Calibration in radiographical diagnostics and removal of carious tissue in deep lesions

Azam Bakhshandeh1, Mette Borum2, Lars Høvenhoff3, Hanne Gaard4, Helena Fransson5, Lina Stangvaltaite6, Lars Bjørndal1

1) Department of Odontology, University of Copenhagen, Copenhagen, Denmark, 2) Public Dental Health Care Service, Aarhus municipality, Denmark, 3) Public Dental Health Care Service, Randers municipality, Denmark, 4) Public Dental Health Care Service, Copenhagen municipality, Denmark, 5) Faculty of Odontology, Malmö, Sweden, 6) Department of Clinical Dentistry, UiT The Arctic University of Norway, Oslo, Norway

Conclusions
Variations in inter- and intra-examiner kappa values indicates that repeating monitored centre-visits are mandatory for the performance of radiographical diagnosis and removal of profound caries lesions.

Background
Sufficient evidence is lacking in the literature supporting whether one stage selective removal is better or worse compared with two stage approach in permanent teeth with primary deep carious lesions. One objective for improving is to investigate the beneficial and harmful effects of selective carious removal versus stepwise removal by applying a RCT.

Aims
Before starting the RCT study, we aimed to evaluate the level of agreement between the dentists and between the dentists and the ‘gold standard’ in the following radiographical and clinical assessments:

a) Definition of deep caries lesions, which might be relevant for stepwise excavations.
   Thus, the radiographical depth shall be in 3/4 of the dentin
b) Selective caries removal at the central part of profound lesions at the first visit

Our hypothesis was that the dentists were well calibrated in radiographical diagnosis and caries removal of profound occlusal and approximal caries lesions.

Materials and Methods
Case-based PowerPoint presentations were prepared including occlusal and approximal lesions in 50 radiographical and 13 clinical cases on permanent teeth. 53 dentists from six municipalities in Denmark and two dentists from Lithuania participated in the sub-study. 25 randomized, selected radiographs were scored twice with three hours in between scorings, while the clinical cases were scored only once. The first radiographical scorings were based on the dentist’s daily performance and the second scorings were after a detailed review and discussion of the knowledge and literature concerning current criteria for stepwise excavation.

Radiographical scoring categories (Fig. 1)
1. Not deep enough
2. Deep enough
3. Too deep

Clinical scoring categories (Fig. 2)

a) Too little excavated
b) Optimal excavated
c) Too much excavated

The scorings by dentists were individual and anonymized using Digital voting system (Clickers). Two of the authors (AB+LB) scored the cases which were used as ‘gold standard’ for statistical analyses.

Results
Regarding the radiographical agreements, the intra-examiner kappa for the 55 dentists varied from poor to good agreement (k=0.7), (Fig. 3). Inter-examiner kappa, calculated between the ‘gold standard’ and the 55 dentists, varied from poor to almost perfect agreement (k=0.9). Regarding clinical agreements the inter-examiner kappa, calculated between the ‘gold standard’ and the 55 dentists, varied from poor to almost perfect agreement (k=0.8), (Table).

Figure 1: Examples radiographical cases. LB and AB assessed the lesions as follow: Case 2, 10, 23: Deep enough, Case 5: Not deep enough

Figure 2: Examples of clinical cases. LB and AB assessed the excavations as follow: Case 2: Optimal excavated, Case 3, 6, 11: Too little excavated

Figure 3: Radiographical assessment of four cases. 55 dentists participated

Table: Clinical assessment of caries removal at the first visit for stepwise excavation in four cases. 55 dentists participated.