Cervical tooth loss defects
This evidence summary aims to locate and summarise evidence on when non-carious cervical lesions should be monitored or restored. It does not include detailed descriptions of the studies cited nor does it include information that was not presented in the literature.

The Curious about website encourages dental professionals to raise issues where a review of the available evidence would provide a useful resource for other dental professionals. Where there is a lack of evidence, the topic is considered for research and an award is made available.

These activities are sponsored by the Shirley Glasstone Hughes Fund, a restricted fund within the BDA Trust Fund.
Key findings

• There is a dearth of evidence relating to factors that influence whether non-carious cervical lesions (NCCLs) should be restored or monitored.
• Age has no effect on the clinical performance of bond adhesives in NCCLs.

Review question

This evidence summary was prepared in response to the following question: When to watch and when to fill non-carious cervical defects? A number of sub questions are considered:

• Does lesion depth influence this decision
• Does the cause of the lesion (erosion, abfraction or abrasion) influence this decision
• Should the age of the patient be factored in to this decision
• Is there a better filling type or technique for the different lesions - whether the lesion be wedge- or saucer-shaped.

Aim

To identify factors that affect the decision to restore a NCCL.

The case for action

Definition and aetiology

Non-carious cervical lesions are defined as the pathological loss of tooth substance at the cemento-enamel junction (CEJ) by a disease process other than dental caries. The condition appears to be unique to modern man with no NCCLs found in the Copper or Middle ages. The lesions are common and have a multifactorial aetiology involving erosion, abrasion, abfraction and their possible interaction.

Prevalence, affected teeth and clinical appearance

The condition is becoming more significant as people live, and retain their teeth, for longer and become more aware of the importance of oral health. As both caries and periodontal disease incidence have declined, tooth wear and NCCLs have come to the forefront. Prevalence varies greatly, for example from five to 85 per cent, the range being partly explained by the increase in NCCLs in older adults and the varied populations examined. Further possible contributors to both this wide documented variation in prevalence and NCCL occurrence include dietary and oral hygiene habits, bruxism/parafuction, patient location (urban v rural) and income.

The CEJ is a vulnerable region of the tooth and this may contribute to the development of NCCLs, especially in older adults. This group has a greater prevalence of gingival recession, root surface and cementum exposure and brittle enamel and dentine. Non-carious cervical lesions progress slowly and can vary from shallow grooves to dished-out lesions and wedge-shaped defects with different characteristics. For example plaque/calculus retention is associated with wedge or saucer shaped. Prevalence and severity increases with age and with better-than-average oral hygiene. There is no consensus on the distribution of NCCLs.

The effect of NCCLs varies; some patients show no symptoms whereas others experience sensitivity. Lesions can extend to the pulp chamber and teeth affected by NCCLs can have more gingival recession, lower attachment level and higher incidences of bleeding on probing. There is no accepted scientific classification for NCCLs but suggested methods for classification consider lesion depth, angle and width.

Treatment options

Treatment options for NCCLs include restoration, occlusal adjustment, oral hygiene instruction or no treatment at all. For NCCLs associated with gingival recession, periodontal surgery is an option. Primary indications for treating the condition include sensitivity, aesthetics, protection against further loss of tooth structure and the affected tooth being an abutment for a removable partial denture. Appropriate treatment is important; without it tooth structure may continue to be lost, the tooth may become sensitive and/or weak or be lost, or endodontic therapy may be required. Restoring NCCLs could reduce stress on the tooth and possibly prevent further load-induced deterioration of the tooth. But restoration should not always be the first treatment choice with current knowledge allowing non-restorative, conservative management, as an alternative. Early diagnosis may stop progression if etiological factors are controlled and the patient is monitored and complies with advice. A slower progression rate in young people, a high capacity of self-defence of sclerotic dentin and the lack of evidence for tooth weakening in the absence of a restoration could support a “Wait and see” philosophy.
Removal of cervical tooth loss defects

Restoration

Longevity and clinical performance of a restoration depend on the patient, the material used, the clinical acumen of the practitioner and the lesion itself. Restoring NCCLs is often considered a challenge as no retention form is present and the cervical margin is frequently located in the cementum or dentin, increasing susceptibility to microleakage. Access and moisture control can also be problems. Generally NCCLs are restored with tooth-coloured materials (resin composites, glass ionomer and compomer, for example). Composite are used most often due to their aesthetic and physical properties. Glass ionomer cement has a significantly lower risk of loss compared to three- and two-step etch-and-rinse adhesive systems; three-step systems have better retention than two-step.

The evidence

The evidence suggests that, when deciding on how a NCCL should be restored, age is not a factor. However, no evidence was found on the possible effects of lesion depth, surface area, cause, shape, restorative technique, or material. Consequently, when making treatment decisions, these factors cannot be supported or rejected with the data currently available.

Age

One randomised controlled trial (RCT) was located for this sub-question and demonstrated that age has no effect on the clinical performance of bond adhesives in NCCLs over a 24 month period. The investigation considered XP Bond with a light-cured microhybrid resin-based composite (Esthet X) placed incrementally.

Discussion

There is a dearth of literature covering aspects that influence the decision to restore a NCCL. Age has been shown to have no effect on the clinical performance of bond adhesives but no other parameter of interest was found to have been examined. This illustrates a need for better reporting, and possibly standardisation, of RCTs investigating NCCLs; one suggested explanation for this paucity of data was that NCCLs are seldom associated with extensive damage (pulp exposure and abscess, for example) that required treatment.

Clinicians recommend watching and waiting, or early intervention, or avoiding a restoration. A 2014 survey on how general dentists and prosthodontic specialists determined NCCL management strategies illustrated that, while clinicians did not agree on when to restore, monitor or seal NCCLs with certain characteristics, there was a correlation between increases in lesion depth and sensitivity and a willingness to restore. Age would affect the decision to restore in the majority of clinicians as would sensitivity and aesthetic concerns.

Methods

Search strategy

Controlled vocabulary terms and free text were used for searching with the search string consisting of two sections: terms and text covering NCCLs and terms and text covering publication/study type. Terms and text covering NCCLs included:

- ((non-carious or Noncarious or non carious) and (cervical adj lesion$))
- Non-carious Loss of Cervical Tooth Tissues
- Non-carious cervical tooth surface loss
- exp Tooth Cervix
- class adj (5 or V or five)

No language limits were used but search terms were only in English with results limited to the last 10 years (2006 - 2016). Grey literature was searched and a snowballing strategy was employed once publications relating to the questions were located.

Papers were included if they met the following criteria:

- Randomised controlled trials (RCTs)
- Reported outcomes were:
  - Retention rate
  - post-operative sensitivity
  - secondary caries
  - marginal discoloration
  - marginal integrity
  - colour match
  - surface texture
  - anatomical form
  - fracture
Papers were excluded if:

- Patients were medically compromised
- A combination of cervical carious and non-carious lesions were treated
- A combination of cervical non-carious lesions and other classes of cavities were treated
- The study follow-up was less than 18 months
- Studies reported extremely low recall rates (<75 per cent after 18 months, <60 per cent after 3 years and <50 per cent after 5 years or more)
- Studies were animal or in vitro studies or had no fixed outcome.

Databases searched were:

- Medline (OVID)
- Cochrane
- EMBASE
- Cochrane CENTRAL
- DOAJ
- BBO
- IndMed
- German National Library of Medicine (DBIS) (LIVIVO)
- OpenSIGLE
- Opengrey
- WHO ICTRP
- The UK Clinical Trials Gateway

Results

Over 550 publications were located through the electronic searches and, following an initial sift based on title and abstract, 85 articles were obtained in full text. One additional publication in Chinese was obtained but could not be translated\(^\text{19}\) Only one of the full text articles was judged to be of interest.\(^\text{21}\) The main reasons for rejection at this stage were that subject age and/or lesion shape, depth or cause was mentioned as a characteristic but not used as an experimental variable or that these aspects were not mentioned at all. While the focus of this summary is RCTs, other clinical studies, such as observational or cohort studies, were of interest but none of relevance were located.

The located publication had a subject age range of 21 – 54 years with participants split into two groups according to age.\(^\text{23}\) The cervical lesions to be restored from both age groups were randomly assigned to a restoration protocol with the same subject having up to four restorations performed. Placing test and control restorations in the same subject has advantages: confounding variables are standardised but problems may exist, for example, when placing more than one pair of restorations in the same subject as this can influence the generalisability of the results to the whole population. While the authors state that a randomisation schedule was prepared to exclude bias and minimise the effects of the subject/material, no further information about the process was provided.

References

11. Jiang H, Du MQ, Huang W, Peng B, Bian Z, Tai BJ. The prevalence of and risk factors for non-carious...
### Appendix one

<table>
<thead>
<tr>
<th>Reference and study type</th>
<th>Population</th>
<th>Aim</th>
<th>Outcomes</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farias 2015<a href="#footnote1">1</a> RCT</td>
<td>40 adults (aged 21 – 54 years) southern Brazil (140 NCCLs)</td>
<td>Evaluate the influence of age and dentin etching time on clinical performance of two step etch and rinse adhesive in NCCLs.</td>
<td>Retention rate, post-operative sensitivity, secondary caries and marginal discoloration and integrity.</td>
<td>The subject’s age had no influence on the clinical performance of XP Bond adhesive in NCCLs over a 24-month period.</td>
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Appendix One: Study included in this summary.