Case 1: A 6-Year-Old Boy with High Caries Risk

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Anamnesis

Gender: male
Age: 6 years
First visit: June 2010
Last visit: September 2010
Follow-up visit: May 2011

The patient came to the pediatric dental clinic for his first ever visit to the dentist. Both he and his mother were aware of the presence of cavitated caries lesions in the primary teeth and wanted to have them treated. According to his mother the patient had been complaining of tooth pain earlier, but felt no pain at the moment. No relevant general medical information was reported by the mother.

Clinical Findings (Tooth Level)

Oral examination revealed a mixed dentition with lower permanent central incisors and one upper permanent first molar already having erupted. The mucosa was healthy, the gingiva was inflamed, but no signs of periodontitis could be observed (**Fig. 26.1**). Frank cavities could easily be detected in the upper primary molars.

Caries detection was based on visual–tactile examination combined with bitewing radiographs (**Fig. 26.2**). For extensively carious teeth, radiographs depicting the periapical area were taken to support an eventual treatment decision regarding pulp therapy or extraction (**Fig. 26.3**).

CLINICAL PEARL

Tooth surfaces must be cleaned before caries assessment; otherwise initial caries lesions will not be detected. It does not matter whether the dental biofilm is removed with a rotating instrument or toothbrush. However, if the dental professional uses the toothbrush, it is possible to combine plaque removal with oral hygiene instructions to the patient/parents and to show them how the toothbrush can be as effective as the "professional rotating instrument."

All primary molars were affected by active caries lesions at different levels of severity. Extensive cavitated caries lesions were clearly visible (ICDAS 6) in the upper primary molars (**Fig. 26.1a**). Tooth 55 was the most severely affected; only roots remained in the mouth. In the lower primary molars, approximal caries lesions were detected radiographically (**Fig. 26.2a, b**). An active noncavitated caries lesion (ICDAS 1) was detected in the occlusal surface of the upper permanent first molar. Only the anterior teeth were not affected by caries lesions. The $d_1$ft count was 8 and the D_1MFT was 1. Detailed information about

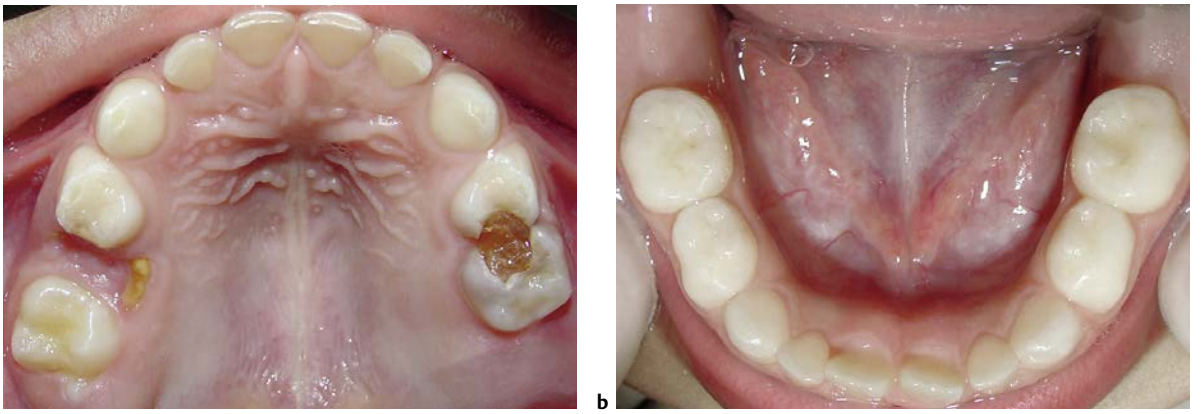

Fig. 26.1a, b Clinical aspect of the upper (**a**) and lower (**b**) jaws at the first examination.

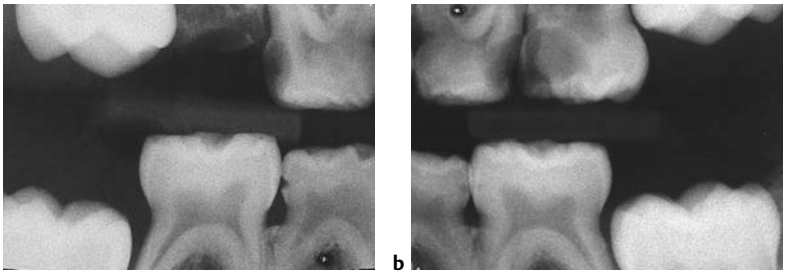

Fig. 26.2a, b Initial right (**a**) and left (**b**) bitewing radiographs. See **Fig. 26.4** for assessment.

Fig. 26.3a, b Periapical radiographs of upper right (**a**) and left (**b**) molars.

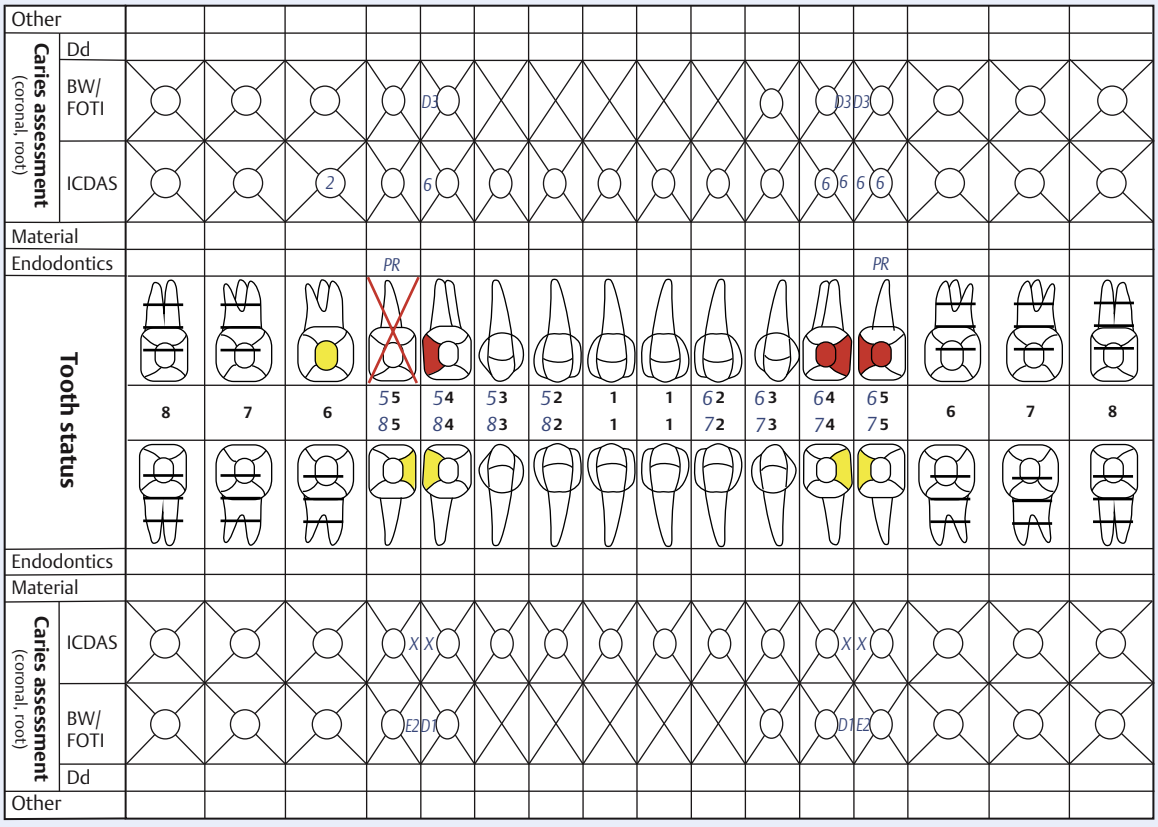

Fig. 26.4 Dental status

each tooth surface is available in the dental examination scheme (**Fig. 26.4**).

Caries Risk Assessment (Individual Level)

Caries risk assessment is based on the evaluation of a series of factors at the individual level, which may influence oral health positively or negatively (see Chapter 7).

Regarding the dietary habits, high and regular consumption of sweetened food and beverages from four to five times daily was reported by the mother. When asked about the frequency of consumption of drinking water, the mother informed us that the child almost never drinks water, but sweetened beverages like juice, tea, or soda. The family had access to fluoridated water and the child brushed his teeth with fluoridated toothpaste usually twice daily. Dental floss had never been used and tooth brushing was not assisted by an adult. Visible dental biofilm was present in 53% of the approximal sites, specifically at those with an adjacent tooth and an intact contact point. Dental plaque was assessed visually with no disclosing solution. If the dental plaque was not visible in the entrance of the approximal area, a probe was used to confirm the presence or the absence of approximal plaque. The occlusal surface of the permanent first molar was covered by thick biofilm.

CLINICAL PEARL

Although disclosing solution may be helpful to show the dental plaque to the patient, thick plaque is easily visualized without it. Thick/mature dental biofilm is what the patient has to avoid. If only thin biofilm is detected, it means that the patient is able to control plaque acceptably.

The high caries experience ($d_1ft + D_1MFT = 9$), the cariogenic dietary habits, and the presence of a considerable amount of visible biofilm were relevant risk factors in the present case. However, the patient had regular access to fluoride sources (fluoridated water and fluoride toothpaste), did not use any medications, and had normal salivary flow. As a result, he was classified as being medium risk at present (53%), but this would have been higher in previous years.

Diagnosis and Treatment Plan

Based on the minimum interventional treatment concept, the treatment plan was focused on the prevention and arrest of caries, preserving dental tissues as much as possible. After a comprehensive examination and the caries risk assessment, treatment strategies were planned at two levels: the individual level and the tooth/surface level.

Individual Level

Oral Hygiene and Fluoride

The parents were instructed to have their son's teeth brushed twice a day with regular fluoride toothpaste (1000–1500 ppm F^-) and flossed once a day. As the child had access to fluoridated water, no other home-use fluoride product was prescribed. As the patient had active caries lesions, topical application of fluoride gel was recommended on a weekly basis. The mother was asked to help the child with tooth brushing once daily to ensure proper plaque control at least once a day, emphasizing that the quality of cleaning is more important than the frequency.

CLINICAL PEARL

Instead of advising that parents should brush their child's teeth before bedtime, let parents decide the best time of the day for them to do it. Explain how important it is to disorganize the dental biofilm once a day, and that a child needs help to do it properly. The chance of a good compliance is increased when the decisions are shared with parents.

Oral hygiene instructions were focused on two main aspects: plaque control in the occlusal surface of the erupting permanent first molar, and flossing the lower primary molars. The mother was shown how to reach the permanent first molar better by positioning the toothbrush transversally to the tooth. At the first visit, the child presented only one permanent first molar, but at the end of the treatment phase one more had partially erupted. The mother was instructed to brush the permanent molars first and then brush the other teeth.

CLINICAL PEARL

Give clear oral hygiene instructions and prioritize what is most important for each case. Dental professionals usually say to the patient/parents, in a generic way, that tooth cleaning should be improved. Be specific: concentrate your explanation on the most important needs. Suggest that tooth cleaning should begin with tooth surfaces at risk of caries development or progression, that is, occlusal surfaces of permanent first molars partially erupted or tooth surfaces with initial enamel caries lesions.

The approximal caries lesions in the lower primary molars visualized on the radiographs were shown to the mother to emphasize the importance of daily flossing. It was mentioned that the extensive caries lesions in the upper teeth clearly started as approximal lesions and that flossing would help to avoid the progression of the noncavitated approximal caries lesions in the lower teeth.

CLINICAL PEARL

Show the tooth surfaces with thick biofilm to the patient/parents. Show the difference between a clean and a dirty tooth surface. Encourage the patient to feel with his or her tongue the smoothness of a clean tooth surface in comparison to the roughness of a dirty one. These are simple and practical ways to make patients able to check the quality of their own tooth cleaning at home.

Dietary Counseling The influence of high frequency of sugar consumption on the cariogenic potential of the dental biofilm was explained to the mother.

CLINICAL PEARL

Explain the association between sugar and dental biofilm with easy and clear words. Patients are usually advised to eat less sugar, because it causes caries. But this association is often not clearly explained. Encourage the patient to perceive in his or her own teeth how dental plaque will be thicker in the end of a day full of sugar, in comparison to another day when much less sugar was consumed.

Table 26.1 Diagnoses and treatments at a glance

Diagnosis	Caries	Caries non-progressiva (CNP)		Caries progressiva superficialis (CS)			Caries progressiva media (CM) et profunda (CP)		
	Restorations	Restauratio insufficienta initialis (RII)		Restauratio insufficienta partialis (RIP)			Restauratio insufficienta totalis (RIT)		
	Sound surfaces	–		Sanus majoris periculi (SMP)			–		
"Treatment"		Particular surveillance		Noninvasive or microinvasive/ repair			(Minimally) invasive		
		Tooth + Surface	Diagnosis	Tooth + Surface	Diagnosis	Therapy	Tooth + Surface	Diagnosis	Therapy
				16 o	CS	FS ✔	55	CP	EX ✔
				75 m	CS	INF ✔	54 od	CP	FC ✔
				74 d	CS	INF ✔	64	CP	EX ✔
				85 m	CS	INF ✔	65	CP	EX ✔
				26 o*	SMP	CB ✔	84 od	CM	FC ✔
				FS fissure sealing INF caries infiltration CB cross brushing			FC composite filling EX extraction		

*Diagnosed during treatment.

The patient was instructed to reduce the consumption of sweetened food and beverages, particularly during the weekdays. It was emphasized that water should always be the first choice to relieve thirstiness instead of sweetened beverages.

CLINICAL PEARL

Suggest some deals between parents and children like: "always have a glass of water before any other beverage."

Tooth Level

Diagnoses and treatment decisions are summarized in **Table 26.1**. To eliminate plaque stagnation areas, the cavity on the distal surface of tooth 54 was temporarily filled with glass-ionomer cement and extractions were planned to be done at the beginning of the treatment.

Due to Caries progressiva profunda, teeth 55, 65, and 64 were extracted (**Fig. 26.5**). Tooth 55 had only roots remaining and teeth 65 and 64 were extensively affected by caries with advanced root resorption, contraindicating pulp therapy. Due to advanced coronal destruction of tooth 55, tooth 16 had drifted mesially, causing loss of space in the arch. As it was necessary to regain space before placing a space maintainer, the patient was referred to the orthodontic clinic after the end of the treatment.

In the lower left side, noncavitated caries lesions were detected radiographically in the distal surface of tooth 74 and in the mesial surface of tooth 75, scored as D1 and E2, respectively (see **Fig. 26.2b**). These lesions were considered as being progressive, although activity could only be affirmed by the local plaque level (no gingival bleeding, other assessments not feasible). Nonetheless, owing to the generally high caries risk, both caries lesions were treated by the infiltration technique (**Fig. 26.6**).

In the lower right side the caries lesion at the distal surface of tooth 84 was cavitated (clearly detectable on the bitewing radiograph) and considered as being active (Caries progressiva media). The mesial surface of tooth 85 had a caries lesion scored radiographically as E2 (**Fig. 26.2a**). On tooth 84, caries was accessed by a vertical slot and the resulting cavity was filled with composite (**Fig. 26.7**). During invasive treatment, cavity and activity status of 85 mesial was assessed thoroughly (**Fig. 26.7b**). The lesion was diagnosed as Caries progressiva superficialis that was not supposed to be hampered in progression by noninvasive measures only and thus was treated by the infiltration technique (alternatively sealing) (**Fig. 26.7c–e**).

When approximal caries lesions extend into dentin the probability of further progression is rather high. This fact supported the decision of infiltrating the approximal caries lesions of the distal surface of tooth 74, scored radiographically as D1. The approximal lesions of both 75 and 85 mesial were scored as E2. The decision for infiltrating

Fig. 26.5a–f Tooth 55 is extensively destroyed by caries (**a**); periapical radiograph shows only roots remaining of tooth 55 (**b**); clinical aspect directly after extraction of tooth 55 (**c**); teeth 65 and 64 have extensive caries (**d**); periapical radiograph show deep caries in teeth 65 and 64 and pathological reabsorption of tooth 65 (**e**); clinical aspect directly after the extraction of teeth 65 and 64 (**f**).

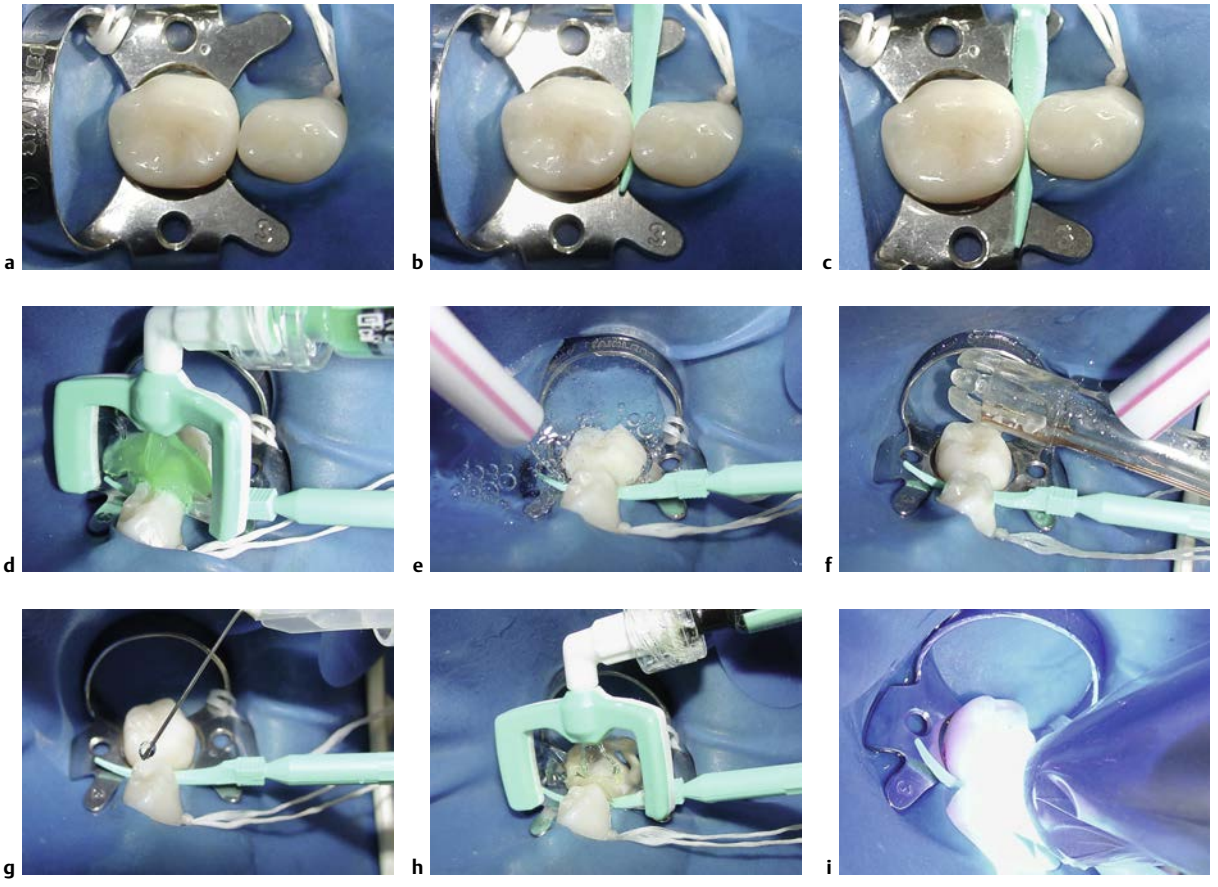

Fig. 26.6a–l Teeth 75 and 74 after rubber dam placement (**a**); the wedge for immediate tooth separation is inserted (**b**); after 30–60 seconds, enough space is obtained between the teeth (**c**); the foil attached to the acid syringe is placed and the distal surface of tooth 74 is etched with HCl for 120 seconds (**d**); washing for 30 seconds (**e**); air drying for 30 seconds (**f**); application of ethanol for 30 seconds (**g**). After air drying, a new foil attached to the infiltrant syringe is placed between the tooth surface and the wedge and the infiltrant is applied (**h**); after 3 minutes, any excess must be removed with dental floss before light curing for 60 seconds (**i**).

Fig. 26.6j–l ▷

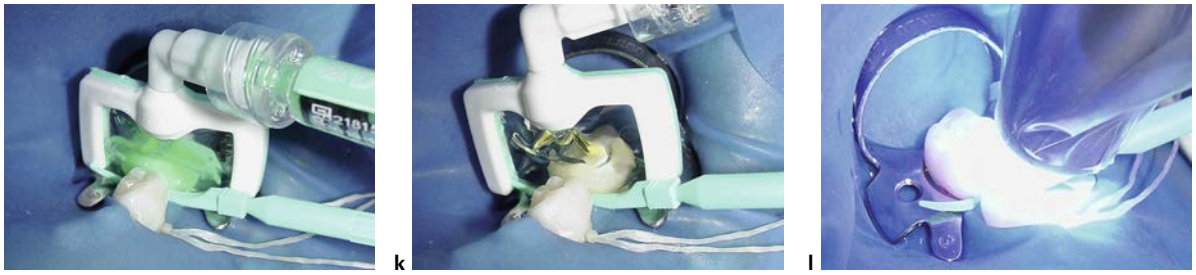

Fig. 26.6j–l The infiltrant was reapplied for 1 minute and light cured for 60 seconds before all steps were repeated for the mesial surface of tooth 75, with etching (**j**); after washing, air drying and ethanol application, the infiltrant is applied (**k**); light curing for 60 seconds, reapplication of the infiltrant for 1 minute and final light curing (**l**).

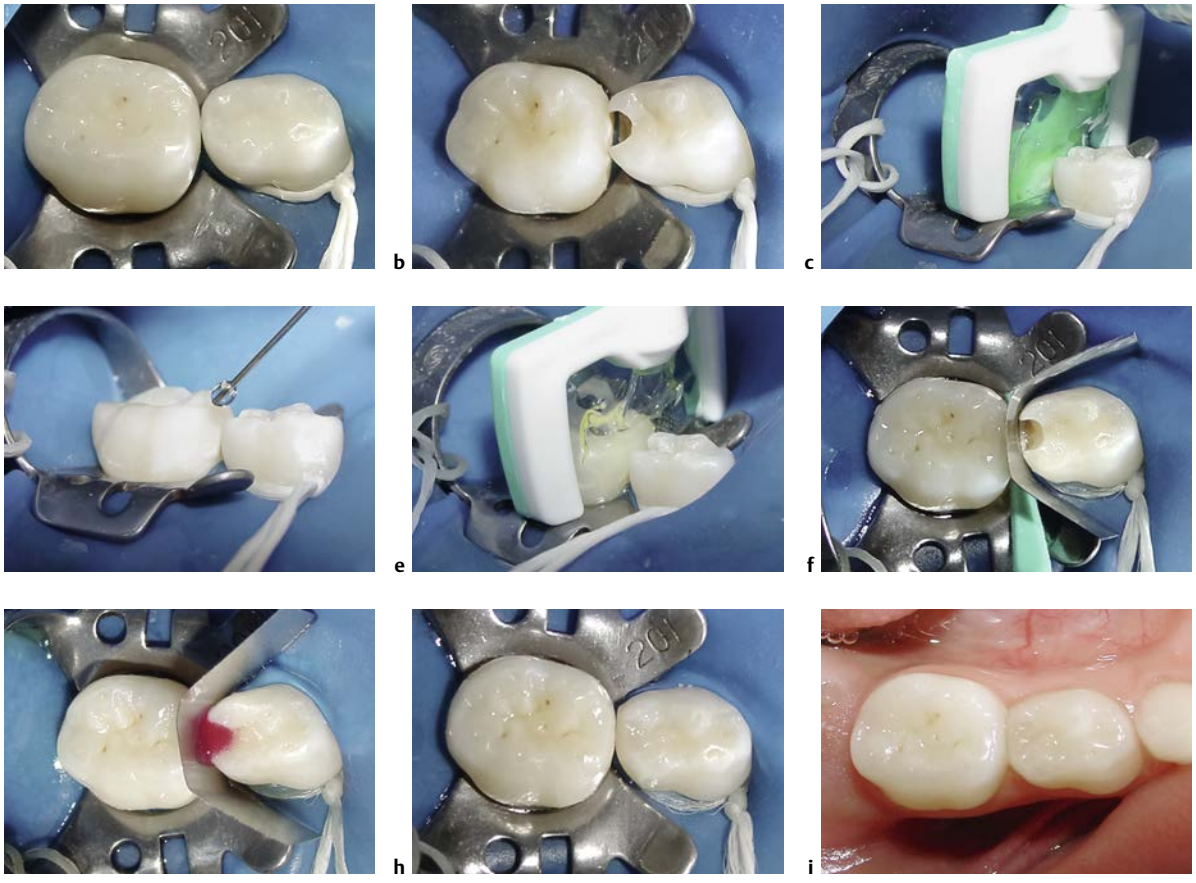

Fig. 26.7a–i Teeth 85 and 84 after rubber dam placement (**a**); after caries removal in the distal surface of tooth 84, the absence of a cavity is confirmed in the mesial surface of tooth 85 (**b**); the foil attached to the acid syringe is placed (it was not necessary to use the wedge in this case) and the mesial surface of tooth 85 is etched with HCl for 120 seconds (**c**); after washing and air drying, ethanol is applied for 30 seconds (**d**); after air drying, the infiltrant is applied for 3 minutes using a new foil (**e**); after light curing for 60 seconds, reapplication for 1 minute, and final light curing of the infiltrant, the cavity (**f**) in tooth 84 is etched with H_3PO_4 (**g**); the finished composite restoration (**h**); the clinical aspect 1 month later (**i**).

these lesions was based on the fact that the patient had advanced caries lesions in many other approximal surfaces and relevant risk factors for caries progression were recorded during caries risk assessment.

On tooth 54 the temporary glass-ionomer was removed with a bur and caries removal in dentin was completed manually (**Fig. 26.8**). In the same session a fissure sealant was applied onto the occlusal surface of tooth 16 (**Fig. 26.9**), which presented an active noncavitated caries lesion scored as ICDAS 1 (more clearly visible in the distal fissure). The decision for sealing this occlusal surface was based not only on the presence of general risk factors for caries progression, but also because the surface was persistently covered by dental biofilm. As the lower permanent first molar was not erupted, the occlusal surface of the antagonist would remain without masticatory attri-

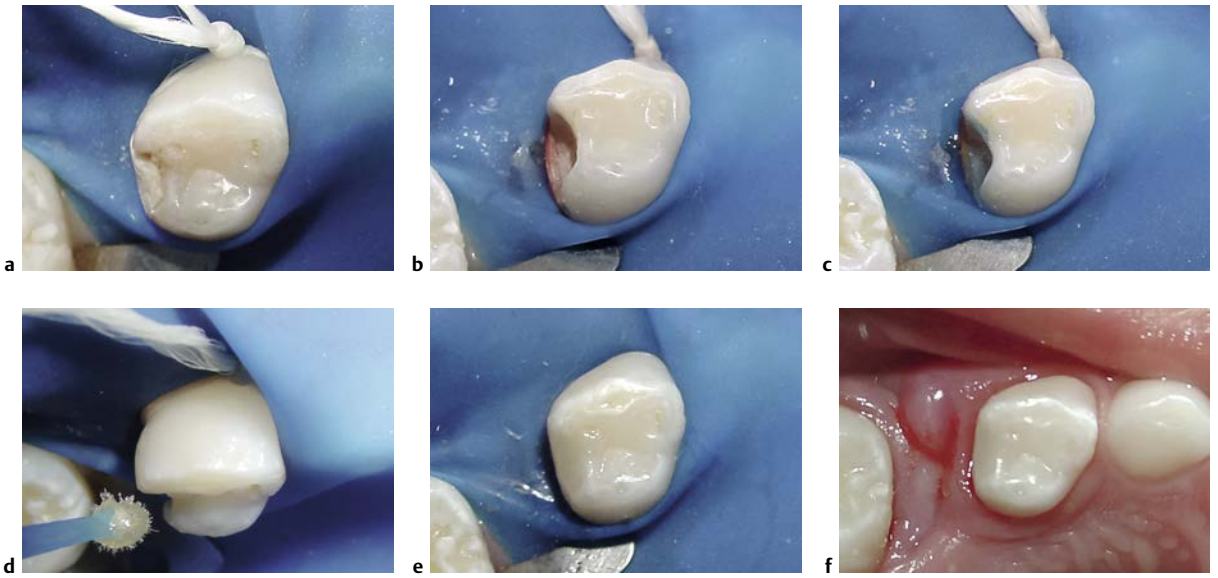

Fig. 26.8a–f Tooth 54 after rubber dam placement (**a**); the temporary filling was removed by bur and the carious dentin was removed by hand excavation (**b**); acid etching with H_3PO_4 (**c**); adhesive application (**d**); composite restoration finished (**e**); clinical aspect directly after rubber dam removal (**f**).

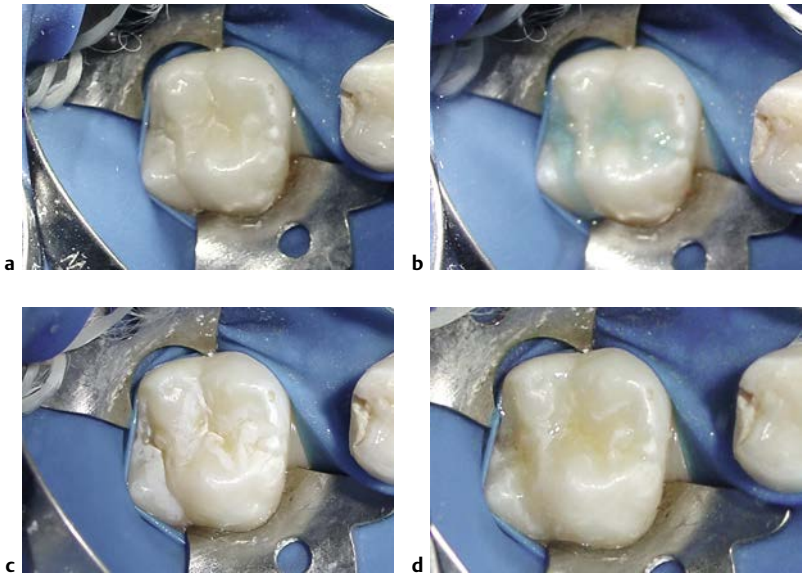

Fig. 26.9a–d Tooth 16 after rubber dam placement. The active caries lesion (ICDAS 1) is more clearly visualized in the distal fossa (**a**); acid etching with H_3PO_4 (**b**); aspect after etching (**c**); fissure sealant light cured (**d**).

tion and therefore susceptible to plaque stagnation for a considerable period of time. Due to the low compliance with brushing in the past, the fissure was referred to sealing rather than cross brushing or fluoridation only.

Clinical Aspect at the End of the Treatment (Fig. 26.10)

Follow-up

Ten months after the end of the treatment no clinical signs of new caries lesions were detected. Instructions for oral hygiene were reinforced, emphasizing the importance of cleaning the occlusal surface of the permanent first molars, with their being partially erupted. Follow-up radiographs were obtained to monitor the infiltrated approximal lesions after 10 months. No caries progression was detected (**Fig. 26.11**). Regarding the management of space loss in the upper arch, the patient continued to be under the surveillance of the orthodontic clinic. The orthodontist was waiting for the upper permanent molars to erupt more, before inserting any orthodontic appliance.