

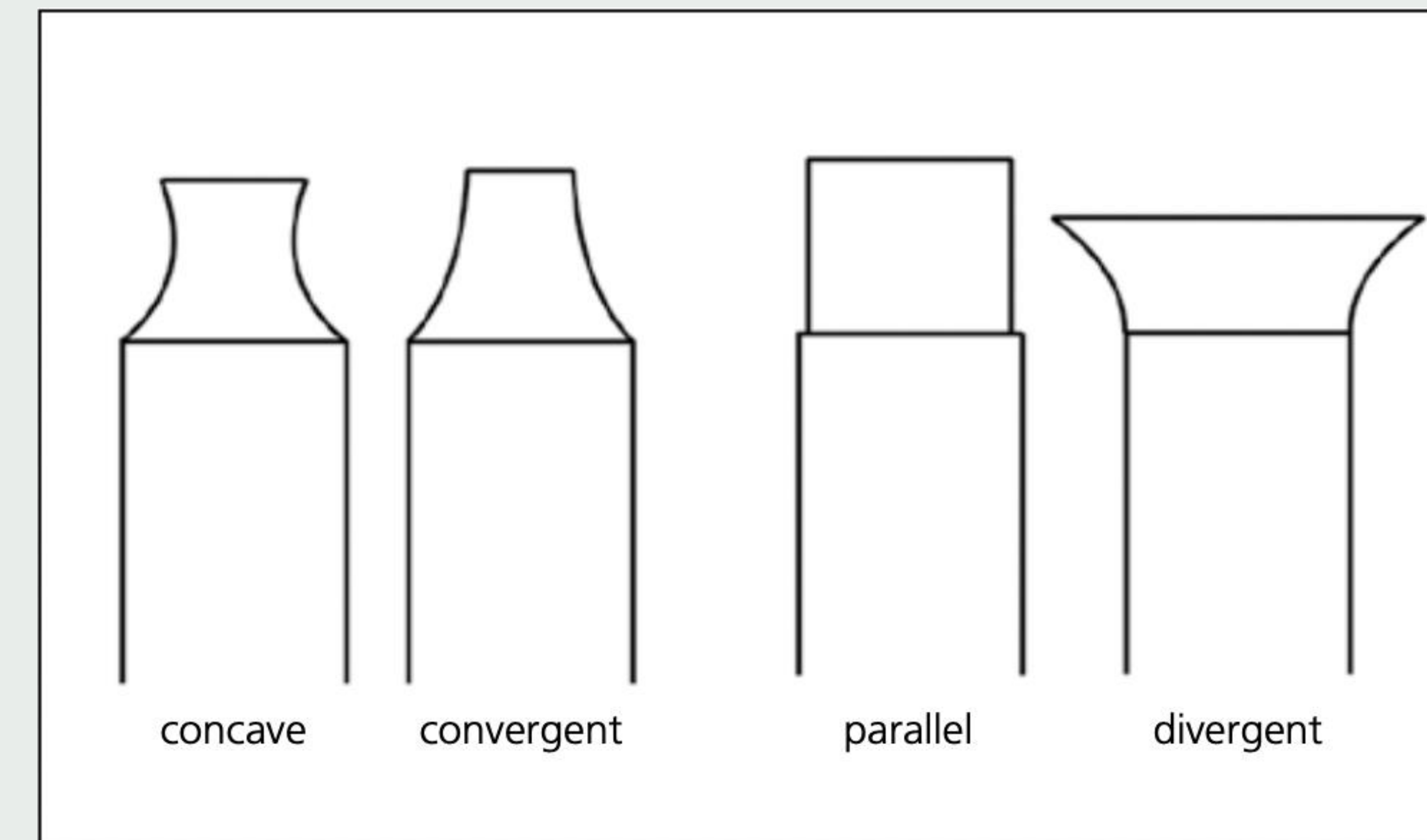
Introduction

Marginal bone loss (MBL) is a key factor affecting the long-term success of implant-supported restorations. Preventing excessive bone loss is crucial to avoid exposure of rough implant surfaces, which can promote biofilm accumulation and peri-implant disease.

Several factors influence MBL, including:

- Surgical technique
- Prosthetic design
- Implant-abutment connection
- Patient-specific factors (bone quality, systemic health)
- Prosthetic abutment design** plays a significant role in bone stability:
- Emergence angle:** A systematic review (Soulami et al., 2022) found that an angle $>30^\circ$ was associated with increased MBL and a higher prevalence of peri-implantitis.
- Abutment width:** A meta-analysis (Canullo et al., 2020) reported that narrow abutments resulted in significantly lower MBL compared to wider designs.

Understanding the relationship between **abutment design and MBL** is essential for improving implant longevity.



Different types of transmucusal design

Valente NA,. 2020 Sep/Oct;33(5):553-564

Objectives

- The aim of this systematic review is to evaluate the impact of prosthetic emergence profile and abutment design (width, height, and shape) on marginal bone loss in implant-supported restorations. This review aims to analyze how different abutment and prosthetic configurations influence early and long-term marginal bone-level changes, including bone loss and bone remodeling."

Methods

Recommandations
PRISMA 2020



Prospero Registration



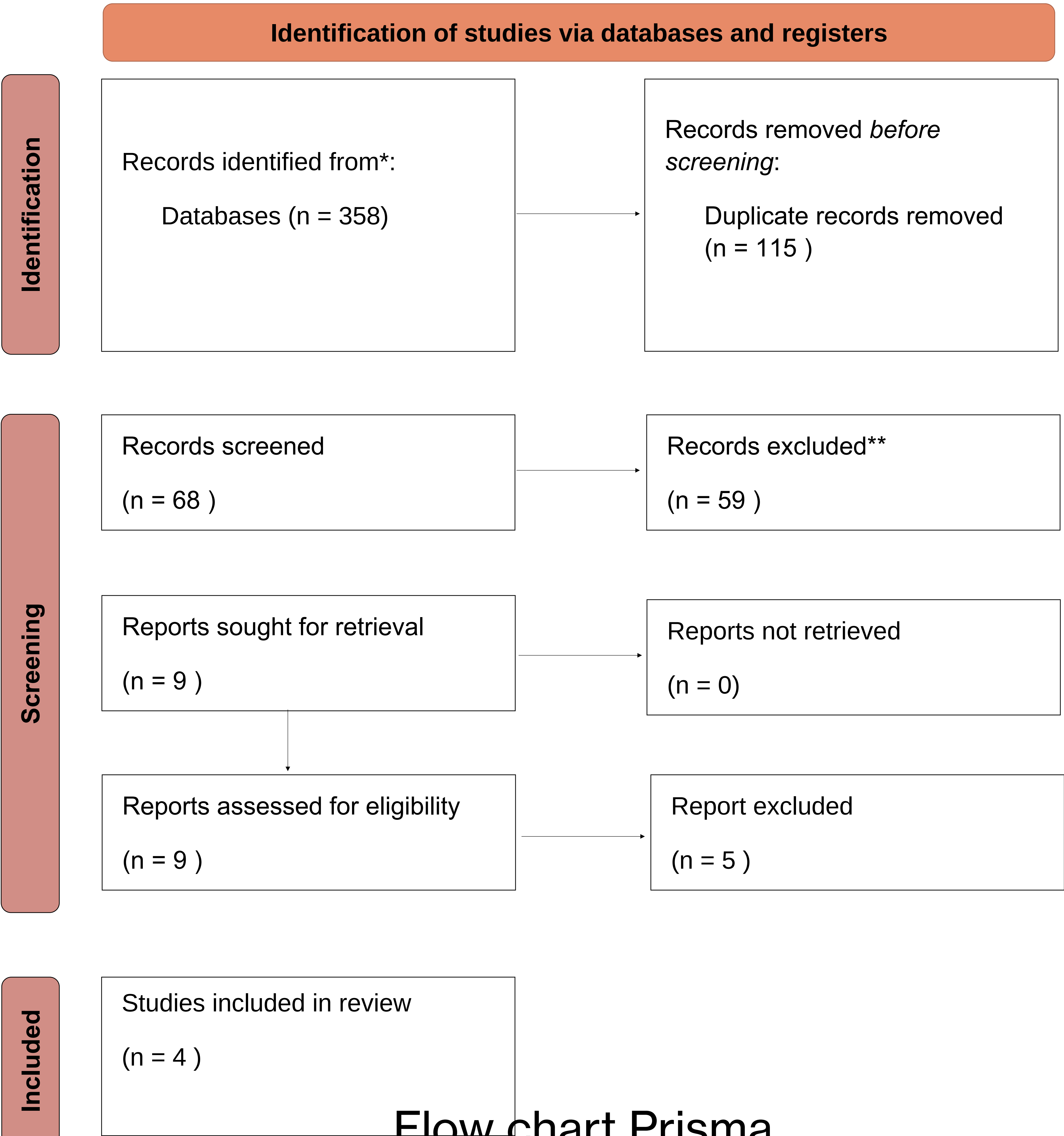
Databases

PICOS Criteria
Population : Patients with dental implants
Intervention : Different prosthetic designs
Comparator: Various prosthetic designs compared to each other
Outcome: Bone loss around dental implants
Study design Randomized controlled clinical trials
PICOS: Population, intervention, comparator, <u>outcomes</u> and study design

Research question

Inclusion criteria	<ul style="list-style-type: none">- Human studies (randomized controllesd trials)- studies published between 2020 and 2025- Follow-up time of at least 3 months- Shape of the abutment- Studies placing bone-level implants- Studies in English language
Exclusion criteria	<ul style="list-style-type: none">- Non-randomized studies- Uncontrolled studies- smoking >10 cigarettes per day;

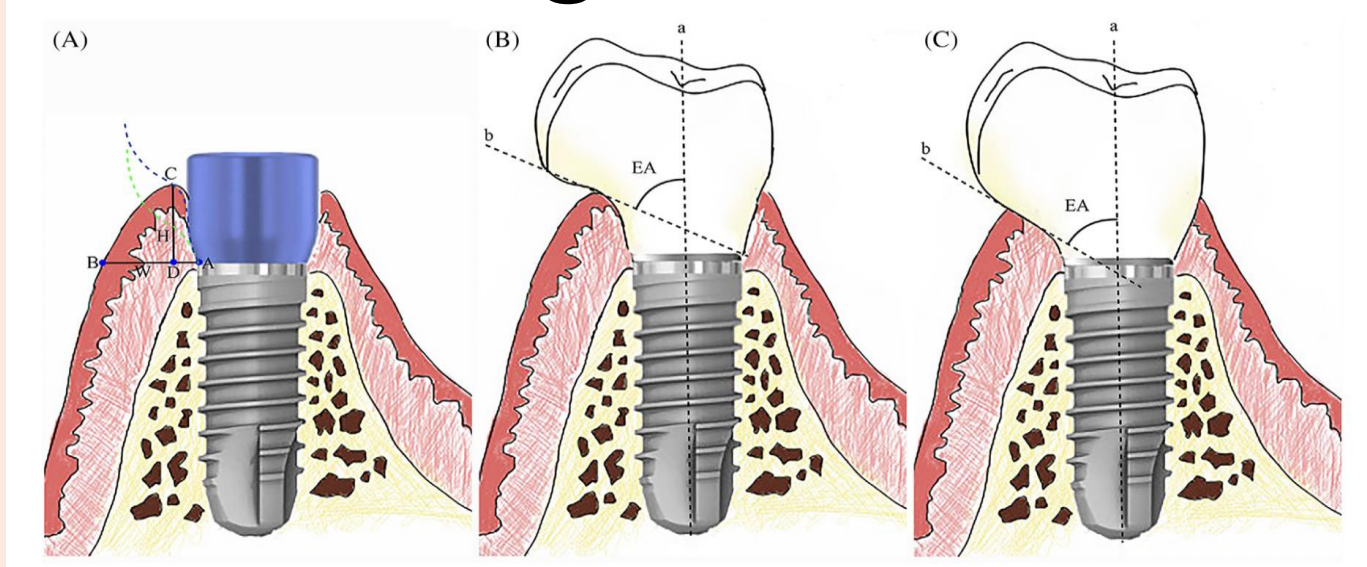
Eligibility criteria



Flow chart Prisma
2020

Results							
Study	Patients	Enrolled Implants /position	Test group (TG)	Control group (CG)	Evaluation methods	Follow up	Marginal bone changes
Juan Wang And al (2022)	19 patients with supracrestal soft tissue thickness ≥2 mm	20 implants 4.5 mm-diameter implants mandibular molar tooth replacement	Emergence profile based on width/height (W/H) ratio 1,3	Healing abutment's original emergence profile	panoramic radiograph and cone-beam computed tomography (CBCT) scans	12 months	TG: 0.00 ± 0.44 CG: 0.11 ± 0.36 P = 0.62
Marina Siegenthaler (2022)	Total 47 enrolled 45	47 dental implants in the anterior area of the maxilla or the mandible	CONVEX (n = 15) CONCAVE (n = 16) Provisional implant	no provisional (healing abutment only)	Standardized single tooth radiograph	12 months	p =0.599
Mario Pérez-Sayans (2022)	25 patients	77 implants esthetic zones 13–23 and 33–43	Cylindrical abutment and Cconcave abutment	No control group	digital intraoral radiology	6 months	–0.6 ± 0.7 mm in the cylindrical abutment –0.4 ± 0.6 mm concave (p = 0.03*)
Juan Carlos Bernabeu-Mira And al (2023)	25 patients	64 implants at least 2 consecutive implants for a 2–3 crown bridge in each posterior mandible or maxilla.	Cylindrical abutments group Wide abutment group	No control group	Parallelized periapical radiographs	1, 3, 6, and 12 months after loading	–0.03 ± 0.22 mm in the cylindrical group 0.42 ± 0.31 mm in the wide group 12 months of follow-up (p < .001*)

Juan Wang and al (2022)



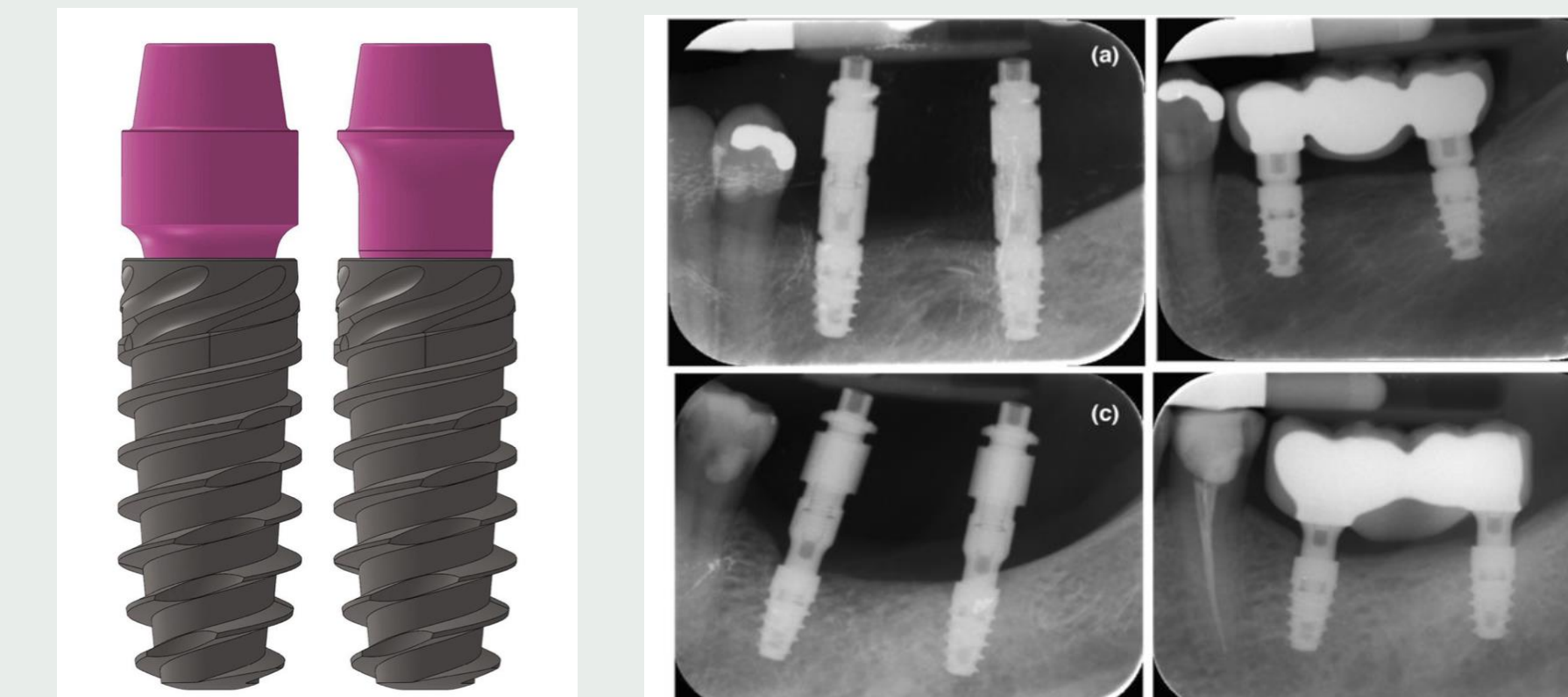
20 implants placed in 19 patients → 2 groups
Emergence profile based on width/height (W/H) ratio 1.3 and Healing abutment's original emergence profile.

MBL in the test group was slightly lower than in the control group, but differences did not reach the statistical significance level (p=0.62)



Linkevicius and al. found that a gingival thickness ≤ 2.0 mm might contribute to crestal bone loss.

Juan Carlos Bernabeu-Mira 2023



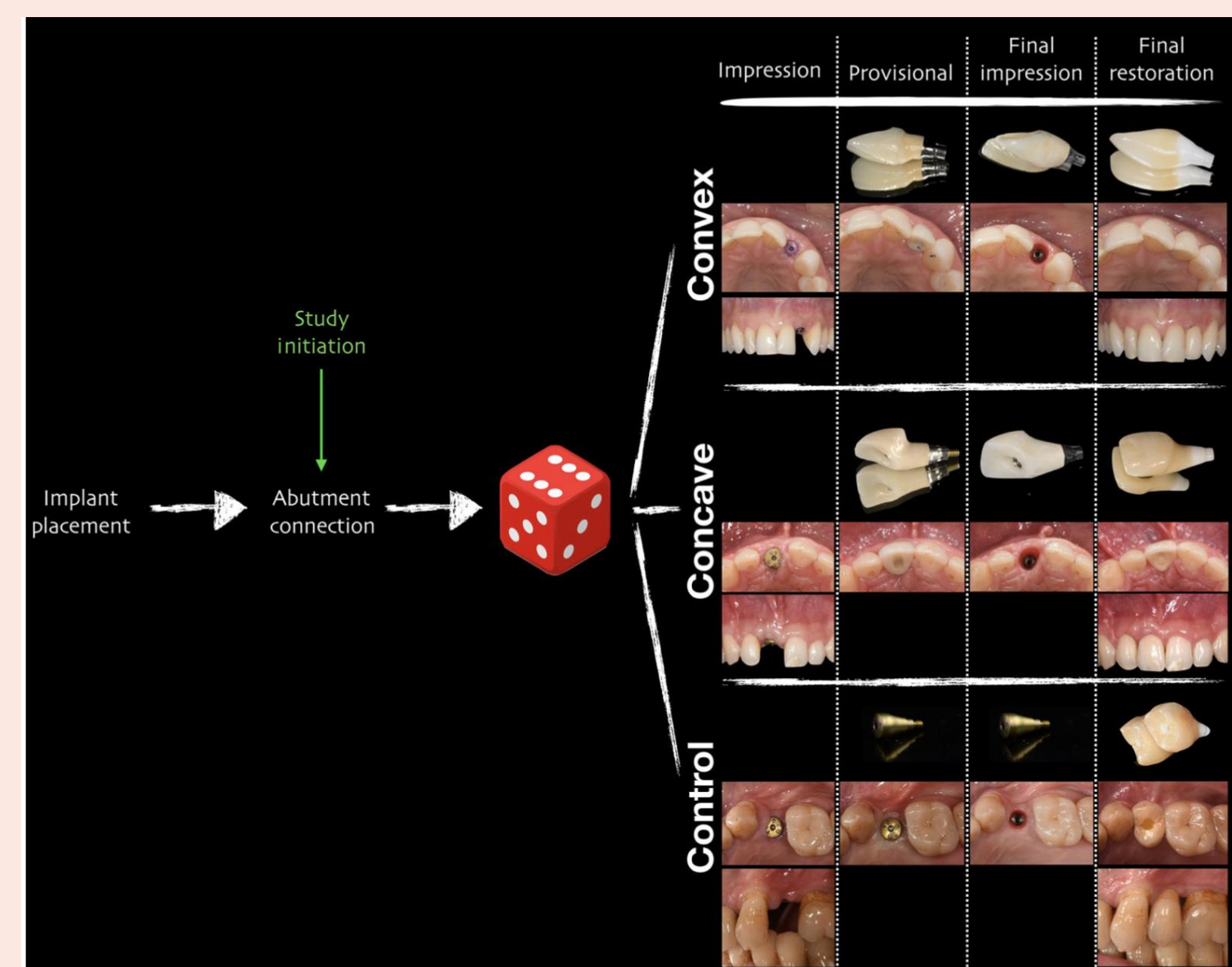
64 dentals implants placed in 25 patients → 2 groups Cylindrical abutments (cylindrical group) Wide abutments (wide group)

The cylindrical group showed less mean marginal bone remodeling (MBR) and marginal bone loss (MBL) than the wide group (p < 0.05*)



Majzoub et al. (2021) showed that prosthetic emergence profiles $>30^\circ$ led to more MBL than prosthetic emergence profiles $\leq 30^\circ$ (2.33 ± 1.20 mm and 0.59 ± 0.71 mm, respectively) .

Marina Siegenthaler 2022



47 implants placed in 47 patients → 3 groups
1.CONVEX (customization of an undercontoured provisional screw-retained crown to a convex contour)
2.CONCAVE (customization of an undercontoured provisional screw-retained crown to a concave contour)
3.CONTROL (no customization by using a standardized healing abutment)

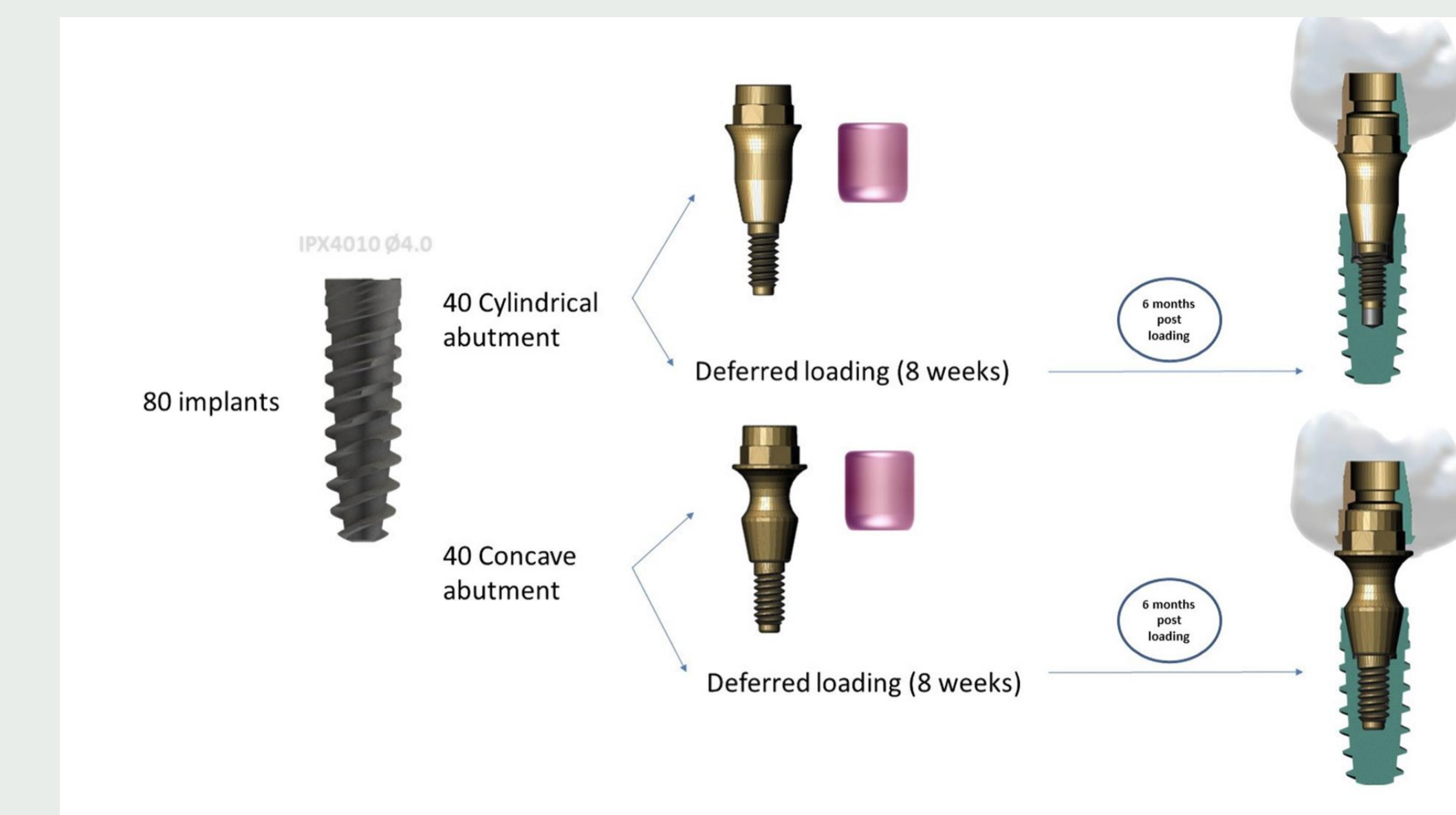
MBL: similar in all groups at any time point (p =0.599)

Comparison of Two Different Abutment Designs on Marginal Bone Loss and Soft Tissue Development

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Aditi Jagdale, BDS⁴/Anjali Dilbaghi, BDS⁵/Marco S. Cune, DDS, PhD⁶

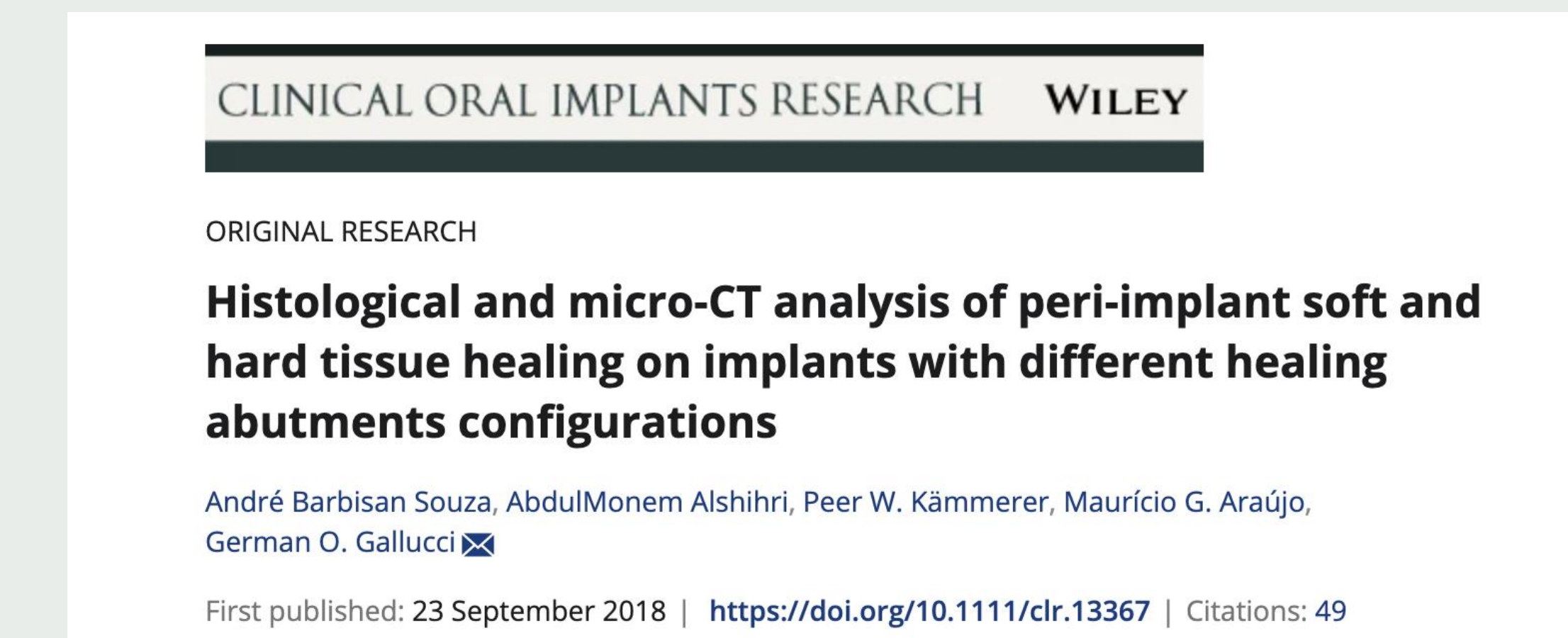
Ratnadeep C 2014 : A titanium abutment with a circumferent curved design is of no additional benefit to soft tissue development and preservation of marginal bone compared to a conventional straight abutment design for the restoration of single-tooth implants in the esthetic zone.

Mario Pérez-Sayans 2022



77 implants placed in 25 patients → 2 groups
The arms were cylindrical abutment and concave abutment

The early global MBL of the cylindrical abutment group was significantly higher than it was in the concave abutment group, in which the early global MBL (p = 0.030*)



Souza et al. (2018) : In the micro-CT analysis, MBL was higher in the case of the wide abutments (1.1 ± 0.66 mm) than in the case of the narrow abutments (0.12 ± 0.21 mm) .

Limitations

- One limitation of this systematic review is the lack of consideration of abutment height, whereas studies such as (Jaun Blanco and al 2017) have shown that this factor significantly influences interproximal bone loss. Indeed, this randomized clinical trial reported that a 1-mm abutment led to greater bone loss compared to a 3-mm abutment after six months of follow-up. Incorporating this variable into future analyses would provide a more comprehensive understanding of the factors affecting bone preservation around implants

Conclusion

- The studies analyzed suggest that several factors influence marginal bone loss (MBL) around dental implants, including soft tissue thickness, prosthetic emergence profile design, and abutment shape.
 1. A gingival thickness of <2.0 mm may contribute to increased crestal bone loss,
 2. Wide abutments and prosthetic emergence profiles >30° are associated with greater MBL compared to narrower or more concave designs, as demonstrated by studies from Majzoub et al. and Souza et al.
 3. Cylindrical abutments seem to induce less marginal bone remodeling and loss than wide abutments,
 4. However, some studies, found no significant difference in MBL between different abutment designs, suggesting that other biological or mechanical factors may play a role.
- Overall, these findings highlight the importance of considering soft tissue thickness and abutment design to minimize marginal bone loss and improve long-term implant success.

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