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study

Periodontal treatment and subsequent risk of ischaemic stroke

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Background

Stroke is a leading cause of functional impairment and death worldwide. Most of the major risk factors contributing to stroke are modifiable (physical inactivity, dyslipidaemia, nutrition and diet, hypertension, high body-mass index (BMI), diabetes mellitus, cigarette smoking, etc.). The association of stroke with gingival inflammation is still uncertain. However, four prospective cohort and case-control studies in Western countries have found that stroke is associated with periodontitis, a chronic inflammation of the dental attachment apparatus.

Considering the high prevalence of periodontitis and this association with stroke, it is essential to define whether an intervention with dental treatment can potentially reduce the risk of stroke. It has been found that dental prophylaxis to maintain periodontal health has helped in reducing the incidence of ischaemic stroke. Nonetheless, the effect of different integrated dental treatments for gingivitis and periodontitis on the incidence of stroke has not been elucidated.

Aims

To assess the effect of three different dental treatments for gingivitis and periodontitis – and the combination of these treatments – on the incidence of ischaemic stroke, using data from the National Health Insurance Research Database (NHIRD) in Taiwan.

Materials & methods

This retrospective cohort study used NHIRD data covering 14 years (2000-2013).

Patients diagnosed with periodontitis and those with gingivitis (as the comparison cohort) – according to diagnostic codes of the International Classification of Diseases, 9th revision, clinical modification (ICD-9-MD) – were recruited. Excluded from this initial recruitment were patients aged <40 and >80 years in 2003, patients with a follow-up of less than one year, and patients with a diagnosis of one of the following conditions before recruitment: ischaemic stroke, haemorrhagic stroke, transient ischaemic attack, and malignant carcinogen. Follow-up was from the date of entrance into the cohort until stroke, death, withdrawal from the NHIRD, or the end of the 10-year follow-up.

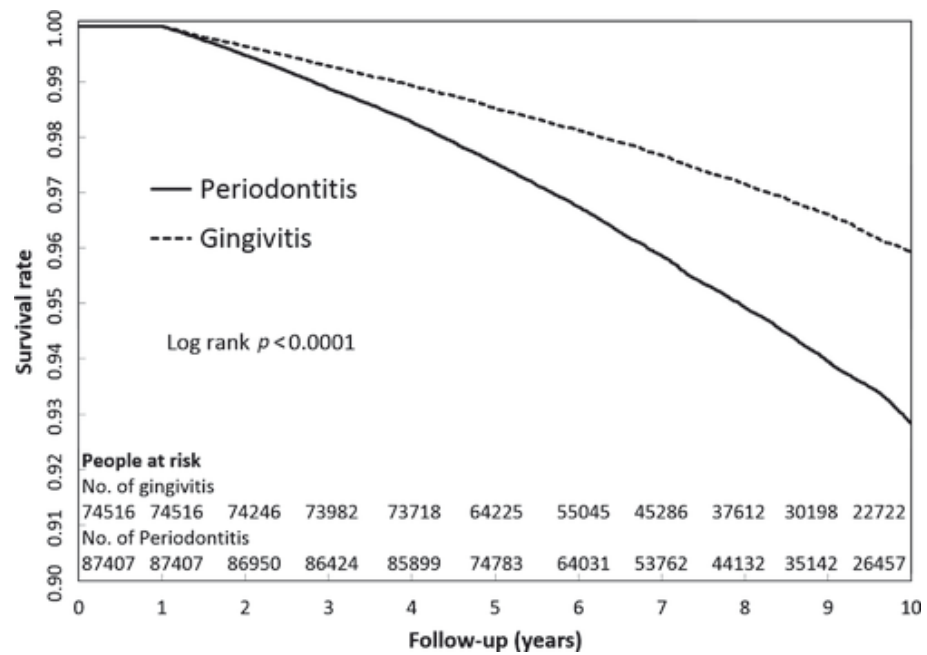
Eight different dental treatment groups were considered: (1) no treatment, (2) dental scaling, (3) intensive treatment (i.e. subgingival curettage and root planing or periodontal flap operation), (4) tooth extraction, (5) scaling + intensive treatment, (6) scaling + tooth extraction, (7) intensive treatment + tooth extraction, and (8) scaling + intensive treatment + tooth extraction.

Differences between groups were assessed using an independent *t*-test for continuous variables and a chi-square test for categorical variables. Overall stroke-incidence rate was calculated ($\frac{\text{total stroke events}}{\text{total person-years during the follow-up period}}$) with a 95% confidence interval (CI), according to Poisson distribution. The risk of stroke between the gingivitis and periodontitis cohorts was estimated using the Kaplan-Meier method and the log-rank test. Cox regression analysis for stroke risk factors of were presented using hazard ratios with a 95% CI.

Figure 1

Kaplan–Meier analysis results of the survival rate of stroke in the periodontitis and comparison cohorts.

Dental treatment procedures for periodontal disease and the subsequent risk of ischaemic stroke: A retrospective population-based cohort study



Results

- During the period 2000-2009, from a total 161,923 patients, 74,516 developed gingivitis and 87,407 developed periodontitis. The mean follow-up was 7.74 years.
- The stroke survival rate in the periodontitis and gingivitis cohorts is shown in Figure 1: patients in the periodontitis cohort had a lower survival rate compared with those in the gingivitis cohort over the 10-year follow-up period ($p < 0.0001$).
- Dental scaling was associated with significantly lower risk of stroke for both the gingivitis and periodontitis groups (HR = 0.73 and 0.77; 95% CI = 0.56-0.95 and 0.66-0.89, respectively).
- Intensive treatment was associated with a significantly lower risk of stroke for both the gingivitis and periodontitis groups (HR = 0.36 and 0.80; 95% CI = 0.14-0.97 and 0.69-0.93, respectively).
- Periodontitis patients who received both scaling and intensive treatment showed a significantly lower risk of stroke than those receiving scaling treatment alone (HR = 0.82; 95% CI = 0.69-0.98), while tooth extraction was associated with significantly higher risk of stroke in periodontitis patients (HR = 1.56; 95% CI = 1.19-2.03).
- The risk of stroke appeared to be higher for those not receiving dental treatment in both the gingivitis and periodontitis groups (HR = 1.38 and 1.35; 95% CI = 1.06-1.80 and 1.13-1.63, respectively).

Limitations

- This is a retrospective study, thus carrying a risk of potential bias in terms of the misdiagnosis of periodontitis and stroke.
- Only patients with at least three dental visits were included.
- Extent and/or severity of periodontal disease was not taken into account.
- Other risk factors for stroke – e.g. smoking and poor BMI in patients with poor oral health – were not considered.

Conclusions & impact

- Patients with periodontitis have a higher risk of and a higher mortality from ischaemic stroke compared to gingivitis patients.
- The risk of stroke was reduced after dental treatment and intensive treatment (especially in patients with periodontitis but also in patients with gingivitis).
- Integrated treatment including scaling and intensive therapy is more effective than scaling only in reducing the risk of stroke.
- An increased risk of stroke after tooth extraction may be found among patients with periodontal disease.
- Incorporating preventive oral health into regular supportive periodontal care may result in healthier oral conditions and a decreased risk of stroke in all patients (periodontitis and gingivitis).

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