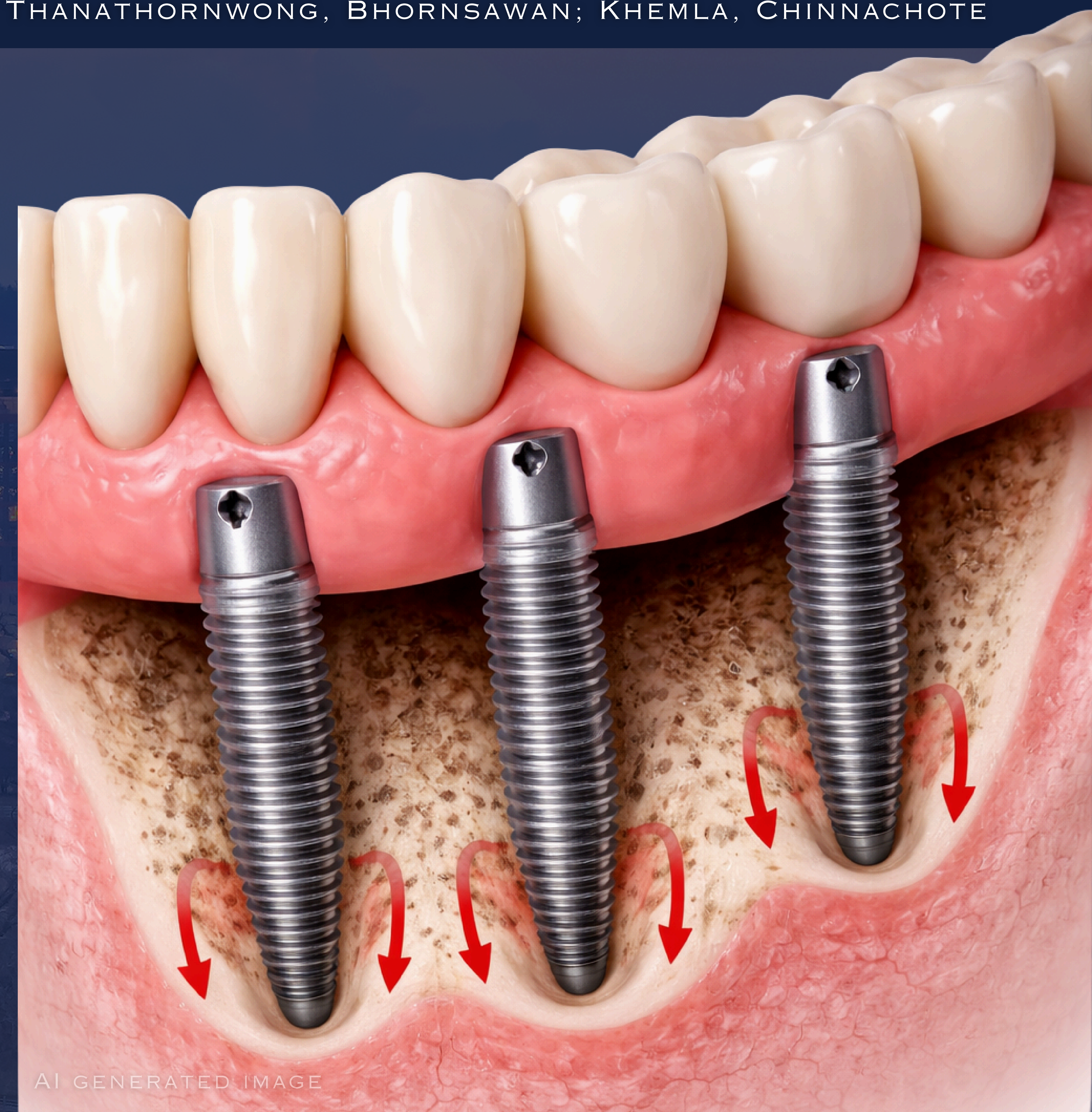
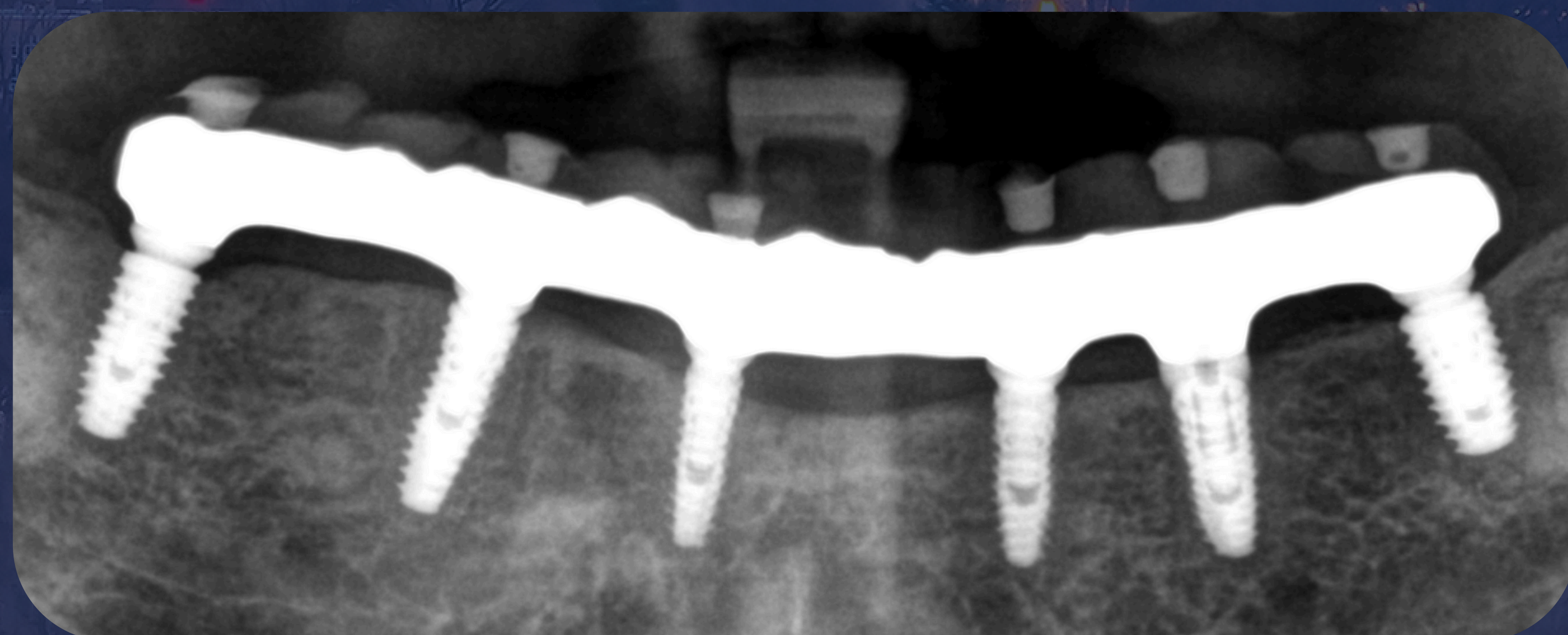


BEYOND MARGINAL BONE LOSS: UNVEILING THE BIOMECHANICAL IMPACT OF APICAL BONE LOSS IN FIXED COMPLETE DENTAL PROSTHESES

NGAMDUMRONGKIAT, PAWARIS; URAPEPON, RAMON; PUENGPAIBOON, USANEE; THANATHORNWONG, BHORNSAWAN; KHEMLA, CHINNACHOTE

INTRODUCTION

Screw loosening remains one of the most prevalent mechanical complications in full-arch fixed complete dental prostheses (FCDPs). While marginal bone loss has been extensively investigated, the biomechanical impact of periapical bone loss (PBL) has received limited attention. This study aimed to elucidate the influence of implant-level PBL characteristics—number and location—alongside patient and prosthesis-related factors on screw loosening in FCDPs.

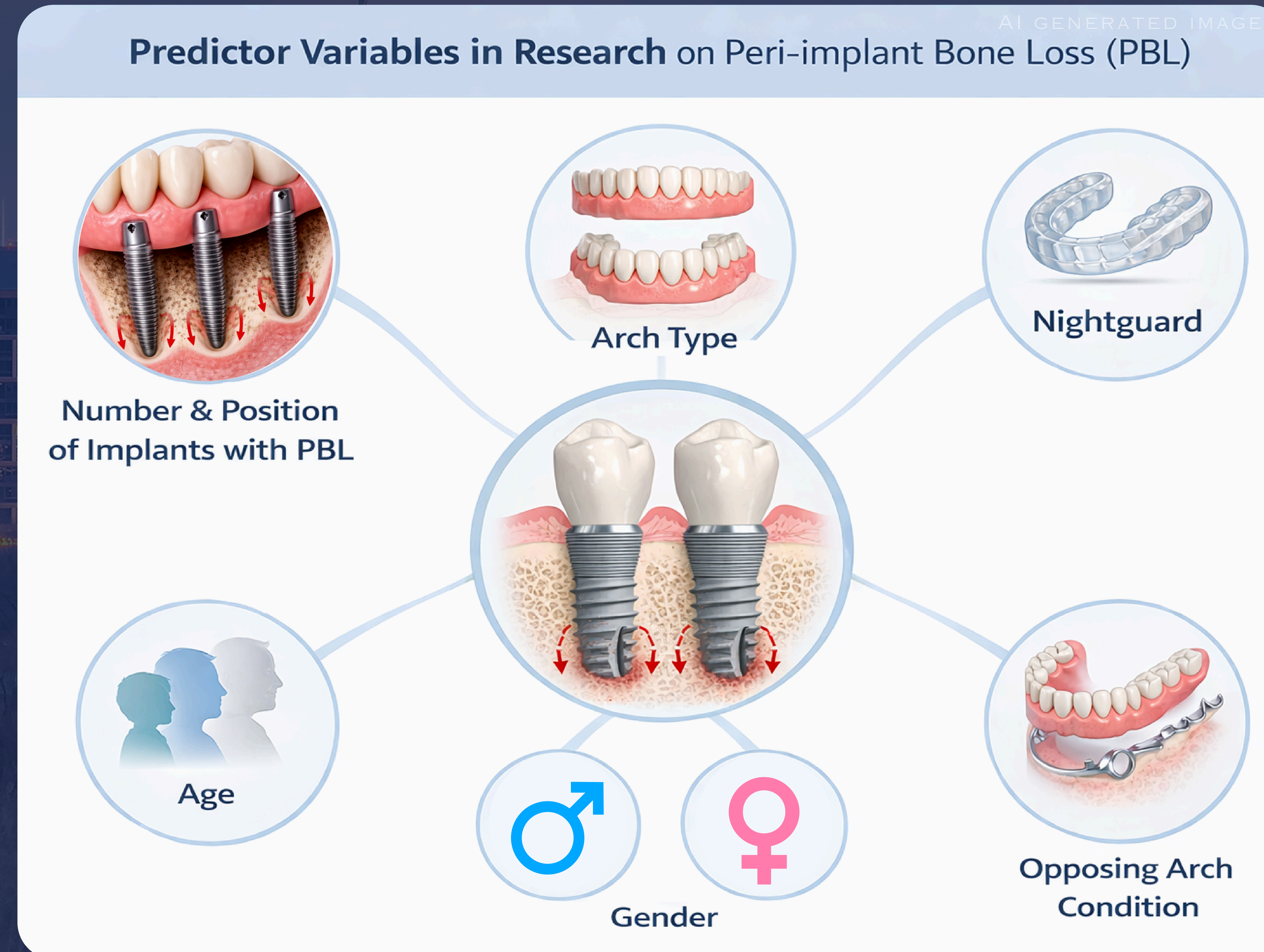


BEYOND MARGINAL BONE LOSS: UNVEILING THE BIOMECHANICAL IMPACT OF APICAL BONE LOSS IN FIXED COMPLETE DENTAL PROSTHESES

NGAMDUMRONGKIAT, PAWARIS; URAPEPON, RAMON; PUENGPAIBOON, USANEE; THANATHORNWONG, BHORNSAWAN; KHEMLA, CHINNACHOTE

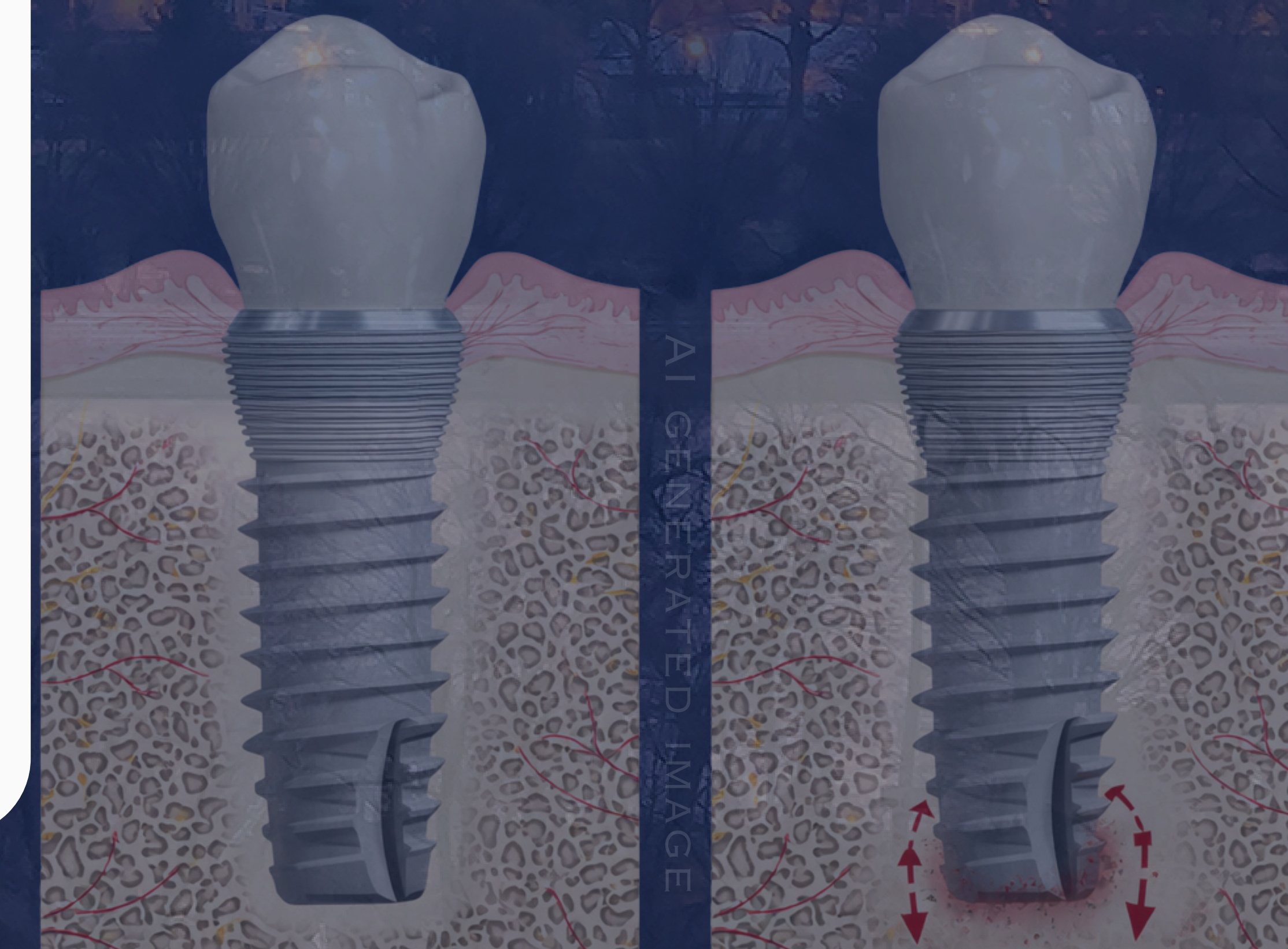
MATERIAL & METHODS

A retrospective analysis was performed on 54 patients rehabilitated with FCDPs supported by 4 or 6 implants per arch, selected through strict inclusion criteria in Thailand, ensuring data quality. Clinical records and panoramic radiographs were evaluated. Predictor variables included the number and position of implants with PBL, arch type, nightguard, age, gender, and opposing arch condition. Screw loosening was identified through clinical documentation of prosthesis mobility or retightening events. Logistic regression analyses were applied to determine significant risk factors ($p < 0.05$). Odds ratios (95% CI) were calculated.



Screw Loosening Checklist

- ☒ Retightening Event
- ☒ Observed Mobility
- ☒ Retorque Event



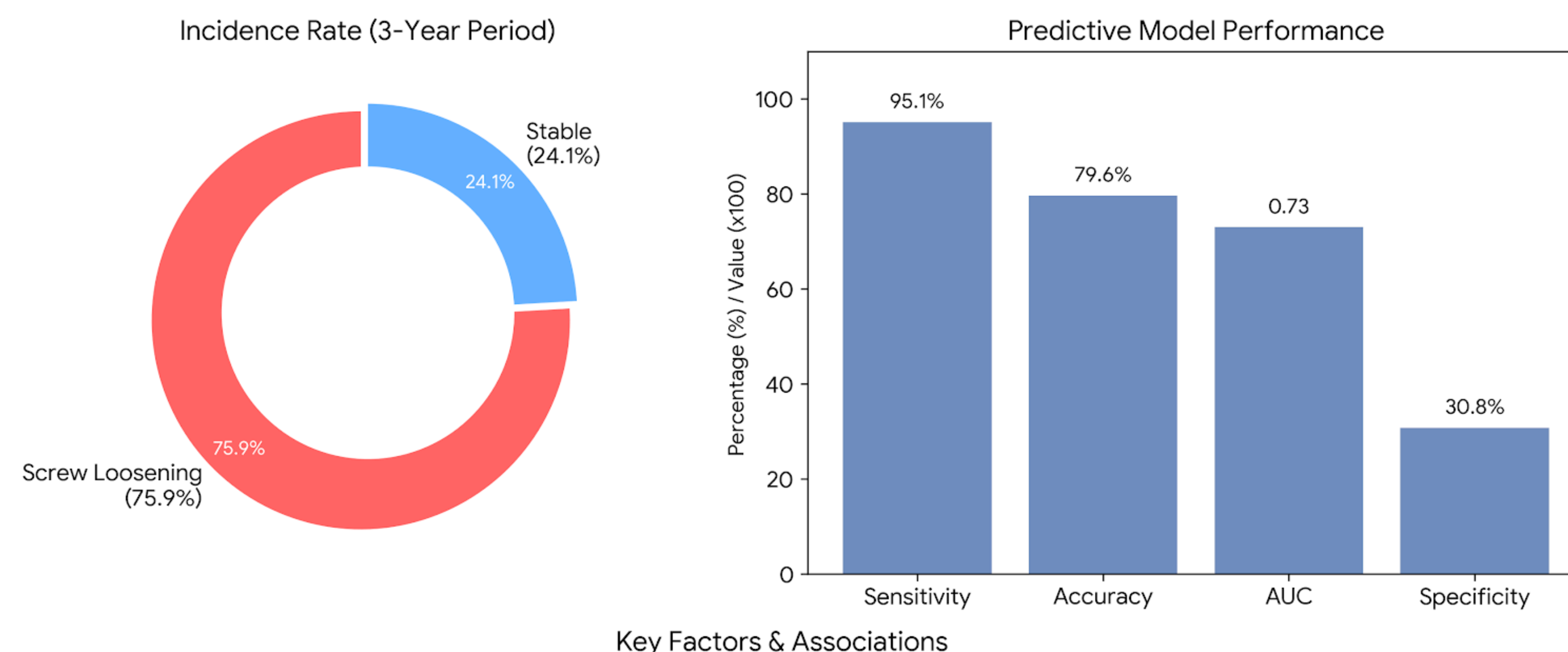
BEYOND MARGINAL BONE LOSS: UNVEILING THE BIOMECHANICAL IMPACT OF APICAL BONE LOSS IN FIXED COMPLETE DENTAL PROSTHESES

NGAMDUMRONGKIAT, PAWARIS; URAPEPON, RAMON; PUENGPAIBOON, USANEE; THANATHORNWONG, BHORNSAWAN; KHEMLA, CHINNACHOTE

RESULTS

Screw loosening occurred in 75.9% of prostheses within a 3-year observation period. The greater number of implants exhibiting PBL significantly reduced the likelihood of loosening (OR = 0.57, 95% CI: 0.34 – 0.96, $p = 0.033$), suggesting that prostheses with greater PBL involvement may reflect a form of adaptive load redistribution rather than structural deterioration. Interestingly, screw loosening was less frequent among patients wearing nightguard (OR = 7.54, 95% CI: 1.02 – 55.75, $p = 0.048$), suggesting that this protective approach may reduce occlusal load, mechanical stress and enhance screw stability. Implant position (anterior, posterior or both) and arch type were not significant, as well as other demographic or prosthetic variables showed no correlation. The predictive model showed good performance (AUC = 0.73 (Figure1); accuracy = 79.6%; sensitivity = 95.1%; specificity = 30.8%).

Research Summary: Screw Loosening in Prostheses



CONCLUSION

Both biological and mechanical factors influence screw stability in FCDPs. Our findings suggest PBL may modulate biomechanical forces, especially in patients with controlled parafunctional activity. Recognizing apical radiolucency as an early biomechanical indicator, rather than as a mere radiographic defect, could shift maintenance from reactive repair to proactive prevention in FCDPs.

Factors Influencing Screw Stability in FCDPs & Paradigm Shift in Maintenance

