

DENTAL ABFRACTION

Health Mantra

Your Practice Builder, April 2001

www.healthmantra.com/ypb/apr01/abfraction.htm

Dealing with hypersensitivity of teeth with non-carious cervical lesions is a difficult task. These were thought to be erosion- abrasion lesions. It was Grippo, who originated the term 'abfraction', in 1991 to describe the pathologic loss of tooth enamel and dentin caused by biomechanical loading of forces.

Up until now, research into the causes of abfractions seems to be divided into two camps- those who argue for tooth brushes and other artificial forces as the cause and those researchers who point to internal physiological sources as the culprit. The latter argument, though not providing a complete explanation, does offer a significant clue to the real cause of this troubling phenomenon.

The earliest review in English, of the erosion –abrasion issue as it relates to tooth brushing and dentifrices seem to be the original works of WD Miller in the late 1880s and early 1900s. He believed that erosion was caused by weak acids or gritty tooth powders, or by both, assisted by the toothbrush.

In 1950, SC Miller suggested that traumatic and lateral forces by the tongue, lips and cheeks were contributors to gingival recession. Glickman, in 1965 proposed that susceptibility to recession was influenced by many factors such as the position of teeth in the arch, the angle of the root in the bone, and the mesio-distal curvature of the tooth surfaces.

Yettram et al found that abfraction could occur even gingival to the margin of crowns and that the amount of load placed on the teeth was the key factor. Finally, in 1984, Lee and Eakle described lateral forces as the cause of the tooth structure breakdown. Grippo had stated that the forces could be static, such as those produced by swallowing and clenching, or cyclic, as in those generated during chewing action.

The abfraction lesions are caused by flexure and ultimate material fatigue of susceptible teeth at locations away from the point of loading. The breakdown is dependent on the magnitude, duration, frequency and location of the forces.

Clinical Implications

A dentist who restores an abfraction lesion to relieve hypersensitivity of the patient's tooth should be aware that to prevent this restoration from falling out, one needs to treat the cause of the abfraction before restoring it.

If a tooth has an abfraction, the occlusal loading on the tooth can be tested in centric occlusion and in excursive movements with occlusal marking paper. There is a good chance that the tooth with abfraction will have a heavy marking on one of the inclines of a cusp. This damaging lateral force produces stress lines in the tooth and results in tooth break down.

If the patient does not have heavy markings on the inclines, then he may have abnormal activity of the tongue. A 'normal swallow' is a swallow that is initiated with the tip of the tongue starting in the area of the maxillary anterior papilla, that

continues with a peristaltic like action, pressing up against the roof of the maxilla, forcing the bolus posteriorly and finally down the throat. The tip of the tongue remains in the area of the anterior papilla during the entire swallow. Any other swallow is considered to be the result of abnormal tongue activity. The tongue should not press with any force into, against or between any teeth during the swallow.

Examine the area of abfraction with the patient's teeth together and lips slightly parted. Check whether the tongue is pushing into the tooth, or if salivary bubbles are visible coming between the interproximal spaces. Tongue thrusting can be the result of large tongues or obstructed airways.

When lateral tongue forces traumatize the teeth or if the key requirements of occlusion are not met, a series of deleterious events can occur

- Abfractions
- Sensitive teeth
- Loosening of teeth
- Excessive wear of teeth
- Change in alignment of teeth
- Bone breakdown and bone loss
- Broken or destroyed restorations
- Non-bacterial, non- plaque related gingival recession
- Opening of contacts.

If during lateral excursions there is cuspid rise, the loading forces of the excursive movement will be directed into the cuspid. Abfractions are frequently found in cases where malaligned cuspids cause initial lateral guidance forces to be exerted on the lingual incline of the buccal cusp of the maxillary bicuspid. Abfractions are also found in patients with slight anterior open bites. Here also, the guidance is coming from the bicuspid, rather than the cuspid.

The common clinical occurrence of class V restoration failure is often blamed on inadequate moisture control. Study by Rees J S and PH Jacobson shows that the presence of a class I restoration, especially an amalgam restoration on the same tooth can influence the prognosis of a class V restoration, They found that the presence of an occlusal restoration increased cuspal movements, which in turn increased the shear forces around the buccal class V cavity.

Lastly, it is important to remember that your cavity preparation and restoration of a class I cavity may cause an abfraction. It is well established that cavity preparation weakens a tooth, resulting in more cuspal movement under occlusal load. In a study by Rees J, under an eccentric 100 N occlusal load, a premolar with an occlusal amalgam restoration showed peak tensile and shear stresses in the buccal cervical region that were in excess of the known failure stress for enamel. Increases in the cavity depth of the occlusal amalgam restorations were found to increase cervical stress more than increases in cavity width.

Here is the last word, the weakening effect of an occlusal cavity preparation may contribute to the development of non carious cervical tooth loss.

Ref:

1. Rees JS & PH Jacobsen J Dent 26(4): 361-7,1998
2. Rees JS Eur J Oral Sci 106(6): 1028-32,1998