

# Hip fracture in the elderly patient: Is the preoperative echocardiogram necessary?

Facundo N. Cosini, Ezequiel Lulkin, Sebastián Pereira, Gabriel Vindver, Fernando Bidolegui

Department of Orthopedics and Traumatology, Hospital Sirio Libanés, ECICARO (Ciudad Autónoma de Buenos Aires, Argentina)

## ABSTRACT

**Introduction:** Hip fractures frequently occur in elderly patients with multiple medical comorbidities. The transthoracic echocardiogram (TTE) is often performed as part of the preoperative evaluation. The main purpose of this study was to assess the impact on surgical delay of preoperative TTE in hip fracture inpatients. **Materials and Methods:** We performed a retrospective study in 40 hip fracture patients who underwent TTE during the preoperative evaluation. The control group was made up of 70 patients of similar ages and comorbidities ( $P > 0,05$ ). We studied the surgical delay, the guideline adherence rate (ACC/AHA), and the impact on perioperative management. **Results:** The surgical delay was longer in the TTE group ( $P < 0,01$ ), the guideline adherence rate was 47,5% and the examination did not generate any changes in the perioperative management in 97,5% of the patients. **Conclusions:** The request for the inpatient echocardiogram generates additional preoperative delays. Approximately half of our series was considered excessive TTE testing, which increases costs, and in patients in whom it is not indicated, TTE does not generate any changes in the perioperative management.

**Key words:** Hip fracture; surgical delay; echocardiogram.

**Level of Evidence:** III

## Fractura de cadera en el paciente añoso. ¿Es necesario esperar el ecocardiograma?

## RESUMEN


**Introducción:** Las fracturas de cadera ocurren generalmente en pacientes añosos con múltiples comorbilidades médicas. Muchas veces el ecocardiograma transtorácico forma parte de la evaluación prequirúrgica. El objetivo principal del estudio fue evaluar el impacto del ecocardiograma en la demora hasta la cirugía, en el paciente internado con fractura de cadera. **Materiales y Métodos:** Se evaluó a 40 pacientes con fractura de cadera a quienes se les realizó un ecocardiograma transtorácico durante la evaluación preoperatoria. El grupo de control estaba integrado por 70 pacientes de similares edades y comorbilidades ( $p > 0,05$ ). Evaluamos la demora hasta la cirugía, la tasa de adherencia a las guías (AHA, ACC) y el impacto en el manejo perioperatorio. **Resultados:** La demora hasta la cirugía fue mayor en el grupo con ecocardiograma transtorácico ( $p < 0,01$ ), la tasa de adherencia a las guías fue del 47,5% y, en el 97,5% de los pacientes, el estudio no modificó el manejo perioperatorio. **Conclusiones:** La solicitud de un ecocardiograma en el ámbito hospitalario genera demoras adicionales hasta el momento de la cirugía. En casi la mitad de nuestra serie, el estudio fue indicado en exceso y prácticamente en todos los pacientes, el resultado no modificó el manejo perioperatorio.

**Palabras clave:** Fractura de cadera; cirugía precoz; ecocardiograma.

**Nivel de Evidencia:** III

## INTRODUCTION

Hip fracture is one of the most common orthopedic trauma in the elderly,<sup>1</sup> and frequently occurs in patients with multiple medical comorbidities,<sup>2</sup> owing to low-energy traumas in low-quality bones.<sup>3</sup>

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It has been well-established that the conservative therapy in hip fracture patients is associated with a high morbidity and mortality rate.<sup>3-6</sup> Surgical treatment is the standard of care in these patients.<sup>7</sup> Timely surgery and mobilization reduce the risks of complications. Delay to surgery from the time of hospital admission has been associated with increased morbidity and mortality risks.<sup>7,8</sup>

Many of these patients have pre-existing diseases that should be addressed before surgery so as to improve the clinical condition, and thus improve postoperative outcomes.<sup>9</sup>

The cardiological assessment includes electrocardiogram and chest radiograph as well as case history and physical examination of the patient. The TTE is a complementary study indicated as part of the preoperative workup in some cases. The TTE provides critical data on the cardiac function which may directly affect the need for a cardiac intervention before surgery, specific care during the anesthetic induction and special postoperative management, so as to decrease the complication rate.

Nevertheless, this study requires specialized staff available, specific technology, and new evaluation protocols by the cardiology department.

The main purpose of this study was to assess the impact on surgical delay of performing a preoperative TTE in hip fracture inpatients. The secondary purpose of this study was to study the TTE impact on the preoperative, intraoperative and postoperative management of the patients of our series.

## MATERIALS AND METHODS

We conducted a comparative retrospective study, based on the review of medical records from hip fracture inpatients between 2015 and 2018. Participant inclusion criteria included: 1) inpatients >55 years; 2) hip fracture (medial or lateral) treated surgically (arthroplasty or internal fixation); 3) TTE indication as part of the preoperative workup. Participant exclusion criteria included: 1) pathological fractures; 2) conservative management; 3) acute intercurrent diseases before surgery that resulted in operative delay.

Forty (9.3%) out of 430 hip fracture patients who underwent surgery had a TTE as part of the preoperative cardiological assessment. We formed a control group of 70 patients who did not undergo a TTE before surgery.

Time to surgery from the time of hospital admission was assessed in both groups. In order to compare the adherence rate to the guidelines for non-cardiac surgery of the American Heart Association/American College of Cardiology (AHA/ACC)<sup>10</sup> and to compare our results with the series published in other studies, we assessed whether the TTE indication complied with the criteria put forth by these guidelines. TTE testing procedure may not be modified by orthopedic surgeons. These criteria included: 1) dyspnea of unknown origin; 2) worsening of known signs or symptoms of heart failure, 3) known history of valvular dysfunction or heart failure without TTE in the last year; and 4) suspicion of moderate or greater valvular stenosis or regurgitation.

When the patient met at least one criterion, it was determined that the TTE had been correctly ordered.

Finally, we studied whether the TTE result had an impact in the perioperative cardiological management.

## Statistical analysis

The chi-square test is a significance test that shows whether some hypotheses are acceptable or not when compared with the frequency distribution of the observed data according to a significance level. In our case, we tested whether the TTE indication resulted in an operative delay with no impact in the perioperative management.

## RESULTS

We assessed the care provided to every patient until hospital discharge. The average age of TTE patients was 87.8 years (range, 78-97 years), compared to a non-TTE patient (control group) average age of 84 years (range, 65-100). Comorbidities between both groups were assessed using the Charlson Comorbidity Index,<sup>11,12</sup> which mean scores were 5.9 for the TTE group, and 5.1 for the control group. We found no significant differences related to age or comorbidities between both groups ( $P>0.05$ ).

Time to surgery from the time of hospital admission was 10.02 days (range, 4-15 days) for TTE patients and 6.2 days (range, 1-12 days) for the control group ( $P<0.01$ ).

Adherence rate to the AHA/ACC guidelines was 47.5%. The TTE indications that met the AHA/ACC recommendations were: murmur or valvular disease (58%), dyspnea of unknown origin (21%), and heart failure (21%). The TTE indications that did not meet the AHA/ACC recommendations were: arrhythmia (50%), assessment of cardiac function (20%), history of chest pain (10%), no recorded indication (10%), history of valvular replacement (5%), history of syncope (5%).

TTE results did not lead to changes in the preoperative management in any of the cases. Only in 1 patient, whose TTE reported severe aortic stenosis, the anesthetic management (general anesthesia instead of spinal anesthesia) and the ICU early postoperative management were modified.

## DISCUSSION

Hip fracture incidence in the elderly continues to rise as the population ages and results in a growing social and economic burden. It is important to follow protocols for the correct care of these patients. Interdisciplinary management should be provided to achieve better outcomes, decrease complications, reduce length of stay (LOS), and lower costs.<sup>2</sup>

In elderly hip fracture patients, timely surgery and mobilization reduce the risks of complications. Delay to surgery from the time of hospital admission has been associated with increased morbidity and mortality risks (increased number of respiratory tract infections, decubitus ulcers, days with pain, etc.) as well as higher re-entry rates during the first month after discharge, increased healthcare costs and longer postoperative hospital stays.<sup>7-9,13-15</sup>

In 2007, Ricci *et al.* published a series of 235 consecutive patients, of which 35 had a TTE during the preoperative workup. TTE did not lead to changes in the preoperative management, and increased the operative delay and treatment costs.<sup>7</sup>

Murry *et al.* conducted a comparative study in 330 hip fracture patients, of which 82 had a TTE and only one of them underwent a cardiac intervention. The authors concluded that while TTE indication increased costs, increased time to definitive treatment, and increased LOS, when it is not indicated it does not contribute negatively to the care of the geriatric patient.<sup>16</sup>

In 2015, Marcantonio *et al.* published a retrospective study evaluating 43 TTE patients and a control group of 161 patients. They concluded that preoperative TTE increases operative delay, LOS, and costs.<sup>17</sup>

Sawhney *et al.* conducted a comparative study in 120 patients, of which 30 had a TTE. They observed that preoperative TTE increased operative delay without a significant change in preoperative cardiac medication or anesthesia technique.<sup>1</sup>

Luttrell *et al.* studied the effect of preoperative TTE on mortality, comparing 131 TTE patients with a control group. Hospital, 30-day, and 1-year mortality did not increase in TTE patients nor in non-TTE patients.<sup>18</sup>

The strengths of our study are the comparative design and the lack of Argentine literature on the subject. The limitations of this study are its retrospective nature and the absence of an analysis of the economic costs associated with TTE.

## CONCLUSIONS

Based on our study, the preoperative TTE indication seeks to increase our data on the patient before surgery, so as to prevent intraoperative and postoperative complications. The request for TTE generates additional preoperative delays. Although excessive TTE testing should be avoided and its modification may be beyond the orthopedic practice's control, our results coincide with those from the international studies considered in this study. Preoperative TTE did not generate any changes in the perioperative management in 97.5% of this case series.

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E. Lulkin ORCID: <http://orcid.org/0000-0002-4119-0483>  
S. Pereira ORCID: <http://orcid.org/0000-0001-9475-3158>

G. Vindver ORCID: <http://orcid.org/0000-0003-3858-6687>  
F. Bidolegui ORCID: <http://orcid.org/0000-0002-0502-2300>

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