Patients Requiring Echocardiogram

- ✓ Patients who are hemodynamically unstable.
- ✓ Patients presenting with unexplained syncope.
- ✓ Patients with known history of cardiac disease (e.g., congestive heart failure, coronary artery disease, or valvulopathy) with poor, unknown, or unable to assess functional status and no echocardiogram within 6 months.
- ✓ Patients with a known history of moderate to severe mitral stenosis or aortic stenosis who do not have an echo within the last 12 months, even if they are asymptomatic or have no clinical signs of decompensation.
- ✓ Patients with pulmonary hypertension or signs of pulmonary embolism, including tachycardia, hypotension, dyspnea, and/or increased oxygen requirements from baseline.

Figure 2. Workflow for Obtaining Expedited (Within 12 hours) Preoperative TTE

Workflow for Obtaining a TTE

- ❑ TTE order in electronic health record (EHR) system may be done by internal medicine or orthopedic services based on established criteria. Cardiology to be consulted if significant findings on exam or history.
- ❑ Order "Transthoracic Echocardiogram" with "STAT" selected on the EHR.
- ❑ During week days, message the "Echo and TEE Escalation" group on EHR messenger system.
- ❑ During week days, after TTE obtained, call Echo Lab and ask attending cardiologist for a wet read.
- ❑ For after hours and weekends, message cardiology fellow on call to perform bedside TTE.

Results

The current literature and guidelines on pre-operative TTE are not easily applicable to the hip fracture population. The 2014 American College of Cardiology/American Heart Association Guidelines discuss the use of "functional status" and "worsening dyspnea" as clinical signs warranting further testing. A substantial proportion of hip fracture patients have dementia and may arrive from nursing homes without family, often precluding the ability to assess functional status or ascertain recent changes in clinical symptoms. To help address this ambiguity, we developed specific criteria for obtaining a pre-operative TTE based on current literature and clinical consensus (see Figure 1). In addition, we outlined a workflow for expediting the study and medical optimization using our hospital's electronic medical record system and pertinent communication lines (see Figure 2). Criterion #3 in Table 1 specifically addresses the question of functional status to help reduce the ambiguity on this matter. Additionally, our protocol introduces the concept of clinical frailty to facilitate risk stratification. Frailty is associated with worse postoperative outcomes and we suggest the employment of the Clinical Frailty Scale, a validated frailty index, in situations in which a patient's functional status is unclear.

Discussion

Our perioperative protocol was released in November 2023. We are confident that by defining more specific criteria for preoperative TTE and cardiac assessment and optimization, we will decrease delays, better prepare for surgery, improve outcomes, and decrease pain and delirium for these high risk patients. There were a few limitations to this project. To date, given time constraints, we have not produced data from pre- and post-introduction of our protocol to evaluate its impact. A few interesting questions to explore include process improvement with respect to obtaining after-hours TTE, the influence of TTE findings on perioperative and anesthetic management, and how clinical frailty assessment can be formally introduced into our pre-operative evaluation.

References

1. American Academy of Orthopaedic Surgeons. Management of Hip Fractures in Older Adults Evidence-Based Clinical Practice Guideline. <https://www.aaos.org/hipfxcpag> Published 12/03/2021
2. Boddaert J, Raux M, Khiami F, Riou B. Perioperative Management of Elderly Patients with Hip Fracture. Anesthesiology 2014; 121:1336-1341.
3. Fleisher, L. A., Fleischmann, K. E., Auerbach, A. D., Barnason, S., Beckman, J. A., Bozkurt, B., Messerli, F. H., Gerhard-Herman, M., Holly, T. A., Kane, G. C., Marine, J. E., Nelson, M. T., Spencer, C. C., Thompson, A., Ting, H. H., Uretsky, B. F., & Wijeyesundera, D. N. (2014). 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery. *Journal of the American College of Cardiology*, 64(22), e77–e137. <https://doi.org/10.1016/j.jacc.2014.07.944>
4. Rockwood K, Theou O. Using the Clinical Frailty Scale in Allocating Scarce Health Care Resources. *Can Geriatr J*. 2020 Sep 1;23(3):210-215.

