Supplementary Material

A novel nomogram for predicting osteoporotic vertebral compression fractures with Hounsfield unit and vertebral bone quality: a retrospective cohort study

Bone Mineral Density Assessment

CT acquisition parameters (for HU measurement):

Scanner model (Siemens Somatom Definition, Germany), tube voltage (120 kVp), effective tube current (150–250 mAs with automatic exposure control), slice thickness (1.25 mm), reconstruction kernel (B40s), and field of view (300–350 mm).

MRI acquisition parameters (for VBQ measurement):

Scanner model (Siemens Aera 1.5T), sequence (non-contrast T1-weighted turbo spin-echo), repetition time (TR) = 500–700 ms, echo time (TE) = 10–15 ms, slice thickness = 3 mm, intersection gap = 0.3 mm, field of view = 280 mm, matrix = 320 × 256. The sagittal plane was used for ROI placement.

ROI placement protocols:

For HU: On axial CT images, three circular ROIs were placed on the upper, middle, and lower axial planes of each vertebral body (L1–L4, or non-fractured levels). ROIs were positioned in the trabecular bone, avoiding cortical bone, posterior venous plexus, and bone islands. The average HU of all measured vertebrae was calculated.

For VBQ: On midsagittal T1-weighted MRI, an oval ROI was placed in the medullary cavity of each L1–L4 vertebral body (or non-fractured levels). A separate ROI was placed in the cerebrospinal fluid (CSF) at the L3 level (or L4 if L3 was compromised). The VBQ was calculated as the median signal intensity of L1–L4 divided by the median signal intensity of the CSF ROI.

Software configuration:

HU and VBQ measurements were performed using the picture archiving and communication system (PACS) (Carestream Vue PACS, version 12.1) for CT, and RadiAnt DICOM Viewer (version 2022.1) for MRI signal intensity quantification. Both software packages allow manual ROI placement and provide mean/median intensity values.

Supplementary Table 1 The samples were deeply divided into four groups (women with/without OVCF; men with/without OVCF).

Supplementary Table 1

	OVCF group (n=127)		Control (n=258)		*p*
	Male (n=34)	Female (n=93)	Male (n=120)	Female (n=138)	
Age (years)	71.59±5.4	70.09±4.9	62.06±4.8	61.35±5.6	0.008
BMI (kg/m^2)	24.1±3.6	21.5±7.5	26.8±4.7	21.7±4.1	0.006
Hypertension,n（%）					0.236
Yes	14(41.18)	27(29.03)	52(43.33)	65(47.10)	
No	20(58.82)	66(70.97)	68(56.67)	73(52.90)	
Diabetes，n（%）					0.126
Yes	5(14.71)	8(8.60)	21(17.50)	24(17.39)	
No	29(85.29)	85(91.40)	99(82.50)	104(82.61)	
Coronary heart disease，n（%）					0.344
Yes	1(2.94)	5(5.38)	8(6.67)	10(7.25)	
No	33(97.06)	88(94.62)	112(93.33)	128(92.75)	
L1-L4 T value	-1.9±1.0	-2.2±0.9	-0.9±1.1	-0.9±1.3	0.006
VBQ	3.3±0.7	3.6±1.2	2.4±0.8	2.6±1.0	<0.001
HU	77.8±18.1	74.6±23.1	132.7±31.2	130.5±27.1	<0.001

Notes: Demographic characteristics grouped by gender

Abbreviations: BMI, body mass index.