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Baseline and pre-operative 1-year mortality risk factors in a cohort of 509 hip fracture patients consecutively admitted to a co-managed orthogeriatric unit (FONDA Cohort)

Rocío Menéndez-Colino[a,b,*], Teresa Alarcon[a,b,c,e,*], Pilar Gotor[a,b], Rocío Queipo[b,c,d], Raquel Ramírez-Martín[a,b], Angel Otero[b,c,d], Juan I. González-Montalvo[a,b,c,e]

[a] Department of Geriatric Medicine, Hospital Universitario la Paz, Paseo de la Castellana 261, 28046, Madrid, Spain
[b] Instituto de Investigación Biomédica del Hospital Universitario La Paz (IdiPAZ), Paseo de la Castellana 261, 28046, Madrid, Spain
[c] Reticef, Spain
[d] Department of Preventive Medicine, Universidad Autónoma de Madrid, Arzobiso Morcillo 4, 28029, Madrid, Spain
[e] Department of Medicine, Universidad Autónoma de Madrid, Arzobiso Morcillo 4, 28029, Madrid, Spain

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ABSTRACT

Introduction: The aim of this study was to determine the patient characteristics that predict 1-year mortality after a hip fracture (HF).
Methods: All patients admitted consecutively with fragility HF during 1 year in a co-managed orthogeriatric unit of a university hospital (FONDA cohort) were assesed. Baseline and admission demographic, clinical, functional, analytical and body-composition variables were collected in the first 72 h after admission. A protocol designed to minimize the consequences of the HF was applied. One year after the fracture patients or their carers were contacted by telephone to ascertain their vital status.
Results: A total of 509 patients with a mean age of 85.6 years were included. One-year mortality was 23.2%. The final multivariate model included 8 independent mortality risk factors: age >85 years, baseline functional impairment in basic activities of daily living, low body mass index, cognitive impairment, heart disease, low hand-grip strength, anaemia at admission, and secondary hyperparathyroidism associated with vitamin D deficiency. The association of several of these factors greatly increased mortality risk, with an OR (95% confidence interval [CI]) of 5.372 (3.227–8.806) in patients with 4 to 5 factors, and an OR (95% CI) of 11.097 (6.432–19.144) in those with 6 or more factors.
Conclusions: In addition to previously known factors (such as age, impairment in basic activities of daily living, cognitive impairment, malnutrition and anaemia at admission), other factors, such as muscle strength and hyperparathyroidism associated with vitamin D deficiency, are associated with greater 1-year mortality after a HF.

Introduction

Fragility hip fracture, with 620,000 new cases per year in the European Union in 2010 and more than 210,000 new cases per year in the US between 2008 and 2011 [1,2], is a public health problem because of its high frequency and impact on older patients. For reasons not yet fully understood, 1-year mortality after a hip fracture varies between 12.1% and 35% [3–12], which signifies an excess of mortality of 8% to 18% per year compared to the population of the same age without hip fracture [13].

In terms of health care, considerable advances in surgery and anaesthesia have been made in recent decades, and different care models for patients with hip fracture have also been developed. These range from care provided by orthopaedic surgeons in orthopaedic wards, with or without the support of a geriatric consultant team, to acute orthogeriatric units, where patients are admitted from the emergency department to a unit with shared care or co-managed by both specialties. Evidence suggests that the latter model provides better acute and long-term care, resulting in shorter hospital stay and a lower mortality rate [14–18]. For this reason, from now on we shall refer mainly to studies conducted in these co-managed units.

* Corresponding authors at: Department of Geriatric Medicine, Hospital Universitario la Paz, Paseo de la Castellana 261, 28046, Madrid, Spain.
E-mail address: rociocolino@hotmail.com (R. Menéndez-Colino).

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Several studies have analysed the patient characteristics associated with a greater risk of 1-year mortality after a hip fracture. These include demographic factors, such as age and male sex [3,4,6–8,11]; orthopaedic factors, such as fracture type [3,4]; prior functional status, such as impaired mobility and dependence for basic or instrumental activities of daily living [3,4,6–9,11]; mental problems, such as the presence of cognitive impairment or dementia [3,4,7,8]; clinical factors, such as the number of comorbidities [3,4,6,7,9,11]; malnutrition [11,19]; the presence of certain diseases, such as cancer [4], heart disease [4,20], kidney failure [4,21], anaemia [4,21,22], chronic obstructive pulmonary disease (COPD) [4], diabetes [4], hyperparathyroidism [21] or postoperative complications [23]; laboratory abnormalities, such as hypoalbuminaemia [4,9,12,21] or lymphopenia [21]; care factors, such as delayed surgery [5,7,20,24,25]; and social factors, such as living in residential care [3,4,23].

While it would be interesting to determine the influence of all these factors together, most studies [5,12,20–22,24,25] have only partially analysed these patients, focussing on certain types of variable (functional, clinical or analytical) without making a comprehensive assessment. Others have excluded hip fracture patients with dementia, living in residential care [19], or non-surgical patients [26], while others, in contrast, restrict their series to patients living in residential care [27], or analyse only small series of patients [9,20,26,27]. We were unable to find studies that include features now considered important in the older population, such as muscle strength and sarcopenia. The aim of this study, therefore, was to determine the patient characteristics that predict 1-year mortality after hip fracture. To do this, we conducted a comprehensive geriatric assessment and evaluated other variables currently considered relevant in this patient population in a representative cohort of patients admitted consecutively over the course of 1 year to a unit co-managed by Orthopaedic Surgery and Geriatric Medicine using a protocol designed to minimize the consequences of the hip fracture.

The study was approved by the Independent Ethics Committee of Hospital Universitario La Paz (Reference HULP-PI-1334). An informed consent form was obtained from patients or relatives before inclusion in the study.

Methods

Setting and subjects

All patients aged over 65 years diagnosed with fragility hip fracture and admitted consecutively to a 1300-bed public university hospital from 25 January 2013 to 24 February 2014 (FONDA cohort) were included. This hospital is the only reference centre for geriatric hip fracture in a health district with a population of about 520,000 (Northern Madrid Health District, Spain).

Patients were admitted directly from the Emergency Service to the Orthogeriatric Unit co-managed by the Orthopaedic Surgery and Geriatric Medicine departments. The activity of this unit has been described previously [28].

Measures

All patients were assessed before surgery, in the first 72 h after admission. A clinical interview was administered to collect data on the following baseline and admission variables: clinical (previous illnesses and treatments), functional (previous Functional Ambulation Category [FAC] [29] and Barthel Index [30] score), cognitive (Escala de Cruz Roja Mental [Red Cross Mental Scale]) [31] and Pfeiffer's Short Portable Mental State Questionnaire (SPMSQ) [30]. Patient-reported pain at rest and during movement of the fractured leg was quantified using a 5-point verbal descriptive scale ranging from 0 (no pain) to 5 (unbearable pain) [32]. Body mass index (BMI) was calculated, wheight registered in the primary health care records, and in the cases that it was no available, the last weight self-referred by the patients or their relatives was used. Height was estimated from tables using height as a function of ulna length [33]. Muscle mass index was estimated

Table 1
Baseline characteristics of patients admitted for hip fracture and subgroups of 1-year survivors and non-survivors.

	Total Sample (n = 509)	n	Survivors n = 391 (76.8%)	Non-survivors n = 118 (23.2%)	p
Demographics					
Age (y)	85.6 (6.9)	509	84.8 (6.9)	88.1 (6.5)	<0.001
Women, n (%)	403 (79.2)	509	317 (81.1)	86 (72.9)	0.038
Living in residential care, n (%)	116 (22.8)	509	84 (21.5)	32 (27.1)	0.225
Surgical risk: ASA III–IV, n (%)	358 (70.3)	509	257 (64.7)	101 (85.6)	<0.001
Extracapsular fracture, n (%)	295 (58)	509	225 (57.5)	70 (59.3)	0.713
Geriatric assessment					
Previous FAC $\leq$ 3, n (%)	106 (20.8)	509	60 (15.3)	46 (39)	<0.001
Previous FAC					
0 n (%)	18 (3.5)	509	9 (2.3)	9 (7.6)	<0.001
1,2,3 n (%)	88 (17.3)		51 (13)	37 (31.4)	0.326
4,5 n (%)	403 (79.2)		331 (84.7)	72 (31.4)	<0.001
Previous BI, (median IQR)	85 (65–95)	509	90 (75–100)	70 (45–85)	<0.001
Previous BI $\leq$ 60, n (%)	119 (23.4)	509	68 (17.4)	51 (43.2)	<0.001
Previous CRM $\geq$ 2, n (%)	165 (32.4)	509	107 (27.4)	58 (49.2)	<0.001
Comorbidities					
Anticoagulant therapy, n (%)	240 (47.2)	509	170 (43.5)	70 (59.3)	0.003
Congestive heart failure, n (%)	67 (13.2)	509	39 (10)	28 (23.7)	<0.001
Coronary artery disease, n (%)	61 (12)	509	39 (10)	22 (18.6)	0.023
Heart disease (any), n (%)	195 (38.3)	509	134 (34.3)	61 (51.7)	0.001
Cerebrovascular disease, n (%)	73 (14.3)	509	54 (13.8)	19 (16.1)	0.450
Chronic pulmonary disease, n (%)	46 (9)	509	29 (7.4)	17 (14.4)	0.008
Kidney disease, n (%)	140 (27.5)	509	99 (23.5)	41 (34.7)	0.029
Diabetes, n (%)	119 (23.4)	509	90 (23)	29 (24.6)	0.078
Cancer, n (%)	65 (12.8)	509	47 (12)	18 (15.3)	0.425
Peripheral vascular disease, n (%)	15 (2.9)	509	9 (2.3)	6 (5.1)	0.088

ASA = American Society of Anaesthesiologists; BI = Barthel Index; CRM = Red Cross Mental Scale; FAC = functional ambulation category scale; n = number of patients with data available.

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