

# The Mucosal Scarring Index

## Reliability of a new composite index for assessing scarring following oral surgery

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### INTRODUCTION

A scar represents a macroscopic disturbance of the normal structure and function of the tissue architecture, resulting from the end-product of the healed wound. The soft tissue framework around teeth and implants is an integral component of dental aesthetics. A reliable method to assess mucosal scarring is needed for aesthetic evaluation of oral surgery. The aim was to propose an index to measure the presence of oral mucosal scarring following mucogingival surgery and to report on its reproducibility by means of an intra-rater and inter-rater agreement.



### MATERIAL AND METHODS

Photographs of 30 post-surgical sites in the maxilla/mandible were assessed using the proposed scarring index. Patients had been surgically treated between 3 months and 10 years prior to evaluation. To ensure the complete spectrum of the index is represented in the analysis, highly aesthetic cases with little to no scarring as well as poor aesthetic cases with extreme scarring were included. Fifteen clinicians, 5 periodontists, 5 orthodontists and 5 prosthodontists were asked to evaluate the cases to assess the potential effect of observer specialisation on MSI scoring. Cases were re-evaluated after a 2-hour break which was presented in a randomised order, this to account for any bias from the first viewing. Cases were presented on a large screen with delineation of the area of interest and a calibrated ruler to allow for dimensional assessment (figure 1).

Mucosal Scarring Index		
	Scar Category	Points
Width	> 1mm	2
	≤ 1mm	1
	0 mm	0
Height/contour	Hypertrophic or Invaginated	2
	Slightly Hypertrophic or Invaginated	1
	Flush with surrounding mucosa	0
Color	Obvious mismatch	2
	Slight mismatch	1
	Perfect	0
Suture marks	Clearly visible	2
	Slightly visible	1
	Absent	0
Overall appearance	Poor	2
	Acceptable	1
	Good	0

The MSI is a composite index based on 5 parameters shown above: width of the scar, height/contour of the scar, color of the scar, visibility of suture marks and the overall appearance. Each parameter is assessed with a 0-1-2 score, 0 being the best and 2 being the worst. This yields a MSI score ranging from 0 (no scar) to 10 (most extreme scar).

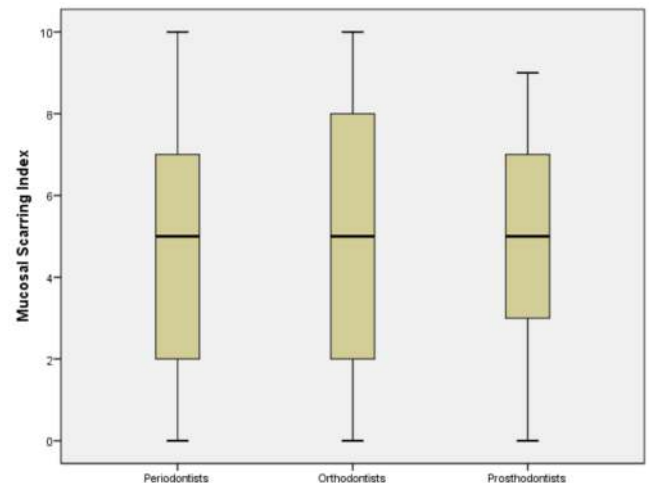
### RESULTS

The complete spectrum of the MSI was represented in the sample since all possible MSI scores had been given. On a total of 450 assessments the mean MSI amounted to 4.91 (SD 3.087). MSI scores given by periodontists (mean 4.65; SD 3.054), orthodontists (mean 5.04; SD 3.301) and prosthodontists (mean 4.81; SD 2.842), thus the field of expertise had no significant impact on MSI scoring ( $p=0.548$ ). Agreement among the 15 clinicians on the 30 selected cases was excellent given an ICC of 0.983 (95% CI 0.973 – 0.991;  $p<0.001$ ). Table 1 shows Fleiss' kappa for multiple raters assessing agreement among the 15 clinicians for each of the 5 parameters of the MSI. Clinicians agreed most on 'overall appearance' (kappa = 0.582;  $p<0.001$ ) and least on 'suture marks' (kappa = 0.352;  $p<0.001$ ). Agreement between the first and second evaluation of the 30 selected cases was excellent given an ICC of 0.924 (95% CI 0.909 - 0.937;  $p=0.001$ ).

Table 1. Agreement among clinicians for the 5 parameters of the Mucosal Scarring Index

Parameter	Fleiss' kappa	p-value
Width	0.475	<0.001
Height/contour	0.422	<0.001
Color	0.434	<0.001
Suture marks	0.352	<0.001
Overall appearance	0.582	<0.001

### MSI scoring per field of expertise



### CONCLUSION AND IMPLICATIONS

The MSI is an effective, easy-to-use and reliable composite index to assess mucosal scarring following oral surgical procedures. The index was developed to be used as an adjunct to other aesthetic indices and may assist in deciding on which surgical protocols to pursue for specific scenarios.