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study

Ten-year outcomes of M-MIST therapy for intrabony defects with and without regeneration materials

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Background

Clinical outcomes of periodontal regeneration are obtained by applying different surgical techniques and regenerative materials.

Surgical techniques have become efficient because of the adaptation of modified incisions to preserve the interdental tissue. These techniques are designed to maintain the integrity of the papilla to allow better wound closure, protection of the coagulum, and first-intention healing.

Enamel matrix derivative (EMD) and resorbable membranes are the "gold-standard" materials for deep intrabony defects in combination with deproteinised bovine bone mineral (DBBM) for non-supporting defects.

To reduce the flap dimensions, healing time, and patient discomfort, and to improve wound stability, minimally invasive surgical approaches have been introduced, such as the modified minimally invasive surgical technique (M-MIST) and the single-flap approach (SFA). Although minimally invasive surgical approaches – with and without biomaterials – for treating intrabony defects have been compared, the long-term stability of the outcomes had not been explored before.

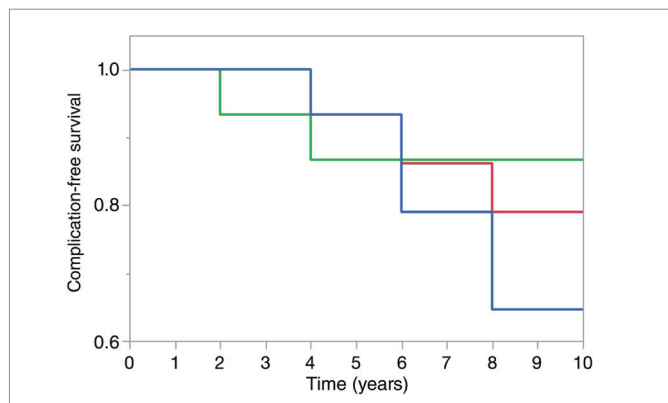
Aim

The aim of this study was to compare the clinical stability of treatment with the M-MIST technique, alone and in combination with two different regenerative approaches in intrabony defects, and to evaluate the costs of reintervention required over a 10-year period.

Materials & methods

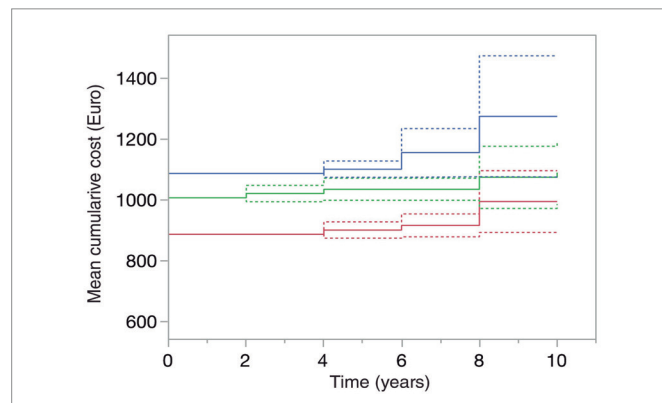
- A 10-year follow-up of a randomised controlled trial comparing three different modalities in deep intrabony defects: M-MIST alone, M-MIST + EMD, M-MIST + EMD + DBBM.
- Forty-five participants presenting one deep intrabony defect, located in the inter-proximal area and not extending into the furcation area.
- Patients were randomly assigned to one of the three treatment groups: (i) M-MIST alone (n=15), the suture was tightened to have blood-clot stability; (ii) M-MIST + EMD (n=15), ethylenediaminetetraacetic acid (EDTA) was applied for two minutes before applying EMD; (iii) M-MIST + EMD + DBBM (n=15), EDTA and EMD were applied before DBBM was placed.
- Clinical measurements – plaque scores, bleeding on probing, pocket probing depth (PPD), and clinical attachment level (CAL) – were evaluated one week before surgery and at the follow-up examinations.
- Radiographic examinations – distance between the cemento-enamel junction and the bottom of the defect [CEJ-BC] and distance between the cemento-enamel junction and the tooth apex [CEJ-A] – were performed with an electronic ruler one week before surgery and at the follow-up examinations.
- Long-term supportive periodontal care (SPC): patients were enrolled every three months and, in case of disease recurrence, non-surgical root debridement, access-flap surgery, or regenerative surgery were performed. Teeth not responding were extracted.

Figure 1: Complication-free survival



Mantel-Haenszel complication-free survival curves for the three groups (modified minimally invasive surgical technique [M-MIST] in red, M-MIST + enamel matrix derivative [EMD] in green, and M-MIST + EMD + DBBM in blue). The diagram shows the interval until the first recurrence of periodontitis event observed at the experimental teeth. No significant differences were observed between groups.

Figure 2: Mean cumulative cost of recurrence over 10 years



Mean cumulative cost of recurrence (in euros) over the 10 year observation period. The diagram shows all periodontitis recurrence events observed and the actual cost of management of the recurrence and includes the cost of surgical treatment. The dashed lines represent the 95% CI. M-MIST is in red, M-MIST + EMD is in green, and M-MIST + EMD + DBBM is in blue.

Results

Experimental population:

- Three subjects were lost to follow-up for reasons unrelated to treatment: one in each group –two after four years and one after six years.
- The sample was considered homogeneous as no differences between groups were observed regarding the full-mouth plaque and bleeding scores at different time points.
- All subjects were compliant regarding SPC.

Clinical and radiographic outcomes:

- No significant intergroup differences were observed at baseline, one year, and 10 years regarding CAL, PPD, and radiographic bone-level changes.
- Intragroup differences were significant between baseline and one year, but no significant changes were observed between one year and 10 years.
- Study had 13.3% power to detect a 0.2mm intergroup difference in CAL between the one- and the 10-year follow-up (ANCOVA).

Complication-free survival:

- Ten events requiring additional periodontal therapy were observed: three in the M-MIST group, five in the M-MIST + EMD + DBBM group, and two in the M-MIST + EMD group. The respective survival until the occurrence of the first event requiring additional periodontal therapy beyond regular SPC was four years, four years, and two years.
- No significant differences in complication-free survival between the three groups were observed, which was 7.46 years (95% CI: 7.05-7.87) for the whole population.

Mean cumulative cost of recurrence:

- Without including the surgical cost, the group with the highest cost of managing disease recurrence was the M-MIST + EMD + DBBM group.
- The cost of the global treatment, including surgical cost and the cost of recurrence management, was also higher for the M-MIST + EMD + DBBM group.

Limitations

- No information was given on whether the periapical radiographs were standardised or not.
- Statistical power may benefit from bigger sample groups.

Conclusions & impact

- Teeth presenting intrabony defects associated with deep pockets can be successfully treated with an M-MIST approach, with or without regenerative material.
- Avoiding regenerative material provides the same short- and long-term benefits at lower cost, compared to a regenerative approach with biomaterial.
- If the patient is compliant with the SPC programme, treated teeth can be maintained over 10 years.
- Avoiding regenerative materials in the M-MIST technique for treating intrabony defects can provide satisfactory survival at a lower cost.

JCP Digest 102, published in June 2022, is a summary of 'Modified minimally invasive surgical technique in human intrabony defects with or without regenerative materials – 10-year follow-up of a randomized clinical trial: Tooth retention, periodontitis recurrence, and costs.' *J Clin Periodontol.* 49(6):528-536. DOI: 10.1111/jcpe.13627

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