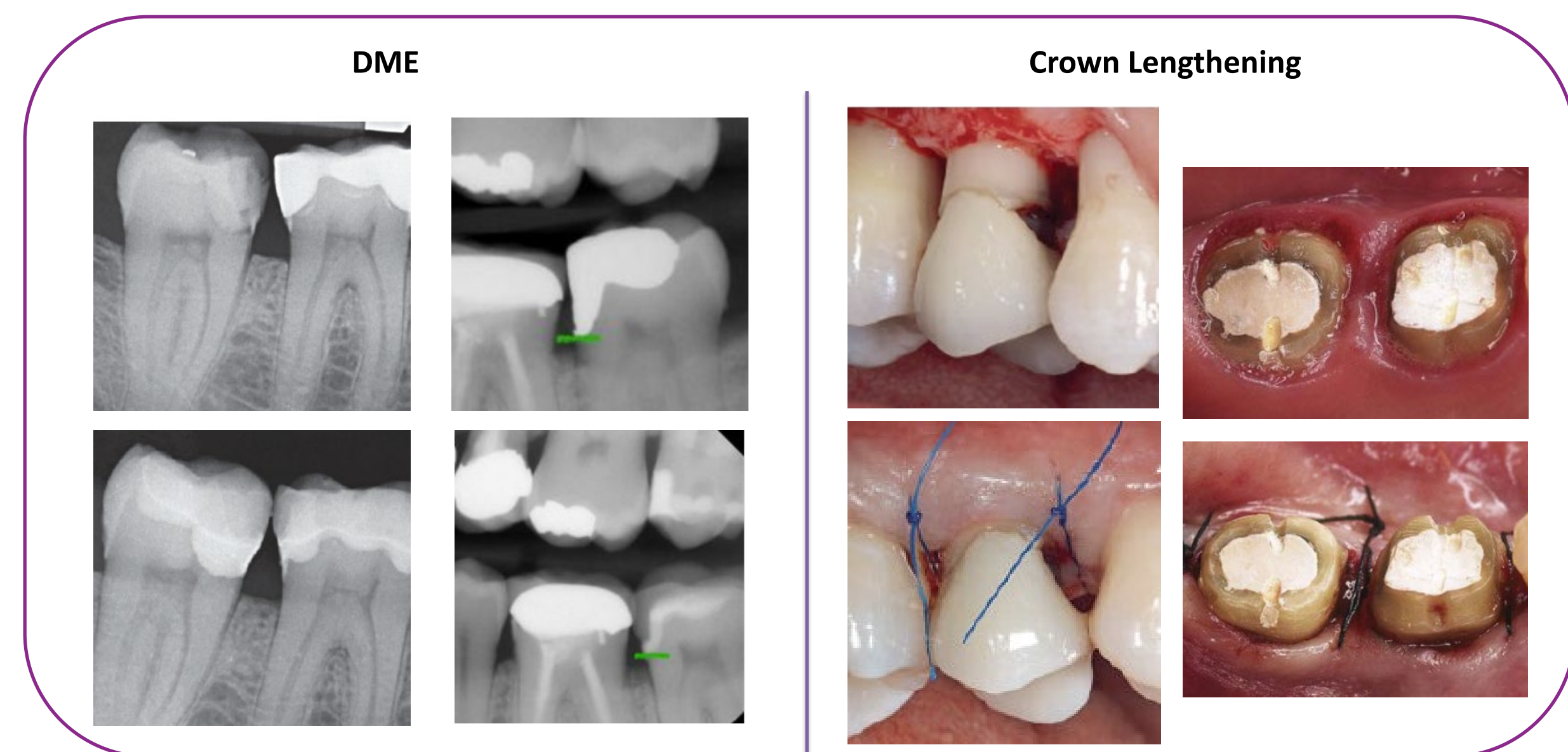


## INTRODUCTION

In this review, the concept of biological width is discussed in terms of treatment options and decisions when restoring teeth with subgingival margins. For many years, to respect biological width clinicians have removed tissue and bone to allow for restorations to be placed far enough to prevent inflammation and attachment loss. Today, with the growth of more conservative and biomimetic treatment, we are seeing more of an additive approach such as Deep Margin Elevation (DME) than former subtractive approaches such as clinical crown lengthening. In this review the prognosis of restored teeth is examined when comparing DME to classical crown lengthening in respect to success of the restoration and consequences on the surrounding periodontium.



## CLINICAL QUESTION

Does the prognosis of a restored tooth differ when completing deep margin elevation vs. clinical crown lengthening?

## Deep Margin Elevation vs. Crown Lengthening

Deep margin elevation (DME) is a treatment approach to relocate the cervical margin of teeth with subgingival defects to a supragingival position with a direct restoration to facilitate rubber dam isolation, impression taking, intraoral scanning and bonding of indirect restorations. Proper working field isolation, bonding protocol and buildup procedure, and biofilm removal are crucial. This approach is also known as proximal box elevation and is a restorative approach that relies on directly repositioning the cervical margin to a supragingival position. There are various protocols, but essentially upon completing the subgingival aspect of a preparation is completed, a matrix is placed and adapted tightly. Tooth is etched, bonded, and a material such as composite, glass ionomer or RMGI is placed. This technique allows for a subgingival margin to become elevated for use in indirect or direct restorations.

Surgical crown lengthening (CLS), typically accomplished by either gingivectomy or apically positioned flap with or without osseous resection, is a reliable treatment approach to relocate the periodontium more apically and establish supragingival restoration margins that do not impinge on the supracrestal tissue attachment. Crown lengthening is associated with longer treatment time, higher costs, patient discomfort, and in certain cases, compromised dental esthetics. Proximity of neighboring teeth complicates interproximal tissue removal, and exposure of furcations should be avoided. A predictable result after CLS depends on several factors such as periodontal phenotype, healing time and operators' clinical skills. Ultimately the goal is to recreate the space necessary to reestablish the biological width when deep restorations are needed, so that the necessary margin between prosthesis and biological tissues is respected.

## RESULTS

### DME Outcomes:

- 8 out of 189 restorations failed within 3.8 to 4.7 years, with a single case each of fracture, severe periodontal breakdown, pulpal necrosis, and five cases of secondary caries.
- One study revealed an overall 95.9% success in survival over the period of ten or more years.
- Fracture strength was not significantly influenced by the DME ( $p = 0.15$ ).
- Onlays with DME had greater fracture strength than inlays with DME
- DME is clinically and histologically well tolerated by the surrounding periodontium → DME does not lead to biological width regeneration but a variable, comprised of a longer junctional epithelium alongside the material and a smaller connective attachment along the dentin underneath the composite
- DME, in conjunction with indirect restorations, was found to have a better survival rate compared with teeth treated with crown lengthening surgery
- Marginal quality at the interface between root dentin and DME restorations is satisfactory and similar to sites without DME
- One systematic review found teeth restored with DME and indirect restorations to have a better survival rate compared with teeth treated with surgical crown lengthening
- BOP was found to occur more frequently at sites with DME in one investigation, but at 180 days follow up plaque index and BOP was similar to that of the CL group.

### Crown lengthening outcomes:

- Post-surgery there was an increase in CL. However, that increased length was found to be significantly reduced at the follow-up.
- The free gingival margin (FGM) displayed significant displacement while healing but showed overall stability at 6 months. Most of this displacement occurs within the first six months of post-surgery
- Patients with thin periodontal phenotypes are less resistant to trauma and surgical insults, making them more susceptible to gingival recession
- Meta-analysis showed no statistically significant changes after three or six months in terms of supracrestal tissue attachment levels, bone level and probing pocket depth between treated and adjacent sites
- 3-month recurrence is frequent particularly in patients presenting thick biotype
- CL procedure leads to opening of the proximal area → evidence of increase of bone loss at 6 mo. f/u

## CONCLUSION

There is a lack of high-quality studies examining comparisons of outcomes between CL and DME with long-term follow-up. Patient and dentist-reported outcomes have not been given sufficient consideration in literature. Based on the limited evidence, it can be concluded that for restorative purposes, crown lengthening surgery can be successful in long-term retention of restored teeth. However, the deep margin elevation technique has a better survival ratio. Further studies are needed to take follow-up over a longer period to properly assess the rebound effect of CL surgery over time and degradation in DME. Future investigations should also consider patient-reported outcomes such as pain, discomfort, cost, and satisfaction. Healing time post crown lengthening is also a factor that can be of interest when treatment planning as it takes 6-12 weeks in posterior areas and 3-6 months in anterior teeth. None of the studies reviewed examined the mobility of the teeth post-surgery or the crown-to-root ratio outcomes which may have a factor in the success of the restorations. A recent study, evaluated CL vs. DME to help in clinical decision making and suggested DME as a better alternative to CL for deep cavities. The conclusion was based on the outcome of biological width and not on the survival ratio or successful retention of the restoration. Additionally, a randomized clinical trial compared results of CL and DME in posterior teeth and found that after 180 days, CAL was higher in the surgery group as expected, but the pocket depths, BOP and plaque index were similar in the groups. We can conclude that DME is tolerated well by the periodontium and overall, a favorable alternative to the classic surgical crown lengthening procedure.

## REFERENCES

- Samartzis TK, Papalexopoulos D, Ntovas P, Rahiotis C, Blatz MB. Deep Margin Elevation: A Literature Review. *Dentistry Journal*. 2022; 10(3):48. <https://doi.org/10.3390/dj10030048>
- Eggmann F, Ayub JM, Conejo J, Blatz MB. Deep margin elevation-Present status and future directions. *J Esthet Restor Dent*. 2023 Jan;35(1):26-47. doi: 10.1111/jerd.13008. Epub 2023 Jan 5. PMID: 36602272.
- Mugri MH, Sayed ME, Nedumgottil BM, Bhandi S, Raj AT, Testarelli L, Khurshid Z, Jain S, Patil S. Treatment Prognosis of Restored Teeth with Crown Lengthening vs. Deep Margin Elevation: A Systematic Review. *Materials (Basel)*. 2021 Nov 8;14(21):6733. doi: 10.3390/ma14216733. PMID: 34772259.
- Sarfati A, Tirlat G. Deep margin elevation versus crown lengthening: biologic width revisited. *Int J Esthet Dent*. 2018;13(3):334-356. PMID: 30073217.
- <https://www.speareducation.com/spear-review/2018/12/benefits-of-deep-margin-elevation-for-treating-subgingival-margins>
- Samantha C. Smith, Rayner Goh, Sunyoung Ma, Getulio R. Nogueira, Momen Atieh, Andrew Tawse-Smith. Periodontal tissue changes after crown lengthening surgery: A systematic review and meta-analysis, *The Saudi Dental Journal*, Volume 35, Issue 4, 2023