

# Identification of Vertebral Fractures in Rheumatoid Arthritis Patients Using Bone Mineral Density and Trabecular Bone Score (TBS)

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## INTRODUCTION

Bone involvement is the main joint complication of rheumatoid arthritis (RA). Patients with RA have a greater risk of osteoporosis and fracture than the general population. The prevalence of osteoporosis in RA is 20% to 30% in the spine and 7-26% in the hip. Clinical studies show that TBS is lower in patients with RA with a fracture compared to those without fracture, regardless of BMD outcomes and major clinical risk factors

## Materials and Methods

### Study population

- ✓ 167 women with RA according to the ACR / EULAR criteria were recruited at the BMD unit as part of the routine procedure
- ✓ Questionnaire comprising a clinical evaluation of the demographic data (age, weight, height, BMI, duration of the disease, corticosteroid dose, age of menopause). The activity of the disease by the DAS28, the HAQ for the quality of life as well as the different basic and biological treatments taken.
- ✓ Radiological evaluation by VF research using the VFA tool (vertebral fracture assessment)
- ✓ Semi-quantitative classification criteria published by Genant et al were used to classify VFs.
- ✓ Lumbar and hip BMD (Hologic-QDR)
- ✓ TBS in the same region used for measurement of lumbar BMD using TBS iNsite V 1.0 (Med-imaps).

## Results

### Characteristics of the study population

Characteristics of population	RA With VF (n=25)	RA Without VF (n=142)	Study population (n=167)	P
Age (years) (mean ±SD)	62,2 ± 13,8	51,4 ± 10,7	54,4 ± 12,3	0,0003
IMC (Kg/m <sup>2</sup> ) (mean ±SD)	24,4 ± 3,5	24,9 ± 5,5	24,5 ± 3,9	0,78
Duration of illness (years) (mean ±SD)	18,8 ± 11,4	15,7 ± 8,2	16,1 ± 9,3	0,51
Positive ACPA(n,%)	18 (73%)	108 (76%)	124 (74,5%)	0,48
DAS28 (mean±SD)	4,2 ± 2,5	3,8 ± 1,9	3,6 ± 1,6	0,67
HAQ (mean±SD)	1,8 ± 1,1	1,3 ± 0,9	1,4 ± 0,8	0,01
Current use of DMARDS (n,%)	17 (71,5%)	126 (89,4%)	142 (85,3%)	0,56
Current use of Biologics(n,%)	15 (60,5%)	101 (71,3%)	117 (70,5%)	0,35
Current use of corticoids (n,%)	16 (63,7)	103 ( 72,8%)	116 (69,7%)	0,52
Duration of menopause	19,8 ± 11,1	10,4 ± 7,1	12,6 ± 8,2	0,0002

### Bone parameters of patients

Caractéristiques of patients	RA With VF (n=25)	RA Without VF (n=142)	Population Study (n=167)	P
BMD Lumbar spine (g/cm <sup>2</sup> ) (mean ± DS)	0.874 ± 0.184	0.940 ± 0.143	0.931 ± 0.138	0.01
Lumbar spine T-score (mean ± DS)	- 1.4 ± 1.3	- 0.7 ± 1.3	- 0.8 ± 1.4	0.01
BMD Total hip (g/cm <sup>2</sup> ) (mean ± DS)	0.711 ± 0.137	0.817 ± 0.147	0.813 ± 0.135	0.001
Total Hip T-score (mean ± DS)	- 1.6 ± 1.1	- 0.8 ± 1.0	- 1.2 ± 1.0	0.0001
Fémoral neck BMD (g/cm <sup>2</sup> ) (mean ± DS)	0.601 ± 0.124	0.713 ± 0.112	0.694 ± 0.141	0.0005
Fémoral neck T-score(mean ± DS)	- 2.1 ± 1.0	- 1.3 ± 1.1	- 1.4 ± 1.2	0.0001
TBS (mean ± DS)	1.128 ± 0.173	1.248 ± 0.112	1.231 ± 0.123	0.0001
Prévalence of ostéoporosis (n, %)	12 (47,7%)	34 (24%)	50 (29,7%)	0,03
TRT OP (n,%)	10 (42,4%)	35 (24,5%)	46 (27,7%)	0,02
Calcium intake (n,%)	11 (44,6%)	46 (32,5%)	60 (35,8%)	0,01
Vit D intake (n,%)	17 (67,7%)	69 (48,8%)	91 (54,6%)	0,01

## Discussion- conclusion

This study is the first in Algeria to assess the discriminatory potential of TBS in a RA population

A significant proportion of patients have VFs while their BMD is greater than the osteoporotic threshold and a low TBS was associated with a high risk of having VF.

RA induces bone and extra-osseous changes. Inflammation and TRT of RA can affect bone quality measurable by TBS and not by BMD.

Our data show that low BMD at the femoral neck is a risk factor for VF occurrence and in this respect is better than lumbar BMD (degenerative phenomena).

## Aims and Objectives

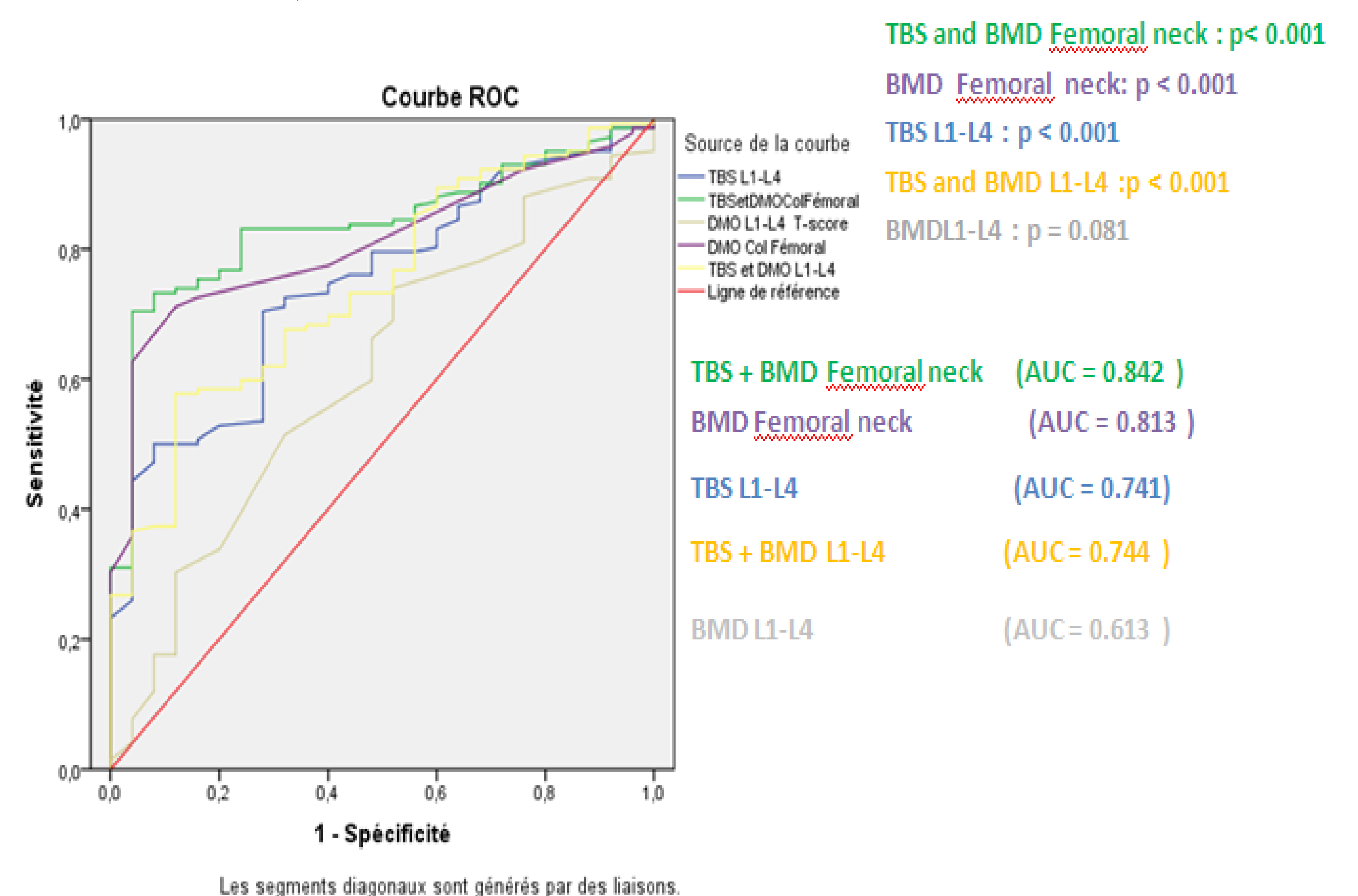
The objective of the study was to evaluate the contribution of TBS in combination with BMD compared to BMD alone in predicting the risk of vertebral fragility fractures in rheumatoid arthritis.

## Results

### TBS Correlation Analyzes

Characteristics of patients	RA With VF (n=25)	RA Without VF (n=142)	Study Population (n=167)
HAQ	- 0.07 (p= 0.52)	- <b>0,28</b> (p=0,001)	- <b>0,21</b> (p=0,007)
DAS 28	0,12 (p=0,74)	- <b>0,19</b> (p=0,03)	-0,13 (p=0,06)
BMD Lumbar spine	<b>0,47</b> (p=0,004)	<b>0,37</b> (p=0,001)	<b>0,45</b> (p=0,002)
BMD Total Hip	<b>0,34</b> (p= 0,05)	<b>0,45</b> (p= 0,001)	<b>0,48</b> (p=0,001)
BMD Femoral neck	0,29 (p=0,14)	<b>0,53</b> (p=0,001)	<b>0,61</b> (p=0,001)

### BMD L1-L4, BMD Femoral neck, TBS L1-L4, TBS L1-L4 associated with BMD L1-L4, TBS L1-L4 associated with BMD Femoral neck



### Determination of diagnostic threshold value (TBS)

The Youden index (Y) is a measure of the accuracy of the diagnostic method.  $Y = Se + Sp - 1$  corresponds to the value of TBS with better sensitivity and specificity

The index of Youden (Y) is 0.531 which corresponds to:

- Sensitivity of 70.1%
- Specificity of 72.0%

The threshold value of the TBS corresponding to these parameters is: 1,169

TBS is pathological if  $< 1,169$  and Normal if  $> 1,169$

### References

- Winzenrieth R et al; Calci Tissue Int, 2010
- Breban S et al, Journal of clin Densitometry , 2012
- Hans D et al; J Bone Miner Res, 2011