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study

Healing of periodontal infrabony defects following regenerative surgery

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Background

Periodontal infrabony defects are defined as defects extending below the bone crest. Within this category are intrabony defects that extend within or inside the bone and which are classified according to location and number of osseous walls.

Regenerative treatment of intrabony defects has shown higher periodontal probing depth (PPD) reduction and clinical attachment level (CAL) gain compared to open-flap debridement surgery. However, the effect of defect morphology on treatment outcomes following periodontal surgery has not been investigated systematically. In addition, there are recent developments in techniques and materials that need to be considered.

Aims

To analyse the healing pattern of infrabony defects following regenerative surgery in relation to clinical and radiographic outcomes, and furthermore to examine how defect morphology is described.

Materials & methods

- This systematic review provided meta-analyses for the predictive value of defect morphology in regenerative procedures. Moreover, the description of defect morphology was analysed in the selected studies.
- The included studies were published between 1992 and 2019.
- The sources of evidence were MEDLINE, Cochrane, and Scopus databases.
- Risk of bias was ranged from low to high after analyses of all included studies.
- Meta-analyses of the following parameters on healing at 12 months after surgery were performed:
  - Effect of ***defect depth:***
    - Categorical analysis for the effect of defect depth >4mm on radiographic hard-tissue gain (Figure 1).
    - Regression estimates for the effect of initial defect depth on radiographic hard-tissue gain.
    - Regression estimates for the effect of initial depth on CAL gain.
  - Effect of ***defect angle:***
    - Categorical analysis for the effect of initial defect angle <37° on radiographic hard-tissue gain (Figure 2).
    - Regression estimates for the effect of initial defect angle on radiographic hard-tissue gain.
    - Regression estimates for the effect of defect angle on CAL gain.
  - Effect of ***number of walls:***
    - Categorical analysis for the effect of one-wall versus two-wall defects on radiographic hard-tissue gain (Figure 3a).
    - Categorical analysis for the effect of two-wall versus three-wall defects on radiographic hard-tissue gain (Figure 3b).
    - Regression estimates for the effect of the number of walls on radiographic hard-tissue gain.
    - Regression estimates for the effect of the number of walls on CAL gain.

Figure 1

Categorical analysis for the effect of defect depth >4 mm on radiographic hard-tissue gain.

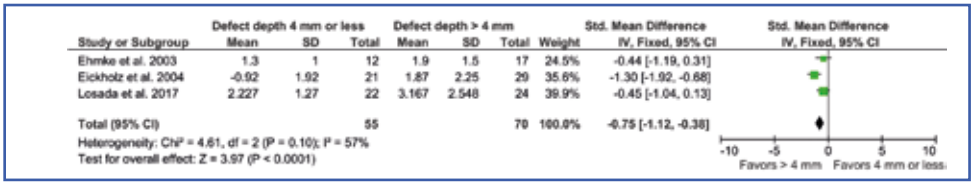
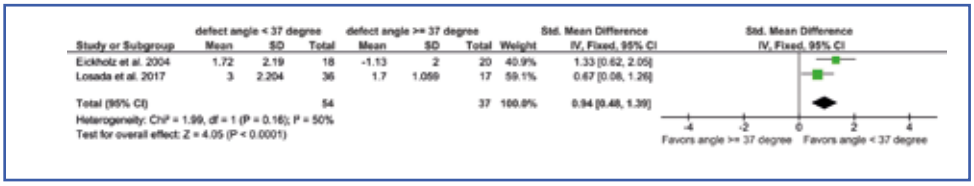


Figure 2

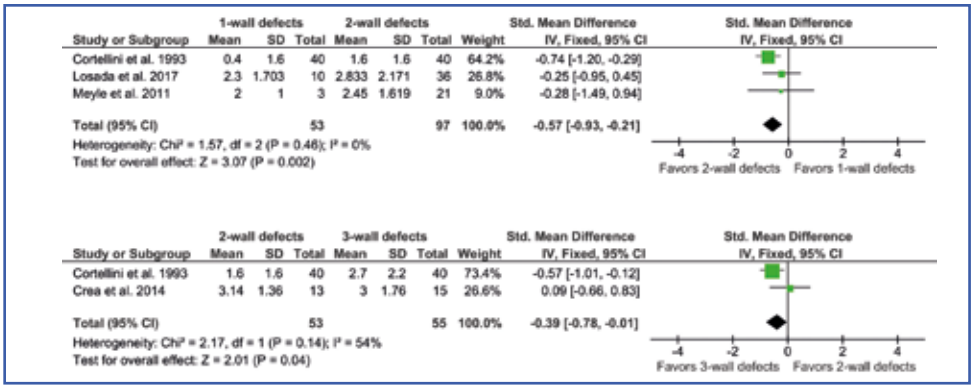
Categorical analysis for the effect of the initial defect angle <37° on radiographic hard-tissue gain.



Figures 3a y 3b

3a: Categorical analysis for the effect of 1-wall versus 2-wall defects on radiographic hard-tissue gain.

3b: Categorical analysis for the effect of 2-wall versus 3-wall defects on radiographic hard-tissue gain.



Results

- The 4,487 titles encountered included 117 randomised controlled trials (RCTs), 20 cohort studies, and six case series. However, it was possible to quantitatively analyse only 14 publications.
- At 12 months following regenerative treatment, the following associations in relation to defect depth, defect angle, and the number of walls were found.
  - Defect depth:
    - A statistically significant association was found between a defect depth >4mm and increased radiographic hard-tissue gain (−0.7mm, 95% CI = −1.12, −0.38).
    - A statistically significant association was found between deeper defect depth and increased radiographic hard-tissue gain (OR = 1.32, 95% CI = 1.19, 1.47).
  - Defect angle
    - A statistically significant association was found between a defect angle <37° and increased radiographic hard-tissue gain (0.94mm, 95% CI 0.48, 1.39).
    - A statistically significant association was found between narrow angles and increased CAL gain (OR = 0.97, 95% CI = 0.95, 0.98).
  - Number of walls
    - Comparison between one-wall and two-wall defects indicated significantly more radiographic hard-tissue gain in treatments of two-wall defects (−0.57mm, 95% CI = −0.93, −0.21).
    - Comparison between two-wall and three-wall defects indicated significantly more radiographic hard-tissue gain in treatments of three-wall defects (−0.39mm, 95% CI = −0.78, −0.01).
    - Comparison between one-wall and three-wall defects indicated significantly more radiographic hard-tissue gain in treatments of three-wall defects (−1.18mm, 95% CI = −1.66, −0.71).

Limitations

- Only a few publications reported outcomes based on defect morphology, although descriptions of defect morphology exist in most of the studies.
- No detailed classification system was widely used to describe infrabony defects. Therefore, only studies with heterogeneously described defects were found.
- No data is available concerning the description of defect morphology with extension to buccal and lingual surfaces.
- Only 12 months of follow-up was reported.

Conclusions & impact

- The 12-month outcome following regenerative surgery of infrabony defects indicated increases in radiographic hard-tissue gain and CAL gain.
- Deep defects positively influenced radiographic hard-tissue gain, while narrow angles and a larger number of walls positively influenced both radiographic hard-tissue gain and CAL gain.
- The initial defect morphology can be used to assess the likely prognosis following regenerative surgery.

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