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- Title: Is Surgeon Assessed Bone Quality During Total Knee Arthroplasty a Valid Tool To Diagnose Osteoporosis ?

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Dislcosures

1. Adit Maniar : None
2. Akshay Nayak : None
3. Arpit Bavaskar : None
4. Vishal Raina : None
5. Ashwini Khokhar : None
6. Rajesh Maniar : Outside the submitted work:

- DePuy Synthes, USA – Royalty
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- Indian Society of Hip and Knee Surgeon – Trustee and Past President

INTRODUCTION

- Osteoporosis affects outcomes of Total Knee Arthroplasty (TKA).[1]
- Bone Mineral Density (BMD) as measured by Dual-energy X-ray absorptiometry (DEXA) is considered the gold standard to diagnose osteoporosis.[2,]
- However, it involves radiation and routinely measures BMD at hip, spine and radius and not the knee.
- Surgeon assessment of bone quality is known to be accurate.[3]
- A tool to diagnose the quality of bone at the knee joint without requiring radiation exposure would be extremely beneficial and reduce costs.

AIM

- We aim to investigate the diagnostic strength of subjective assessment of bone quality by an orthopaedic surgeon against the gold standard, bone mineral density measured by DEXA.

METHODS

- We prospectively enrolled 31 patients undergoing unilateral primary TKA with a mean age of 65.71 years
- All patients underwent BMD by DEXA preoperatively.
- Intraoperatively, based on the bone quality, a single senior surgeon graded the bone on a VAS scale from 0 – 10, with 10 being the strongest bone.
- The surgeon was blinded to the BMD results.

METHODS

- Divided the patients into 3 groups based on the T score in the ipsilateral femoral neck.

a. Normal (>-1.0),
b. Osteopenia (-1.0 to -2.5) and
c. Osteoporosis (<-2.5)

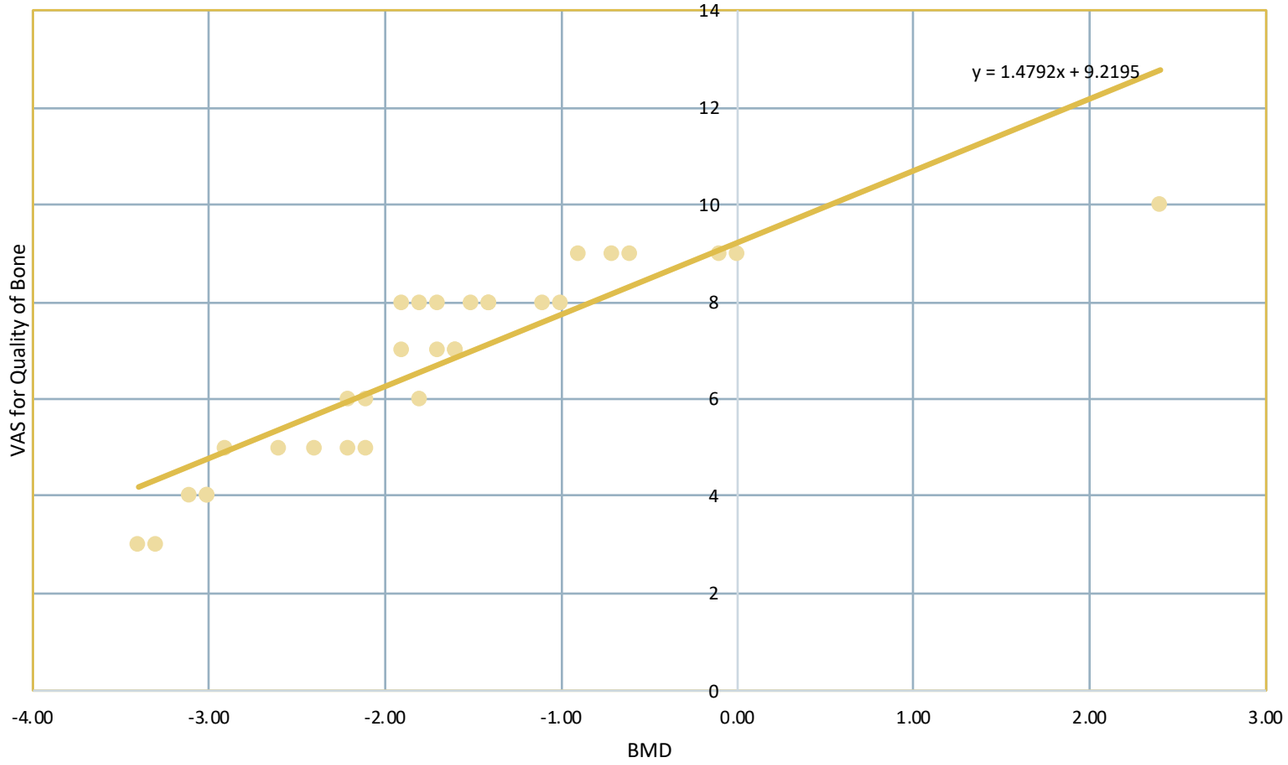
- On the VAS scale we used a cutoff of

a. Normal (≥ 8),
b. Osteopenia (5-7) and
c. Osteoporosis (≤ 4)

- We correlated this T score with the VAS scale scoring.
- We then tested the diagnosing power of these cutoffs in identifying osteoporotic and osteopenic bones.

RESULTS

- The Spearman's rho correlation for VAS and BMD was 0.954 ($p < 0.005$)



Scattered plot of VAS and BMD.

RESULTS

- Surgeon conclusion of Osteoporosis and Osteopenia (VAS < 8) :

	Estimate	Lower 95% CIs	Upper 95% CIs
Sensitivity	**70.83%**	50.83	85.09
Specificity	**100%**	64.57	100
Positive Predictive Value	**100%**	81.57	100
Negative Predictive Value	**50%**	26.8	73.2
Diagnostic Accuracy	**77.42%**	60.19	88.61

RESULTS

- Surgeon conclusion of Osteoporosis (VAS ≤ 4)

	Estimate	Lower 95% CIs	Upper 95% CIs
Sensitivity	**71.43%**	35.89	91.78
Specificity	**100%**	86.2	100
Positive Predictive Value	**100%**	56.55	100
Negative Predictive Value	**92.31%**	75.86	97.86
Diagnostic Accuracy	**93.55%**	79.28	98.21

CONCLUSION

- Intraoperative surgeon assessed bone quality has a strong correlation with BMD measured by DEXA.
- A VAS score of 4 or below has a 100 % specificity and positive predictive value along with a high negative predictive value and diagnostic accuracy for diagnosing osteoporosis.
- A VAS score of 7 and below has a 100 % specificity and positive predictive value for diagnosing osteopenia or osteoporotic bone.

Clinical relevance

This can be used as a tool in diagnosing osteoporosis, eliminating the need for additional tests and radiation exposure.

This may help identify normal bone, aiding the surgeon make better decisions regarding the implant fixation choice – cementless versus cemented.

References

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