What's new for the clinician – summaries of recently published papers (April 2023)

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Edited and Compiled by Prof V Yengopal, Faculty of Dentistry, University of the Western Cape

1. WHAT EVERY ORAL HEALTH PRACTITIONER SHOULD KNOW ABOUT HOW TO EXAMINE PATIENTS WHO HAVE DENTAL IMPLANTS

Dental implants are a common treatment modality that is offered to many patients. There is therefore a good chance that many oral health professionals (dentists, dental therapists, oral hygienists, dental specialists) will encounter such patients in their private or public dental clinics. Barrak and colleagues (2023)[1] have highlighted the mismatch between the knowledge and skill requirement of the general dental practitioner (GDP) in managing such patients and the training provided at undergraduate (UG) and general postgraduate (PG) levels. Studies in the UK among dental schools there and in Ireland have shown that most schools provided lecture-based information with no clinical training at undergraduate level on implant dentistry. This, despite the fact that most implants were in fact placed by dentists who had little training in their undergraduate training.

In our local setting, dental implants are being placed in a wide range of clinical settings, and as a result, general dentists and other oral health professionals will inevitably come across patients who have received implant therapy and should therefore be examining dental implants. This will demand a minimum standard for implant training at undergraduate (UG) and postgraduate (PG) level in order to be able to provide the required professional care.

On review of the dental literature, the terms success and survival rates have been a source of confusion for many years.[1] According to the International Team of Implantology (ITI), the definition of survival indicates the implant is simply present at follow-up but its condition is not specified; while the definition of success indicates the presence of the implant at the follow-up appointment and complications are absent.[1]

Several factors can therefore influence the long-term survival of dental implants. Both biological and technical complications can affect the clinical outcomes of dental implant therapy. Biological complications involve inflammatory conditions, such as peri-implant mucositis and peri-implantitis,[1] as well as soft tissues lesions, such as pain, swelling, hyperplasia and fistula formation.[1] Technical complications affecting dental implants include: i) fracturing of the implant itself; ii) fracture of veneering material; iii) abutment or screw loosening; and iv) loss of retention.[1] It is also clear from the literature that dental implants can and do fail. Failure can be classified as early or late. Early implant failure occurs as a result of unsuccessful osseointegration, while late failure occurs after successful osseointegration.[1]

One of the major causes of late implant failure has been attributed to peri-implantitis,[1] which can progress from peri-implant mucositis if not controlled. Therefore, in order to ensure long-term stability of a dental implant, it is vital to monitor and maintain their peri-implant health, as well as to identify and treat any associated disease as soon as possible.[1]

Dental professionals would benefit from having access to an easy-to-use checklist on how they should examine a dental implant and recognise potential problems in the primary dental care environment, thereby improving early diagnosis of peri-implant mucositis, peri-implantitis and the long-term prognosis of the implant.

Any patient referred for elective implant treatment must have all underlying active dental disease diagnosed and stabilised or treated before implant therapy.[1] Stable oral health also includes a stable occlusion and good periodontal health. A short period of 3-6 months for reviewing and recording evidence of periodontal status may miss fluctuations in periodontal health (bleeding on probing [BOP] and pocket depths), reflecting the variability in the patient's control, motivation and physiological ability to maintain such high levels of periodontal health. Implant treatment in the presence of active periodontal disease is contraindicated due to the increased risk of peri-implantitis, hence the need to stabilise the patient's periodontal health before commencing implant treatment.[1]

Guide to examining the dental implant patient: 10-point checklist for the general oral health practitioner

There are risk assessment tools for biological complications around dental implants by Heitz-Mayfield, also referenced in the ITI treatment guide. Barrak and colleagues (2023)[1] have suggested a ten-point checklist for the general practitioner (dentist, oral hygienist, dental therapist) to use when recording the clinical notes, with a view to help with an accurate history of implant health status and identification of any events which would demand interventional steps.

The following is a **mnemonic** to help with remembering the ten points of the implant examination checklist: ***Safety Is Overseen By Dentists On Monitoring Clues From Reviews***.

1. Satisfaction

Practitioners should record whether the patient is happy with the prosthesis or if they have any symptoms or complaints. Factors affecting patient satisfaction may include the prosthesis itself (overall shape and shade, clean ability), as well as the soft tissue aesthetics (presence of black triangles, any metal show-through in the gingival tissues).

2. Inflammation in surrounding tissues
This refers to any sign of inflammation and tenderness of the adjacent alveolar region surrounding the implant site. It may be an indication of inflammation within the coronal aspect of the gingival tissues or along the length of the fixture within the alveolus (indicative of peri-implant mucositis or peri-implantitis). Such findings would require further investigation with a periapical radiograph, detailed pocket charting and a referral to the clinician who placed the implant or someone with further training in the management of dental implants.

3. Oral hygiene
Poor oral hygiene is a good indicator for future peri-implant disease. Plaque accumulation onto implant surfaces results in peri-implant mucositis. Retrospective evidence indicates that, if untreated, peri-implant mucositis can convert into peri-implantitis.[1] There is a lack of evidence for an accepted standard of care; there the authors that have suggested that tailored oral hygiene regimes should be implemented for each patient, considering both mechanical and chemical plaque disruption. Such regimes would have to consider the number of implant fixtures and the types and designs of prostheses being placed, as this will ultimately influence the type of patient-performed cleaning that will be required. For instance, a single implant crown will require the use of toothbrushes and interdental brushes, while an implant-retained bridge may require the use of super floss as well.

4. Bleeding on probing (BOP)
The Consensus report of the sixth European workshop of periodontology highlighted that it is essential to probe dental implants.[1] Practitioners can be reassured that conventional probing with light force (0.25N) does not harm the peri-implant tissues[1] and is recommended at least once a year.[1] Both plastic and metal probes can be used.

BOP is a key early indicator of disease and is associated with several risk factors, including poor oral hygiene, cigarette smoking, a history of periodontal disease, excess cement and prosthetic design.[1] However, it is difficult to distinguish between BOP caused by peri-implant inflammation and induced by trauma from probing. It is important for the GDP to recognise and record such findings in the clinical notes and to educate their patients on behavioural changes.

5. Deep pockets
Pocket depths around healthy implants should generally be <5mm in depth. Recording the probing depth at the time of fitting the restoration is vital for providing a baseline record which can be used as a reference point for future comparisons and diagnosis of peri-implant disease. In the absence of baseline records (periapical radiograph, pocket depths and bone levels), peri-implantitis may be diagnosed when radiographic evidence of bone loss ≥3mm from the implant neck and probing depths ≥6mm in conjunction with bleeding and/or suppuration is recorded.[1]

6. Occlusion
As implants lack a periodontal ligament, they also lack the 'shock absorbing' ability of natural teeth.[1] Recording an occlusal examination is vital in the assessment of dental implant restorations. This should be completed at the restoration appointment, as well as at future review appointments, as naturally, a patient's occlusal scheme may change (that is, in the case of tooth surface loss or where dental extractions occur). An occlusal assessment should include both static and dynamic functions. The patient's static occlusion would consider the function of the implant prosthesis during maximum intercuspation, while dynamic functions include anterior protrusive and lateral excursive movements. The occlusal prescription is dependent on the type of implant prosthesis placed. For example, with a single implant in a dentate patient, occlusal contacts in excursive movements may be avoided, whereas in a full arch restoration, this would not be possible. Clinical photographs of the occlusal contacts can be invaluable as a record in the patient notes for monitoring occlusal changes at subsequent appointments. The occlusal assessment should also include any signs of occlusal overload on the implant prosthesis. Furthermore, a review of the natural dentition is also required, highlighting any signs of occlusal wear and mobility. If any change in the occlusion is noted then either a chairside adjustment can be made, or a referral made to the clinician who placed or restored the implant or someone with further training in the management of dental implants.

7. Mobility
Mobility may involve the dental implant fixture itself or the components used to restore it (that is, abutment screw, crown or bridge components). Any mobility should be investigated further and dealt with quickly, as this can rapidly deteriorate, resulting in inflammation, subsequent crestal bone loss and peri-implantitis. Mobility may also lead to fractures of the restorative component (such as the abutment screw). Mobility is best assessed using gentle pressure with an instrument (that is, dental mirror handle) on the implant crown as opposed to direct finger pressure, which can mask or give a false impression of movement.[1]

8. Contacts points
The lack of tight contact points can result in food impaction and subsequent caries in adjacent natural teeth, as well as gingival inflammation, peri-implant mucositis and peri-implantitis. Even if the contact points were perfect at the time of the fit of the prostheses, teeth anterior to the implant can drift mesially, thereby opening a gap for food impaction. Hence, checking for the presence of tight contact points at each implant review is important. The integrity of the contact point can be recorded using clinical photographs and also by using floss or fine (12μm) articulating paper between the contacts and recording this.

9. Framework integrity and emergence profile
Practitioners should review the integrity of the implant prosthesis and also consider the emergence profile of the implant restoration. The peri-implant soft tissue architecture is different to that of a natural tooth, as a lack of Sharpey's fibre attachments to the implant surface results in the peri-implant soft tissues being less resistant to clinical probing and biofilm penetration compared to the natural dentition. Proper restorative emergence profile design is essential to facilitate favourable aesthetic outcomes and maintain peri-implant health

10. Radiograph protocol
Baseline radiographs at fit of the restoration and following a period of loading are required for reference and to aid with future diagnosis of peri-implant disease.[1] If the implant was placed and restored in a different practice, it would be advisable (where feasible) to gain a copy of such radiographs

through correspondence with the clinician responsible for placing and restoring the implant fixture.

If it is not feasible to access a copy of baseline radiographs, it would be beneficial to complete a radiographic assessment of the implant when the patient attends for their examination. Any sign of marginal bone loss needs to be discussed with the appropriately trained clinician and the patient made aware, as further consideration and investigation may be required to ascertain the cause.

In the absence of baseline radiographs, the following three clinical findings are indicative of peri-implantitis: BOP and/or suppuration, with, Pocket depth of ≥6mm, and, Bone loss ≥3mm from the neck of the implant.

Conclusion
Barrak and colleagues have suggested that the key role for the non-implant placing GDP in monitoring implant health is the prevention and early detection of potential peri-implant complications. This is implemented through regular monitoring and maintenance of oral health. Any warning signs detected by using this implant examination checklist should be communicated to the clinician who placed and restored the implant so further investigations or interventions can be implemented sooner. If this is not possible, then a referral to an appropriately trained practitioner would be advised.

Implications for practice
There is a responsibility on every practitioner who examines a patient with an implant to advise the patient on the presence of any sign or symptoms that can have an adverse effect on the implant. Additionally, there is also a responsibility on advising the patient on how to keep the mouth clean and disease free thereby contributing to the longevity of the implant.

REFERENCE
1. Barrak F, Caga D, Crean S. What every dental practitioner should know about how to examine patients with dental implants. British Dental Journal 2023; 234: 309-314.

2. DOES ORAL HYGIENE SELF-CARE (OHS) INFLUENCE CARDIOVASCULAR (CVD) MORTALITY?
Although the benefits of good oral hygiene and the use of adjuncts such as flossing and mouthwashes have been shown to have benefits for maintaining a health mouth and teeth, it has not yet been established whether good oral hygiene will result in systemic health benefits. Janket and colleagues (2023)[1] reported on a study that investigated whether oral hygiene self-care (OHS) at baseline was associated with a reduced risk of cardiovascular (CVD) mortality. Additionally, the authors sought to investigate whether mouthwash usage in addition to good OHS would influence its association to CVD mortality in a longitudinal study with 18.8 years of follow-up. They also tested whether mouthwash usage would alter the oral bacterial population.

Thus, the Primary aim of this study was to determine if brushing and flossing affect the risk of CVD mortality in multivariable adjusted models. The Secondary aims were to determine (a) if mouthwash usage has an independent impact on CVD mortality; b) if mouthwash usage affected some periodontal pathogens and cariogenic bacteria proportions.

Methodology
The data for this study was taken from the Kuopio Oral Health and Heart (KOHH) study which ran in Finland from 1995 to 1996 and sought to explore the association between oral health and coronary artery disease (CAD). For the longitudinal part of the study, the mortality data (median follow-up of 18.8 years) were added to the baseline data to create a prospective follow-up study assessing oral infection impacts on CVD mortality. At baseline, 256 consecutive patients attending the Kuopio University Hospital coronary angiography unit and with a confirmed diagnosis of CAD were recruited to participate in the KOHH study. Also, 250 age- and sex-matched controls were recruited from the general surgery or otorhinolaryngology departments at the same hospital. The controls were determined by ‘not having heart disease’ based on their medical history and the pre-admission tests. The controls resided in the same geographic area where the cases arose. The same exclusion and inclusion criteria were applied to the control subjects.

The CVD mortality data were obtained from the Finnish Death Registry in every year from 2009-2015. The current study used the mortality report of 2015. Using the World Health Organisation’s International Classification of Diseases-10 codes, I00 through I99 were considered CVD mortality due to atherosclerotic heart disease and stroke. The reliability of these data was very high, with 99% after comparing the 2009 and 2011 records in a random sample of 100 records.

At the initiation of this study (1995-1996), a single examiner conducted dental examinations. For the current study, the edentulous subjects who cannot floss were excluded. The exposure, that is, OHS, was assessed by questionnaire. Toothbrushing was assessed in four categories: 1) brush once or less frequently a week; 2) brush several times a week; 3) brush once a day; and 4) brush more than once daily. We created a dichotomy of brushing by combining the lower two and upper two groups. Similarly, a dichotomy of flossing was created from the four categories by collapsing the first two and the last two categories: 1) never; 2) once a week; 3) several times per week; and 4) daily.

To assess how mouthwash changes oral microbe proportions, the researchers collected plaque samples from the worst-affected periodontal sites and analysed by rapid multiplex rt-PCR tests using species-specific 16S rRNA gene primers. The periodontal pathogens assessed were *Porphyromonas gingivalis*, *Prevotella intermedia*, *Actinobacillus actinomycetemcomitans* and *Tannerella forsythia*. Similarly, gram-positive microbes were tested from the same plaque samples. The samples were cultured and *Streptococcus mutans* and *Lactobacilli spp*. were identified using the analytical profile index kits (Biomerieux).

Mouthwash usage was assessed by questionnaire. If the patient used mouthwash daily or several times a week, it was considered exposed, and never used or used less frequently than several times weekly were considered as controls. The researchers did not know which patients used what brand, but the brand names of the mouthwashes include chlorhexidine, Listerine (essential oils), products containing 0.05% cetylpyridinium chloride and Meridol (amine fluoride).

Age in years and smoking in three categories (never, past and current smokers) were assessed. Total cholesterol, triglyceride and high-density lipoprotein cholesterol (HDL) were measured by the automated enzymatic technique. The researchers assessed dyslipidemia by total/HDL cholesterol ratio which was proven the best predictor of future atherosclerosis.1 Diabetes was ascertained by medical record review. Subjects were considered to have diabetes if documented diagnoses were in the medical records or if they were being treated for diabetes. To avoid confounding by affluence and high socioeconomic status, the authors adjusted educational levels, income and private insurance status.

Inflammatory markers such as C-reactive protein (CRP) was measured by immunoturbidimetry. All blood samples were collected after fasting if required and analysed immediately in the hospital laboratory.

Salivary lysozyme (SLZ) levels were also quantified in the oral cavity and used as a marker for oral innate immune activation, which can rupture both gram-positive and gram-negative bacterial cell walls.

Dental plaque scores were created, assigning: 0 = if no visible plaque was present; 1 = if plaque covered gingival 1/3 of the tooth surface; 2 = if plaque covered gingival 2/3; and 3 = if plaque covered the whole surface evaluated. Then, mean dental plaque indices were calculated by summing all plaque indices and dividing by the sum of the surfaces evaluated. Mean gingival bleeding indices were created similarly by summing all surfaces with gingival bleeding and dividing by the sum of the surfaces evaluated.

Results

Of the 506 subjects in the original cohort, 127 edentulous subjects who could not perform flossing (the predictor) were excluded, yielding a sample size of 379. Due to missing values in brushing and flossing data, an additional 25 subjects were excluded and a final sample of 354 was included in the analyses.

In this cohort of 354 dentate subjects, only 57 subjects had good OHS. There were 96 all-cause mortalities accrued in 18.8 years of follow-up and 56 of these were CVD-related, while 40 were non-CVD-related deaths. Of the CVD mortalities, 73% occurred in those who had coronary artery disease (CAD) at baseline and thus safely presumed that CAD is on the causal pathway to CVD mortality. Brushing was highly prevalent, showing 88.2% of the cohort brushed daily while flossing had opposite distribution, showing only 17% flossed daily and 83% did not.

Better OHS led to a longer survival compared with shorter survival associated with poor OHS. The CVD mortality risk was the lowest in the best OHS group (both brushing and flossing) (hazard ratio (HR) = 0.25 [confidence interval: 0.07-0.89]; p = 0.03) and in the brushing only group (HR = 0.72 [CI: 0.37-1.41]; p = 0.34). This suggests that flossing presented significantly greater benefits in CVD mortality reduction than brushing alone. The researchers next tested if this beneficial impact of oral hygiene performance is persistent among those who already had coronary artery disease (CAD) at baseline. In a stratified analysis, the CAD group had a sufficient number of CVD mortality and the observed beneficial effects of OHS remained (HR = 0.50 [0.24-1.06]; p = 0.07).

The effect of independent mouthwash usage on CVD mortality was not statistically significant (HR 0.95 [0.45-2.01]; p = 0.89).

Conclusions

The researchers concluded that brushing and flossing, that is, better OHS, was associated with reduced risk of CVD mortality. However, the additional use of mouthwash did not provide any further advantages or disadvantages to OHS alone.

Implications for practice

The results of this long-term follow-up study s has significant public health importance because brushing and flossing are relatively inexpensive and have low risk of adverse effects. Moreover, even those who already have heart disease can lower the risk of CVD mortality by maintaining good oral hygiene.

REFERENCE

1. Janket SJ, Lee C, Surakka M, Jangam TG, Van Dyke TE, Baird AE, Meurman JH. Oral hygiene, mouthwash usage and cardiovascular mortality during 18.8 years of follow-up. British Dental Journal. 2023 Feb 3:1-6.

CPD questionnaire on page 166

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.