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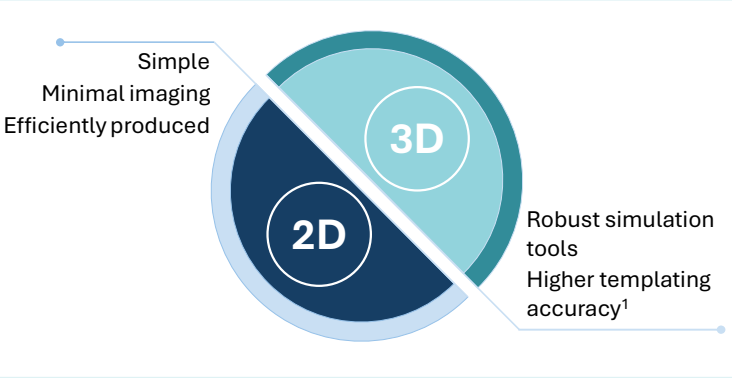
Who Needs 3D Planning for THA?

M. Lyons, B. Walter, K. Abe, H. Bian, S. Kenny

INTRODUCTION

2D vs 3D planning for THA is an ongoing debate amongst orthopaedic surgeons.

As there are concerns about the cost and radiation associated with CT scans for 3D planning[2], the purpose of this study was to compare 2D and 3D pre-operative plans to identify if, and when, 3D planning is needed.



METHOD

1 → 2 → 3 → 4

Assessed **42 patients** who underwent THA

Retrospective **2D planning (Navbit RSP®)**

Spinopelvic analysis
Cup Target

Patients grouped based on 2D outputs

Group A: 1+ spinopelvic risk factor
Group B: no spinopelvic risk factors

Retrospective **3D planning (Coriograph®)**

Cup target from 2D planning used to assess 11 different simulated activities of daily living (ADL)

RESULTS

38% of patients in Group A failed at least 1 simulation activity compared to 18% of patients in Group B. However, Group B failures were mainly deep flexion activities. All patients who failed in Group A had at least 2 spinopelvic risk factors.

A threshold value was developed that identified patients who will impinge based on their spinopelvic kinematics. Based on a population of **100** patients, **70** exceeded this threshold and, **28** were found to benefit from 3D planning.

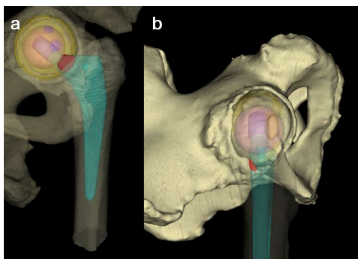


Fig 1: Example of impingement in (a) Group A during 'twist' and (b) Group B during 'bend forward' simulation.

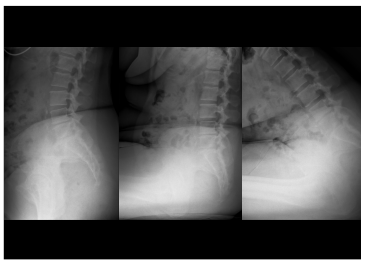


Fig 2: Functional images used for spinopelvic analysis.

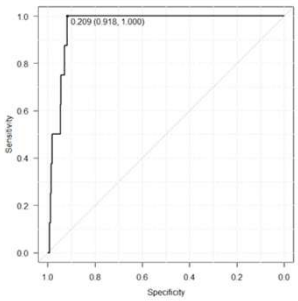


Fig 3: ROC curve for detecting patients who need 3D planning.

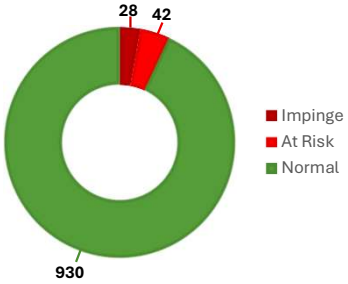


Fig 4: Proportion of patients who may need 3D planning based on 2D planning in a THA population.

CONCLUSION

Using spinopelvic risk factors, we can identify the **3% of patients who may benefit from 3D planning**. These results show that 3D planning did not provide any new insights for 90% of patients.
If we use 2D planning to identify those who need 3D planning, we could avoid the cost and radiation associated with 3D planning in 90% of patients without any reduction in quality of patient care.

REFERENCES

1. Parisi FR, et al. J Clin Med. 2024 PMID: 39518705.
2. Smith-Bindman, et al. JAMA. 2025 PMID: 38319303.
3. Vigdorchik JM, et al. J Arthroplasty. 2023 PMID: 35598762.

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