A single-center experience with opportunistic diagnosis of osteoporosis by artificial intelligence

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Background

- Osteoporosis (OP) is underdiagnosed and frequently left untreated.
- CT-derived bone mineral density (BMD) and identification of vertebral compression fracture (VCF) on CT done for another indication are two new artificial intelligence (AI) based techniques for the opportunistic diagnosis of OP.

Methods

- This retrospective study included patients over age 50, insured by Clalit who underwent a CT scan for any reason between 03.2021-07.2021 and were identified by NanoxAI as having a VCF in one or more vertebrae that was confirmed by a radiologist.
- Patients were excluded if they had a prior diagnosis of a motor vehicle accident, multiple myeloma, or spinal metastases.
- CT-derived BMD was calculated using Hounsfield units (HU), and when available DXA-BMD was retrieved.
- Demographic, clinical, and biochemical data including medication purchase were collected from the EMR

Aim

To assess the clinical impact of opportunistic diagnosis of OP.

Results

Osteoporosis diagnosis	No n=80	Yes n=71	P value
Age at CT (mean (SD))	73.02 (10.74)	77.27 (10.60)	0.016
Gender - Male (%)	47 (58.8)	19 (26.8)	<0.001
Ethnicity - Jewish (%)	63 (78.8)	62 (87.3)	0.239
Diabetes Type 2 (%)	33 (41.2)	26 (36.6)	0.678
Rheumatoid arthritis (%)	3 (3.8)	4 (5.6)	0.871
Age at OP diagnosis (mean (SD))	Na (NA)	69.72 (9.75)	NA
Known to endocrine service (%)	11 (13.8)	37 (52.1)	<0.001
End-stage kidney disease (%)	3 (3.8)	1 (1.4)	0.710
Malignancy (%)	36 (45.0)	21 (29.6)	0.075
Metastasis (%)	17 (21.2)	8 (11.3)	0.153
Any anti Osteoporosis treatment n (%)	1 (1.2)	9 (12.7)	0.013

Osteoporosis diagnosis	No n=80	Yes n=71	P value
n with available data (%)	13 (16.2)	30 (42.3)	0.001
Mean T score (SD)			
L1-L4	-0.29 (1.24)	-2.22 (1.10)	<0.001
Femur neck	-1.66 (0.79)	-2.42 (0.85)	0.009
Total hip	-1.18 (0.85)	-2.30 (1.17)	0.004
L1 CT derived BMD n (%)	77 (96.2)	70 (98.6)	0.699
HU mean (SD)	95.05 (44.96)	90.33 (48.32)	0.540

HU	Negative VCF	Positive VCF	p value
Mean/SD (N)	120/45 (155)	93/46 (147)	p<0.001

Discussion and Conclusions

- Diagnosis gap: 52% of patients with VCF did not have a prior diagnosis of OP.
- Treatment gap: only 12.7% of patients with OP and VCF had prior OP therapy.
- Rates of male gender were higher & age was lower in patients with an opportunistic Dx of VCF.
- CT-derived BMD was dignostic of OP in all patients with an opportunistic Dx of VCF & normal in those w/o VCF.
- Opportunistic diagnosis of OP with VCF and CT-derived BMD is feasible and has a clinical impact.