

## UK National Clinical Guidelines in Paediatric Dentistry\*

### Introduction

The seventh National Clinical Guideline in Paediatric Dentistry is published here. The process of guideline production began in 1994, resulting in first publication in 1997. Each guideline has a nominated main author but the content is not a personal view; it represents rather a consensus opinion of best clinical practice. Each guideline has been circulated to all consultants in Paediatric Dentistry in the UK, to Council of BSPD, and to people of related specialities recognized to have expertise in the subject. The final version of the guideline is produced from a combination of this input and a thorough review of published literature. The intention is to encourage improvement in clinical practice and to stimulate research and clinical audit in areas where scientific evidence is inadequate. Evidence underlying recommendations is scored according to the SIGN classification and guidelines should be read in this context. For those wishing for further detail, the process of guideline production in the UK is described in *International Journal of Paediatric Dentistry* 1997; **7**: 267–268.

## Management of the stained fissure in the first permanent molar

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### Introduction

The occlusal surface of the first permanent molar is the tooth surface most vulnerable to dental decay [1]. For many years there has been a marked decline in the levels of dental decay found in children's teeth. This trend has continued throughout the period 1973–1993 and has been noted in many countries. However, as the overall caries level drops the proportion of the caries that is accounted for by occlusal pit and fissure caries rises [1–5]. This appears to be true regardless of the reason for the reduction.

The following guideline is intended to assist with the management of the first permanent molar where the fissure is stained rendering the diagnosis for that surface less clear.

A stained fissure is taken to mean a fissure that is discoloured, brown or black. Also included are fissures where there is an area of white or opaque

enamel, i.e. its normal translucency is lost but it has no evidence of surface breakdown (cavitation).

Where diagnosis is definite, treatment decisions are straightforward, i.e.:

1. Where a tooth is newly erupted and the fissure system is untainted but considered at risk from caries, fissure sealing is recommended (BSPD policy document on fissure sealants) [6].
2. Where there is occlusal cavitation it is synonymous with an extensive lesion therefore a restorative approach is recommended [7]. However it should be remembered that precavitated lesions in the pit and fissures are about twice as frequent as cavitated lesions [8].

### Diagnosis of the stained fissure

Several methods of diagnosis have been proposed both alone and in combination:

- visual (dry tooth),
- probe/explorer [9,10],
- bitewing radiographs [11–13],

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- electronic [14–17],
- fibre optic transillumination (FOTI) [18],
- CO<sub>2</sub> laser [19],
- air abrasion [20].

When two or three methods are used in combination, there is a greater accuracy and higher detection of caries [15,18,21,22]. A minimum should comprise the use of visual examination and bitewing radiography. It is essential that the tooth is dried thoroughly to permit study of the colour and translucency of the enamel.

See 'Additional considerations' for prediction of progress of caries.

### Treatment

Where the diagnostic methods, visual inspection and bitewing radiographs have established that a stained fissure is a carious lesion into dentine, restorative treatment is indicated. This can take the form of a preventive resin restoration (PRR)/sealant restoration (SR) [23–25], or if the lesion proves more extensive, then composite or amalgam occlusal restoration.

### PRR/SR

For this, local analgesia and the use of a rubber dam are desirable. Suspect areas of the fissure system are explored with a high speed small bur. In this procedure only enough enamel to gain access and the incipient caries is removed. (If the radiograph shows dentinal caries access must progress into dentine.) The access must be wide enough to ensure that the caries can be removed from the peripheral tissue. It is emphasized that undermined enamel is left *in situ*, since it has been shown that the bis GMA resin restoration virtually restores the original strength of the tooth. Line the cavity with a calcium hydroxide preparation, etch [26,27] (recommended times vary), wash [28,29], dry and fill.

If the resultant cavity is large, either a suitable dentine bonding agent and posterior composite, or a combination of an inner core of glass polyalkenoate and an outer shell of composite may be utilized. If composite alone is to be used then an incremental technique must be employed to achieve satisfactory polymerization and resultant strength. If the cavity is small and not subject to occlusal load either the latter treatment method or glass polyalkenoate could be used [30]. It is important to seal all the

remaining fissure system, and finally to check the occlusion.

Regular review of the surface sealant integrity is important (at routine 4 or 6 monthly intervals). Repeat etching of the occlusal surface will facilitate identification of sealant presence, if visual examination is inconclusive [30–33].

Where diagnostic methods are inconclusive but indicate no definite signs of dentinal caries, explore the fissure with a small round or a very fine short tapered bur [diamond or tungsten carbide]. Either a slow running handpiece or airtor have been advocated.

If the lesion obviously progresses into dentine, proceed as above. If the lesion is confined to enamel, etch, wash and dry as before and place posterior composite if appropriate (i.e. consider final size of the exploratory cavity). Seal all the remaining fissure system and monitor. Where the discolouration is deemed to be purely staining and does not shield caries, fissure seal and monitor regularly.

Where co-operation is inadequate to proceed as above, the following approach is suggested:

- fissure seal and inform the parent: (a) that caries is present [33], and (b) that the tooth will need further treatment in the future;
- monitor at frequent intervals (it is more difficult to assess the severity of the lesion once it is sealed [34,35];
- treat with PRR as and when co-operation improves.

Where co-operation is minimal and it is impossible to obtain adequate moisture control to place conventional, but technique sensitive composite fissure sealant:

- place glass polyalkenoate over the fissure system [36–42];
- apply regular fluoride varnish [43];
- attempt to progress the treatment as circumstances change. It is imperative that in such treatment scheduling the parents are kept fully informed and that appropriate dietary, oral hygiene and fluoride advice is reinforced.

All the above treatments utilize the preventive effect of sealing the fissure to prevent the ingress of bacteria and debris that facilitate caries.

### Additional considerations

The difficulty in diagnosing fissure caries means that it is hard to quantify the extent of a lesion. Hence it

is also arduous to accurately monitor the progress of any such lesion, just as it is problematic to predict the likely rate of progress and conversely the chances of remineralization of any lesion. Researchers in one review [44] investigated the status of questionable fissures in permanent molars from other studies and found that after varying periods a large number of the studied teeth had become carious, i.e. progression of the lesion was more likely than not.

The studies looking at diagnosis of occlusal caries have shown that it is more likely that occlusal caries will go undetected compared to non-carious surfaces filled. Therefore before considering treatment recommendations, factors must be considered that could influence the progress of caries and therefore help to predict the likely outcome of treatment options.

Although in the past, sealing over known caries has been advocated as acceptable [45–47] it is not recommended as a definitive treatment because studies have revealed active cariogenic organisms and soft carious dentine even when marginal adaptation was assessed as good when viewed with scanning electron microscope (S.E.M). Coupled with the difficulty of attempting to assess the integrity of sealants clinically, the extent of the problem becomes apparent. Nearly 50% of clinically apparently well sealed teeth have marginal defects on S.E.M. Added to this, the complexity of the problem is exacerbated by poor patient attendance [48].

#### Age

The younger the age of the patient exhibiting the stained fissure the greater the risk of caries progressing [49].

#### Co-operation

All restorative treatment options need reasonable patient co-operation. Fissure sealing requires less co-operation. Procedures used only as a temporary measure to delay caries progression such as glass ionomer cement (GIC) over dubious areas or preventive measures such as fluoride varnish applications require the least co-operation from the child.

#### Predictive factors

A number of predictive factors must be taken into account when planning treatment.

*Findings on the other first permanent molars.* If the other first permanent molars exhibit cavitated lesions the stained fissure must be treated.

*History of previous caries.* It has been said that high levels of caries in the primary dentition is predictive of caries susceptibility in the permanent dentition. This is used as an indication for fissure sealing and should also be used to indicate need for active treatment of a stained fissure in a first permanent molar tooth [50].

*Dietary considerations.* The relationship between frequent sucrose intake and dental caries is well established [51–54]. Thus in patients with a diet known to have more than three sugary intakes per day, it must be considered that caries is likely to progress and stained fissures should be treated. To investigate a diet, personal questioning and a diet history sheet will help to quantify the extent of refined carbohydrate ingestion.

*Oral hygiene.* Normal brushing always leaves some plaque in fissures, thus oral hygiene status does not have any definitive relationship with caries levels. Apart from the obvious benefit, regular brushing entails in facilitating fluoride exposure, oral hygiene status cannot be used to predict the likely progress of a stained fissure lesion.

It is imperative that in such treatment scheduling, the parents are kept fully informed and that appropriate dietary, oral hygiene and fluoride advice is reinforced.

In conclusion it follows that these techniques should all be mutually supportive such that the management of the stained fissure would incorporate: a diagnosis made as accurately as possible with the methods available, investigation and treatment of the suspect area, a dietary record and advice, oral hygiene instruction, appropriate fluoride advice, and sealing of all potentially vulnerable sites.

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