SA0347: Hip Fracture In Early Stages of Type 2 Diabetes: A Population-Based Cohort Study

Prieto-Alhambra D[1,2,3], Martinez-Laguna D[1,4], Tebé C[5], Nogués X[2], and Diez-Perez A[2]

1. GREMPAL Research Group, IDIAP Jordi Gol, Universitat Autònoma de Barcelona, Spain; 2. Institut Municipal d'Investigació Mèdica, Spain; 3. NDORMS, University of Oxford, UK; 4. Institut Català de la Salut, Spain; 5. Agencia de Qualitat i Avaluació Sanitàries de Catalunya (AQuAS)

Background

- Patients with type 2 diabetes mellitus (T2DM) have increased bone mineral density but no corresponding fracture risk reduction.
- The predictors of fragility fractures in T2DM patients might be different to the classical factors described for the general population.

Objectives

- We study the association between recently diagnosed type 2 diabetes mellitus (T2DM) and hip fracture risk.
- Secondly, we assess the key predictors of hip fracture among newly diagnosed T2DM patients, and provide a clinical tool to assess their risk based on these.

Methods

- We conducted a population-based cohort study using data from the SIDIAP Database (www.sidiap.org). SIDIAP contains clinical information from primary care electronic medical records, hospital admissions, and pharmacy invoice data for >5 million patients (80% of the population) in Catalonia, Spain.
- Participants were all newly diagnosed T2DM patients registered in SIDIAP in 2006-2010 (T2DM cohort). Up to 3 diabetes-free controls were matched to each T2DM participant on age, gender, and primary care practice.
- Main outcome was incident hip fracture, ascertained using ICD10 codes. Main exposure was T2DM status.
- We used Fine and Gray survival modelling to estimate risk of hip fracture according to T2DM status accounting for competing risk with death, and adjusted for body mass index, previous fracture and use of oral glucocorticoids.
- Secondly, backwards stepwise Fine and Gray regression was used to identify key predictors of hip fracture in the T2DM cohort, among a list of a priori defined potential risk factors: history of cataracts, stroke, IHD, T2DM complications (polineuropathy, nephropathy), anti-osteoporosis medications, body mass index, smoking, alcohol drinking, and history of falls and fractures.
- The estimated coefficients were used to create a clinical predictive tool, which was tested for discrimination and calibration using ROC curves, and predicted/observed rates for each risk decile respectively.

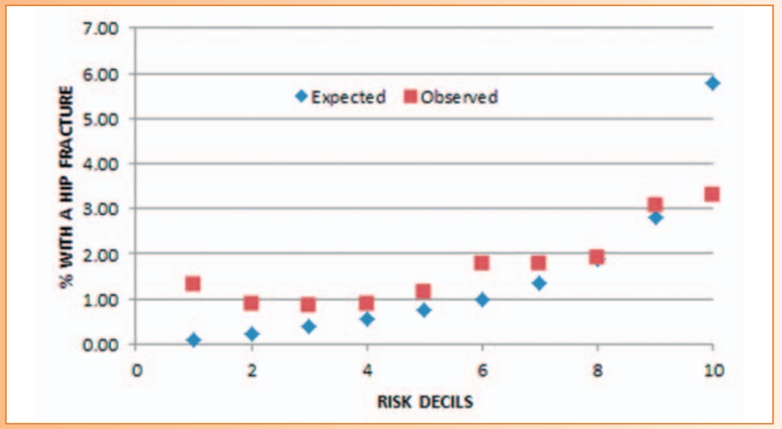
Results

TABLE 1. KEY PREDICTORS OF HIP FRACTURE IN T2DM PATIENTS

Predictors	Beta	Score
Male Gender	-0,649	-6
Age (per 1 year above 75)	0,117	1
BMI (per 1 kg/m^2 above 30)	-0,037	0
Previous fracture	1,252	13
Previous IHD	0,341	3
Previous nephropathy	0,579	6
Oral glucocorticoids	0,03	0
Age x Nephropathy	-0,057	-1
Male Gender x Oral glucocorticoids	0,681	7

- 444/55,275 diabetic patients sustained a hip fracture (Incidence Rate 2.7/1,000 person-years) compared to 776/113,448 matched controls (2.4/1,000): unadjusted SHR 1.11 [0.99-1.24], adjusted SHR 1.20 [1.06-1.35].
- Key predictors of hip fractures in T2DM patients are shown in Table 1. The proposed predictive tool had an area under the ROC curve of 0.74 [95%CI 0.72-0.77], and discrepancies between predicted and observed risk were seen only for extreme risk deciles [see Figure].

FIGURE. CALIBRATION OF THE PROPOSED PREDICTIVE TOOL



Conclusion

- Newly diagnosed T2DM patients are at a 20% increased risk of hip fracture even in the early stages of disease.
- We propose a simple predictive tool, which can be used to identify diabetic patients at high risk of hip fracture at the time of T2DM diagnosis.

Funding & Contact Information

THIS WORK WAS FUNDED BY A GRANT FROM THE SPANISH SOCIETY OF BONE AND MINERAL RESEARCH (SEIOMM).

Please contact: daniel.prietoalhambra@ndorms.ox.ac.uk