

Toothwear: Causes and Management

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ABSTRACT

Toothwear was highlighted using the following outline: Introduction, Risk factors, Clinical Presentations, Diagnosis, Treatment plan, Management of tooth wear, Prevention, Monitoring, Restorative intervention, Follow Up, Conclusion, References

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INTRODUCTION

Toothwear (TW) is a multifactorial disease defined as loss of dental hard tissue in the absence of caries or trauma. It could be physiological or pathological. Physiological TW is the loss of dental hard tissue that is associated with ageing with no associated pathology. TW becomes pathological when the rate of wear is in excess of what is expected for a particular age or when the remaining tooth structure or pulpal health is compromised. Three (3) processes that contribute to aetiology of TW are erosion, abrasion and attrition

Erosion: Chemical dissolution of hard dental tissue without bacterial involvement. Acids involved in this process are of two major categories;

i. Intrinsic acid= (Gastric acid)- brought back up the alimentary tract into oral cavity via regurgitation, vomiting or involuntary gastro-oesophageal reflux disease.

ii. Extrinsic acid: Dietary acids, acidic medicine, occupational exposure to acidic fumes

Erosion is a dominant factor in TW by acid softening the tooth surface and rendering it susceptible to physical damage from abrasion or attrition

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Abrasion: is the wearing of dental hard tissue by some things other than teeth.

It can be due to foreign objects or substances repeatedly contacting teeth. Frequently associated with traumatic tooth brushing or holding objects between the teeth.

Attrition: Is the physical wear caused by tooth-to-tooth contact. Tooth clenching and grinding are linked to attrition. These are habits which the patients may not be aware of.

Previously abfraction was implicated in the aetiology of TW but recent consensus workshop has discouraged the use of this terminology because there is insufficient evidence to justify abfraction as a separate process.

Abfraction is theorized to be caused by occlusal loading resulting in tooth flexure and mechanical micro-fracture resulting to loss of dental tissue at the CEJ

RISK FACTORS

1. Saliva: Main biological protective factor for prevention of erosion. It dilutes, neutralizes and clears acid. It also provides a reservoir of calcium, phosphate and fluoride ions for promoting remineralization. Compromised salivary flow increases the risk of TW. Such negative influencing factors on salivary flow rate are; ageing, radio or chemotherapy, systemic disease and drug induced xerostomia

Other influencing factors that increase the risk of TW include;

2. Frequent consumption of dietary acids: soft drinks, fresh fruits, fruit juices, pickles, sport drinks etc
3. Gastro-oesophageal reflux disease
4. Alcoholism
5. Anorexia nervosa/Bulimia nervosa
6. Antidepressants/Sleeping medications
7. Occupational: Competitive swimmer, wine taster
8. Bruxism

CLINICAL PRESENTATION

A combination of signs and symptoms are used to diagnose TW

SYMPTOMS

Tooth sensitivity: If severe, it signifies that the aetiology of the TW is in an active phase, Sharp edges to teeth, soft tissue trauma, Pulpitis: Pain, Aesthetic concern manifesting as: Shortened teeth, altered tooth shape or reduced lower face height. Major function affected is mastication: patient presents with reduced masticatory function or altered diet selection

SIGNS

Attrition -Manifests as loss of tooth structure on occlusal and incisal surfaces leaving flattened surfaces with sharp edges. Generally, attrition creates corresponding wear facets on opposing teeth surfaces. There may be fracture lines on teeth / restorations. There may be associated hypertrophy of masseter muscle and loss of lower face height.

Abrasion-Abrasion appears as notching on the cervical areas of the teeth.

It may also occur as cupping on the occlusal or incisal surfaces especially with a prior dentine exposure. Edges of enamel appear rough and sharp.

There may be non -cariou cervical lesion which tends to result from a combination of erosive and abrasive processes.

Erosion- This appears as loss of tooth structure on labial or palatal surface

Usually if source of acid is intrinsic, the lesion is palatal. Erosion is characterised by shiny glossy appearance with rounded edges while abrasion is sharp.

Existing restorations such as amalgam project from surface of tooth.

Stained worn surfaces indicate a passive or historic TW while an active or ongoing TW is glassy and unstained.

DIAGNOSIS

Clinical diagnosis of TW is often challenging due to its aetiology from a range of processes which tend to act synergistically rather than in isolation.

The morphology of defects varies based on the predominant aetiological factor.

Therefore, as a result of the multifactorial nature of TW, a thorough and detailed dietary history, oral hygiene, medical and dental history as well as other lifestyle habits are necessary to help inform the diagnosis

MANAGEMENT OF TOOTHWEAR

Management of TW involves a broader approach than the active treatment of the problem. It involves prevention, monitoring, passive intervention and active treatment while treatment implies active intervention.

A. PREVENTION

It is the first line of management of TW.

1. This includes counselling and education of the patient to assist in identifying and reducing aetiological factors.
2. Diet diary and analysis with individual focused advice.

Highlight dietary acids: recommend decrease frequency of consumption and keep to mealtime. Explore intrinsic acid sources: vomiting, reflux and eating disorders: refer patient to general physicians if required.

3. Recommend fluoridation measures to increase resistance of tooth surface to erosion: use fluoride mouth rinse during the day, Stannous fluoride toothpaste emphasizing "spit don't rinse".

4. Correct traumatic tooth brushing, dissuade brushing immediately after acidic drinks hence

delay for 20mins after, recommend brushing before breakfast.

5. Preventative agents can be applied in the surgery or at home. Home care products are advised if frequent application is required: Stannous fluoride is available in over-the-counter toothpaste. This has been proven clinically to reduce erosive TW. Professionally applied Fluoride varnishes also to be applied regularly: A less cost effective solution

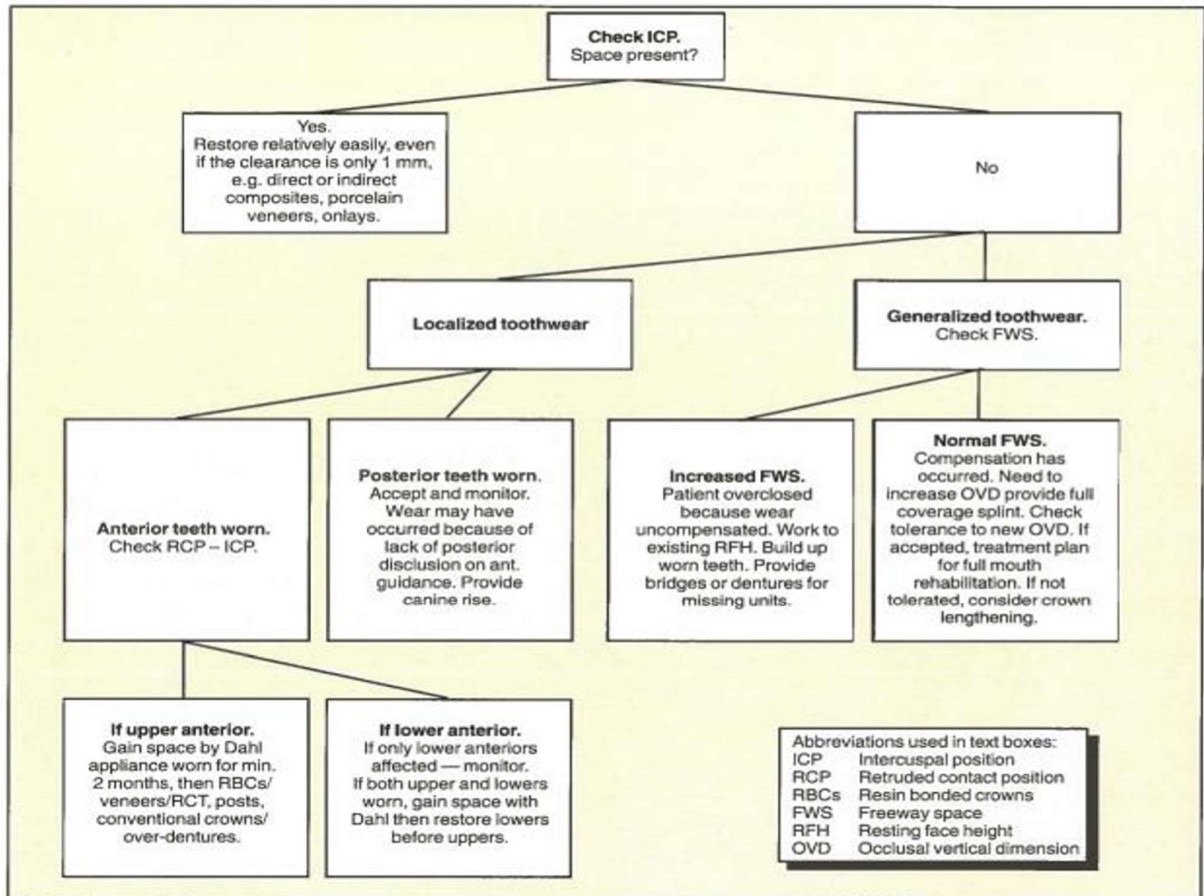


Figure 5: Flow chart of treatment planning for Toothwear (Milosevic, 1998)

MONITORING

Regular monitoring done with; Study models/casts: For detection of TW progression. ii. Intra-Oral photographs: For detection of TW progression iii. Silicone impression iv. iv. Radiographs v. Tooth wear indices: To diagnose,

grade and monitor TW e.g vi. -Tooth wear Index by Smith & Knight 1984 modified in 2008 -BEWE (Basic Erosive Wear Examination). It is currently the gold standard TW index. It has both grading and management section.

TABLE 1: BEWE CRITERIA GRADING EROSIVE WEAR

score	Clinical appearance
0	No erosive tooth wear
1	Initial loss of surface texture
2	Distinct defect, hard tissue loss <50% of surface area
3	Hard tissue loss > 50% of surface area

Table 2: BEWE risk levels to guide clinical management

Risk level	Cumulative score of all sextants	Management
None	Less than or equal to 2	Routine maintenance and observation. Repeat at 3-year interval
Low	Between 3 and 8	OH and dietary assessment and advice, routine maintenance and observation. Repeat at 2year interval
Medium	Between 9 and 13	OH and dietary assessment and advice. Identify the main aetiological factor(s) for tissue loss and develop strategies to eliminate respective impacts.
		Consider fluoridation measures or other strategies to increase the resistance of tooth surfaces Ideally, avoid the placement of restoration and monitor erosive wear with study casts, photographs or silicone impression. Repeat at 6- 12month intervals.
high	14 and over	OH and dietary assessment and advice. Identify the main aetiological factor(s) for tissue loss and develop strategies to eliminate respective impacts. Consider fluoridation measures or other strategies to increase the resistance to tooth surfaces Ideally, avoid restorations and monitor tooth wear with study casts, photographs or silicone impressions Especially in cases severe progression. Consider special care that may involve restoration Repeat at 6-12 month interval.

C. RESTORATIVE INTERVENTION

If restorations are required for aesthetics, function or to manage symptoms of pain it is of utmost importance to stabilize the causative factors prior rehabilitation to ensure longevity of the restoration. Generally bonded restorations are treatment of choice to minimize the need of extensive preparation of the teeth which may result to further dental tissue loss.

1. ADHESIVE MATERIALS

The use of these materials brought about a paradigm shift in the operative management of TW. Therefore, composite resin is the material of choice for restoration of worn teeth with minimal tooth preparation.

Adhesive restorations are retrievable and repairable at low biological costs.

2. DAHL CONCEPT

Major challenge of restoring tooth tissue loss in relation to anterior teeth is lack of space vertically and antero-posteriorly in order to restore the lost tooth structure. This was formerly managed by reorganizing the occlusion through an extensive fixed prosthodontics.

The introduction of “Dahl’s concept” brought about a huge success in the management of TW.

This involves selective provision of restorations in supra-occlusion with the remaining teeth out of occlusion. Over a period of time, the teeth which were out of occlusion will erupt into occlusion thus creating space for the restoration of anterior teeth. This technique has evolved from the placement of a removable orthodontic appliance to create the space vertically for direct placement of composite.

3. FIXED PROSTHODONTICS

The use of Dahl's appliance created more space for provision of fixed restorations.

4. REMOVABLE PROSTHODONTICS

These can be used to replace missing teeth, lost tooth tissue and also to restore the vertical dimension. Can be accomplished with overdentures and partial dentures e.g a chrome onlay type of prosthesis can be used to provide and maintain vertical dimension.

Treatment of Primary Dentition:

Asymptomatic condition- No restoration

If sensitive- Restore small areas of wear with composite resin

Restore larger areas of wear with composite crown and preformed metal crowns posteriorly

Severe wear cases- Offending tooth should be extracted

Treatment of Mixed Dentition

Permanent teeth-Treat Conservatively by monitoring or addition of composite resins to eroded and worn surfaces.

Cupped or groved surfaces-Restore to enamel rim without increasing the OVD (Occlusal Vertical Dimension)

GIC or polyalkenoates are susceptible to acid dissolution so avoid use

Treatment of Permanent Dentition

Depends on availability of space in ICP (intercuspal position) i.e interocclusal space.

1. Palatal wear of upper anteriors with non interocclusal space. Very difficult case—Requires Dahl's appliance

Worn or eroded labial, buccal, and palatal surfaces can be restored with composite, veneers or dentine bonded crowns

Cupped occlusal sites are amenable to composite restorations

Clinical studies have supported restoring anterior teeth at increased OV without an interim stage of Dahl's appliance as the restoration themselves have Dahl's effect

2. Generalised Erosion- May result in mandibular overclosure (Collapsed face).

In many cases there is compensatory over eruption (supraeruption) which maintains the existing OVD FWS (Freeway Space) should be evaluated to determine the need or otherwise of encroaching upon it in order to restore it

3. Normal freeway space (FWS)

Management of this is difficult, hence use interim acrylic appliance (Splint) at the desired OVD.

Restoration done by conventional crowns or appliances of adhesive technology e.g Composite resin/ dentine bonded crowns

Embarking on full mouth restoration should be done with caution. Adhesive restorations are reversible with minimal tooth preparation whereas application of conventional crown work in multiple tooth preparation requires great planning and execution

FOLLOW UP

This is very important. Follow up/ review more frequent once TW becomes more severe. Possibility of restoration becomes more necessary at each follow up. Once condition stabilizes patient would be reviewed every 6 months.

CONCLUSION

Tooth wear increases with age. It is a reflection of lifetime's dental experiences. It could be physiological or pathological. Management of TW involves identifying the aetiological factor(s) establishing preventive measures and monitoring for progression. If restorative intervention is required it should involve minimal preparation of teeth and use of bonding agents. It requires long term maintenance.

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Conflicts of interest

None declared

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