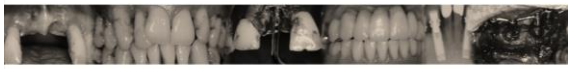
Implant use in the periodontally-susceptible part-edentate patient

Professor Dominic O'Sullivan

University of BRISTOL bsspd



Dental Implants

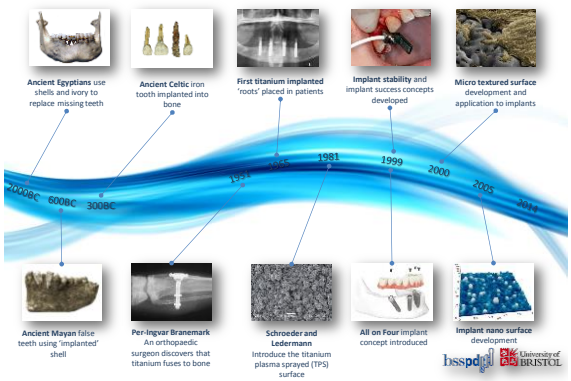
- 1 million placed annually worldwide
- Over 450 different implant designs
- $2bn market ($7bn by 2020)
- Market growing by ~15% per year

- In Europe - 770 million people missing one or more teeth by 65 years of age

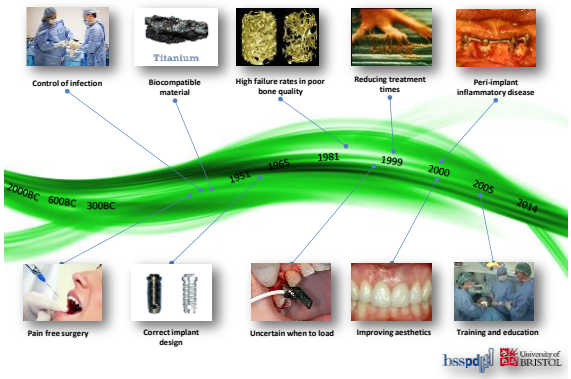
- Increase in implant-related vs conventional treatment options

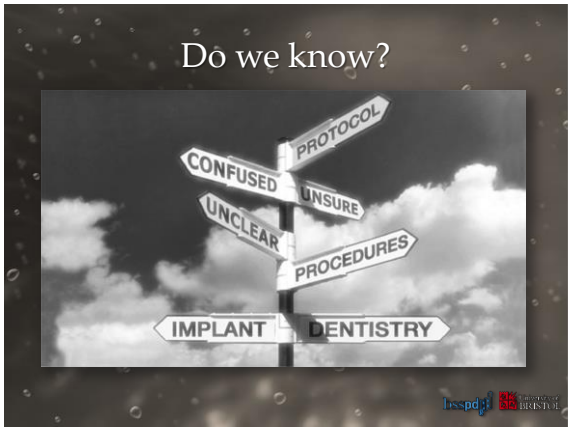
Implant-Based reconstruction. The worldwide Dental Implant and Bone Graft Market. Kalorama Information.

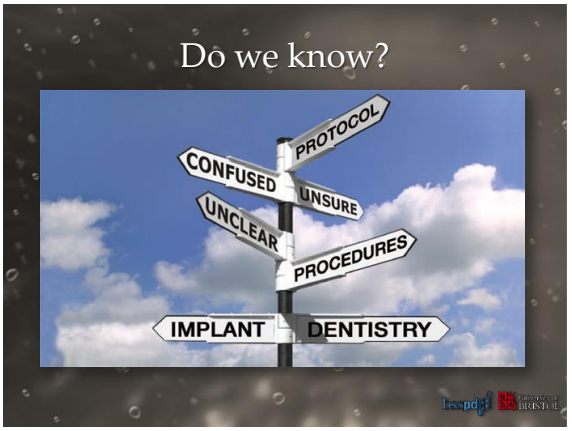
History of Dental Implants



The Challenges







Dogmas

- Implant treatment is more predictable than periodontal treatment
- Implants deliver better function and aesthetics than natural teeth
- Patients' quality of life is better with implants than with periodontal therapy
- Implants maintain bone better than periodontally involved teeth

Proactive strategic extraction

- Some practitioners are advising extraction of periodontally involved teeth and choosing implant placement
- Proactively as a positive treatment choice for patients

Kao RT. Strategic extraction: a paradigm shift that is changing our profession. Journal of Periodontology 2008 ;79: 971-972.

Splieth C, Giesenberg J, Fanghanel J, Bernhardt O & Kocher T. Periodontal attachment level of extractions presumably performed for periodontal reasons. Journal of Clinical Periodontology 2002;29:514-518.

Decision making

- Based on evidence
- Prognosis of tooth under consideration
- Prognosis of the dentition
- Centred on the patient's wishes and attitudes

Donos N, Laurell L, Mardas N. Hierarchical decisions on teeth vs. implants in the periodontitis-susceptible patient: the modern dilemma. Periodontol 2000. 2012;59(1):89-110.

Proactive strategic extraction

- Does the environment affect our decision to promote dental implants to patients?
- Does training affect our decisions?

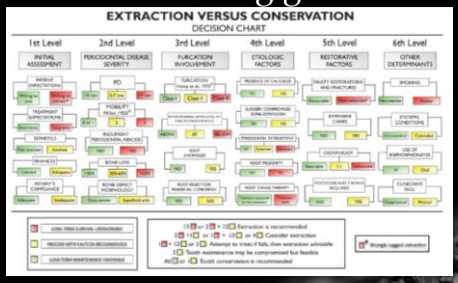
Lang-Hua BH, Lang NP, Lo EC & McGrath CP. Attitudes of general dental practitioners towards implant dentistry in an environment with widespread provision of implant therapy. Clinical Oral Implants Research 2013;24:278-284.

Zitzmann NU, Scherrer SS, Weiger R, Lang NP, Walter C. Preferences of dental care providers in maintaining compromised teeth in relation to their professional status: implants instead of periodontally involved maxillary molars? Clin Oral Implants Res. 2011;22(2):143-50.

Prognosis

- Severity of disease at outset/presentation
- Local modifying factors
- Systemic modifying factors
- Predictability of potential treatment options
- Skills of the clinician
- Clinical environment and equipment available
- Patients compliance

Decision making guidelines



Avila G, Galindo-Moreno P, Soehren S, Misch CE, Morelli T, Wang HL. A novel decision-making process for tooth retention or extraction. J Periodontol. 2009;80(3):476-91.

Conventional vs implants

S. Kourkouta, K. W. Hemmings & L. Laurell. Restoration of periodontally compromised dentitions using cross-arch bridges. Principles of perio-prosthetic patient management. BDJ, 2007;203, 189 - 195

Conventional vs implants

- Conventional treatment skills for a periodontally compromised dentition are being lost in the era of minimal intervention, implant and adhesive dentistry
- Success rates of conventional treatment were comparable to treatment on non-compromised individuals
- Yet implants are now considered the automatic treatment of choice by many dentists

Lulic M, Brägger U, Lang NP, Zwahlen M, Salvi GE. Ante's (1926) law revisited: a systematic review on survival rates and complications of fixed dental prostheses (FDPs) on severely reduced periodontal tissue support. Clin Oral Implants Res. 2007;18 Suppl 3:63-72.

Conventional vs implants

- Dental implants do not surpass the longevity of even compromised but successfully treated natural teeth
- Attempts to maintain teeth should be the first priority

Holm-Pedersen P, Lang NP, Müller F. What are the longevities of teeth and oral implants? Clin Oral Implants Res. 2007;18 Suppl 3:15-9.

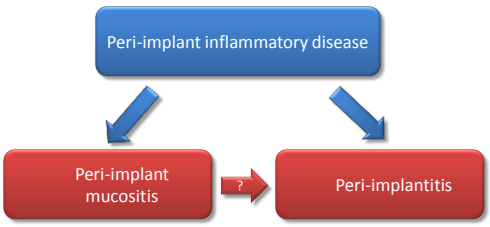
Roccuzzo M, De Angelis N, Bonino L, Aglietta M. Ten-year results of a three-arm prospective cohort study on implants in periodontally compromised patients. Part 1: implant loss and radiographic bone loss. Clin Oral Implants Res. 2010;21(5):490-6.

Conventional vs implants

- The approach of multiple 'preventive' dental extractions and implant placement should be approached with caution

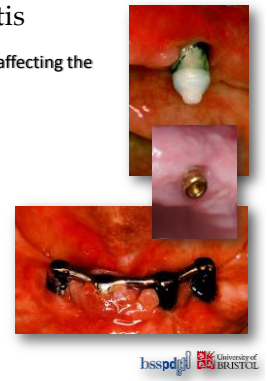
Holm-Pedersen P, Lang NP, Müller F. What are the longevities of teeth and oral implants? Clin Oral Implants Res. 2007;18 Suppl 3:15-9.

Roccuzzo M, De Angelis N, Bonino L, Aglietta M. Ten-year results of a three-arm prospective cohort study on implants in periodontally compromised patients. Part 1: implant loss and radiographic bone loss. Clin Oral Implants Res. 2010;21(5):490-6.



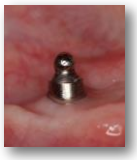
Peri-implant mucositis

- Reversible, inflammatory lesion affecting the peri-implant soft tissues
- No bone involvement,
- Redness, swelling locally, BOP
- A necrotising variant has also been described linked with smoking and immunosuppression
- Can also be hyperplastic
- Analogous to gingivitis BUT…



Peri-implant mucositis

- Reverses with careful attention to oral hygiene
- Affects 50% of implants in use over 9 years
- 80% of patients can be affected
- Overall implant success over that period is ~96%



Roos-Jansaker AM, Lindahl C, Renvert H, Renvert S. Nine to fourteen year follow up of implant treatment. Part II. J Clin Periodontol 2006; 33:290-295.

Peri-implantitis

- Inflammatory disease which also affects bone
- BOP, +/- pus, marginal bone loss
- Bone loss >1.8mm after the first year of function

- Analogous to periodontitis BUT…

Roos-Jansaker AM, Lindahl C, Renvert H, Renvert S. Nine to fourteen year follow up of implant treatment. Part II. J Clin Periodontol 2006; 33:290-295.

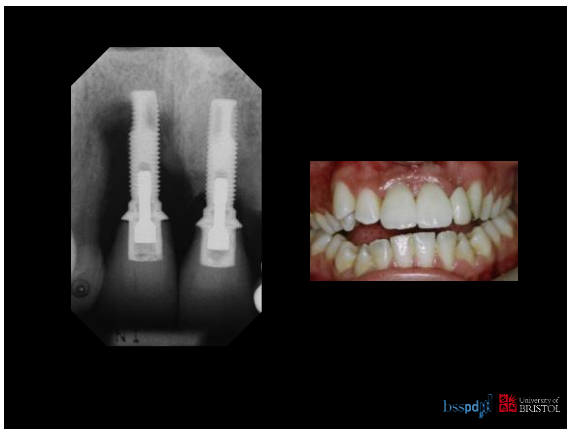
Peri-implantitis

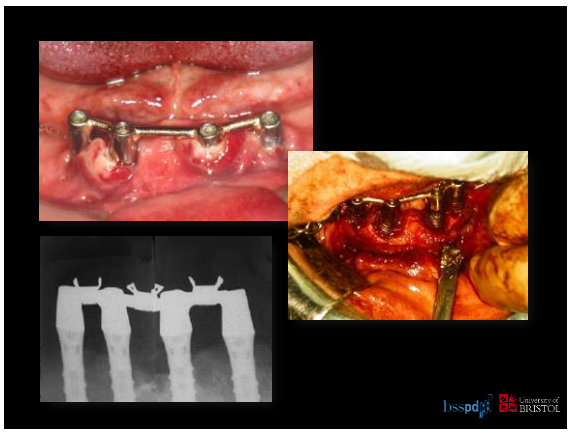
- How big a problem is it?
- 12-43% of implants in use over 9 years affected
- 28-56% of patients affected
- Review by Mombelli et al 2012 – prevalence 10% of implants, 20% of patients 5-10yrs post surgery

Roos-Jansaker AM, Lindahl C, Renvert H, Renvert S. Nine to fourteen year follow up of implant treatment. Part II. J Clin Periodontol 2006; 33:290-295.

Zitzmann NU, Berglundh T. Definition and prevalence of peri-implant diseases. J Clin Periodontol 2008; 35: 286-291.

Mombelli A, Müller N, Cionca N. The epidemiology of peri-implantitis. Clin Oral Implants Res. 2012;23 Suppl 6:67-76.





History of Periodontal disease

- Treated periodontitis is associated with increased rates of implant complications
- Severity of disease matters

Levin L, Ofec R, Grossmann Y, Anner R. Periodontal disease as a risk for dental implant failure over time: a long-term historical cohort study. Clin Periodontol. 2011;38(8):732-7.

Risks

- Periodontally susceptible patients with residual pockets ≥5mm at the end of treatment have greater risk of peri-implantitis and implant loss
- Even if patients are in SPT they pose a greater risk of peri-implantitis development than periodontally stable patients

Pjetursson BE, Helbling C, Weber HP, Matuliene G, Salvi GE, Brägger U, Schmidlin K, Zwahlen M, Lang NP. Peri-implantitis susceptibility as it relates to periodontal therapy and supportive care. Clin Oral Implants Res. 2012 Jul;23(7):888-94.

Aggressive Periodontitis

- Caution is advised when treating patients with aggressive periodontitis
- They have been shown to be more susceptible to peri-implantitis, have more marginal bone loss and lower implant survival than patients with chronic periodontitis or healthy patients

De Boever AL, Quirynen M, Coucke W, Theuniers G, De Boever JA. Clinical and radiographic study of implant treatment outcome in periodontally susceptible and non-susceptible patients: a prospective long-term study. Clin Oral Implants Res. 2009;20(12):1341-50.

Mengel R, Flores-de-Jacoby L. Implants in patients treated for generalized aggressive and chronic periodontitis: a 3-year prospective longitudinal study. J Periodontol. 2005;76(4):534-43.

How can we minimise the risks?

History of Periodontal disease

- Assess patient susceptibility to periodontal disease at the treatment planning stage
- Assess disease severity
- Implant placement needs to be delayed until periodontal disease resolution has occurred
- Patients should then be in effective SPT

Risk Factors

Risk factors for peri-implantitis:

- History of periodontal disease
- Cigarette smoking
- Oral hygiene
- Limited evidence for the role of diabetes and alcohol

Heitz-Mayfield LJ. Peri-implant diseases: diagnosis and risk indicators. J Clin Periodontol. 2008;35(8 Suppl):292-304.

When should we place implants?

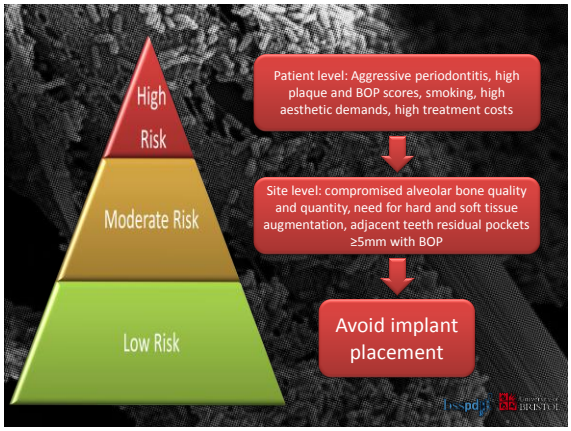
- Ong 2008 defined treated periodontitis as patients who before implant placement are in a SPT programme with all sites ≤5mm without BOP
- This can be difficult to achieve but should be considered the goal

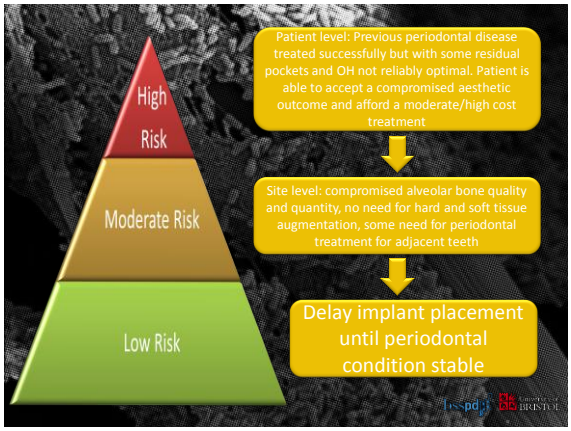
Ong CT, Ivanovski S, Needleman IG, Retzepi M, Moles DR, Tonetti MS, Donos N. Systematic review of implant outcomes in treated periodontitis subjects. J Clin Periodontol. 2008;35(5):438-62.

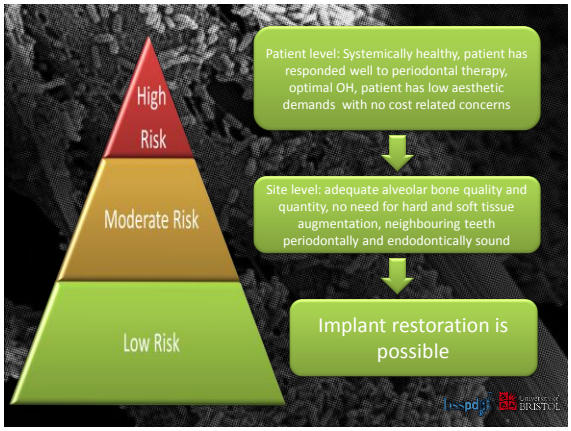
Subject and site level tool

Patient level:	Site Level:
• BOP score • Prevalence of residual pockets ≥5mm • Number of lost teeth • Loss of attachment/bone level support in relation to pt's age • Systemic and genetic modifying factors • Environmental factors e.g. smoking	• Residual peri-apical lesions • Bone quality/quantity • Soft tissue biotype • Proximity of anatomical structures • Status of adjacent teeth – residual pockets, BOP and suppuration, tooth anatomy and position, furcation involvement, iatrogenic factors (overhangs, ledges), tooth mobility

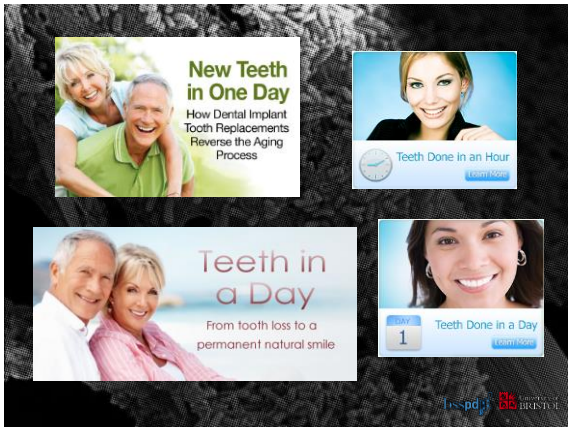
Donos N, Laurell L, Mardas N. Hierarchical decisions on teeth vs. implants in the periodontitis-susceptible patient: the modern dilemma. Periodontol 2000. 2012;59(1):89-110.







Is immediate placement ever right for periodontal disease susceptible patients?



Immediate placement in the perio. susceptible patient?

- Higher trend for implant failures and biological complications with immediate implants vs delayed implantation
- Recent reviews have indicated that there is some promising evidence for 5 year survival rates where strict protocols are used

Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Interventions for replacing missing teeth: dental implants in fresh extraction sockets (immediate, immediate-delayed and delayed implants). Cochrane Database Syst Rev. 2010 8;(9)

Immediate placement in the perio. susceptible patient?

- 5 year prospective study 103 consecutive patients with history of periodontal disease and immediate implant placement
- OHI, strict antibiotic and anti-inflammatory regime and follow-up maintenance
- Promising 5 year survival rates (97.9%, 0.71mm bone loss)

Maló P, Nobre Mde A, Lopes A, Ferro A, Gravito I. Immediate loading of implants placed in patients with untreated periodontal disease: a 5-year prospective cohort study. Eur J Oral Implantol. 2014;7(3):295-304.

Immediate placement in the perio. susceptible patient?

- Immediate loading may give reasonable results at 5 years if strict regimes are used or patients have met acceptable end points from periodontal treatment
- In practice this may be difficult to achieve
- No reliable 10 year evidence

Maló P, Nobre Mde A, Lopes A, Ferro A, Gravito I. Immediate loading of implants placed in patients with untreated periodontal disease: a 5-year prospective cohort study. Eur J Oral Implantol. 2014;7(3):295-304.

Does SPT work for implants?

SPT

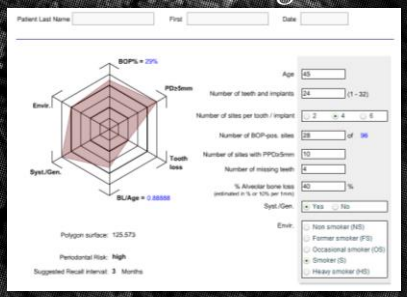
- Similar regime to periodontitis patients
- Radiographic examination immediately post implant placement, at the delivery of the prosthesis and 1 year follow up.
- OHI, Clinical examination of PPD, BOP, plaque scoring, prosthesis function every 3, 6 or 12 months depending upon their history of previous periodontal disease and presence of risk factors.

Donos N, Laurell L, Mardas N. Hierarchical decisions on teeth vs. implants in the periodontitis-susceptible patient: the modern dilemma. Periodontol 2000. 2012;59(1):89-110.

Monitoring

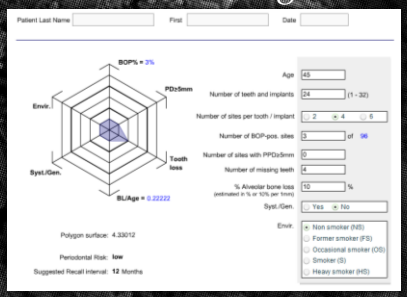
www.perio-tools.com

Monitoring



Lang NP, Tonetti MS. Periodontal risk assessment (PRA) for patients in supportive periodontal therapy (SPT).Oral Health Prev Dent. 2003;1(1):7-16.

Monitoring



Lang NP, Tonetti MS. Periodontal risk assessment (PRA) for patients in supportive periodontal therapy (SPT).Oral Health Prev Dent. 2003;1(1):7-16.

Monitoring

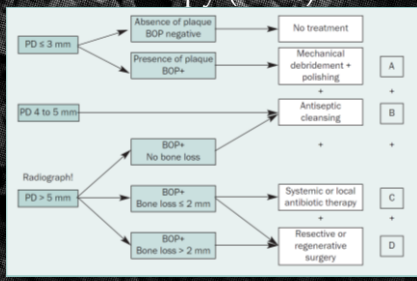
SPT

- Professional plaque-control treatments including supra/submucosal instrumentation should be performed every 3, 6, 12 months
- Presence of high BOP and probing depths ≥5mm then radiographic examination and determination of treatment according to Cumulative Interceptive Supportive Therapy (CIST)

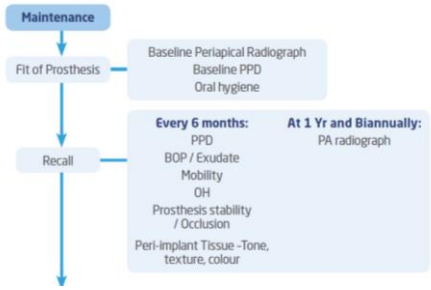
Mombelli A, Lang NP. The diagnosis and treatment of peri-implantitis.Periodontol 2000. 1998 Jun;17:63-76.

What do we do when it all goes wrong?

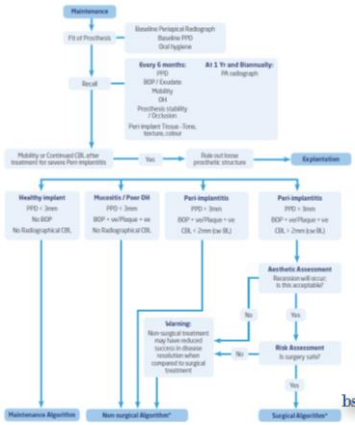
Cumulative interceptive supportive therapy (CIST)

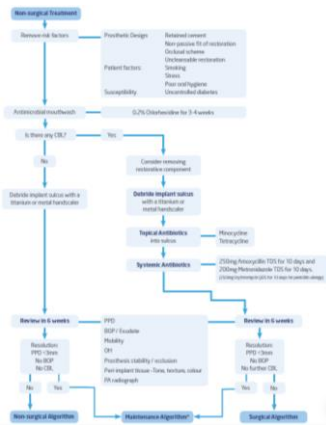


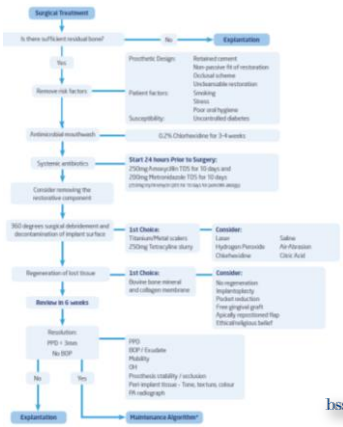
Lang NP, Wilson TG, Corbet EF. Biological complications with dental implants: their prevention, diagnosis and treatment. Clin Oral Impl Res 2000: 11 (Suppl.): 146–155



Ucer, C; Wright, S; Scher E; West, N; Retzepi, M; Simpson, S; Slade, K; Donos, N. ADI GUIDELINES - On Peri-implant Monitoring and Maintenance. 2013

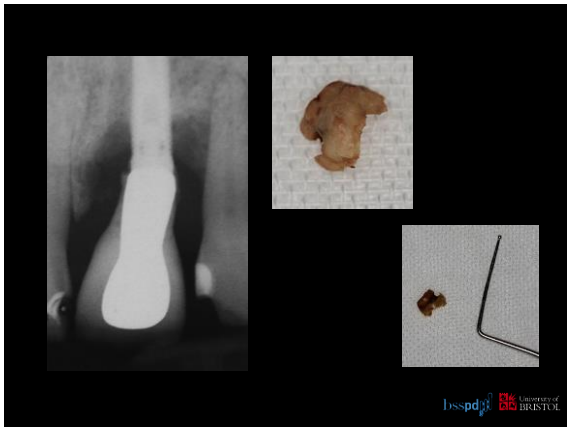






Iatrogenic disease?

Cement vs screw retained?



Cement vs screw retained?

- Effect of increased microgap with cement retained restorations
- Concerns over marginal exposed cement
- Concerns over retained submucosal cement

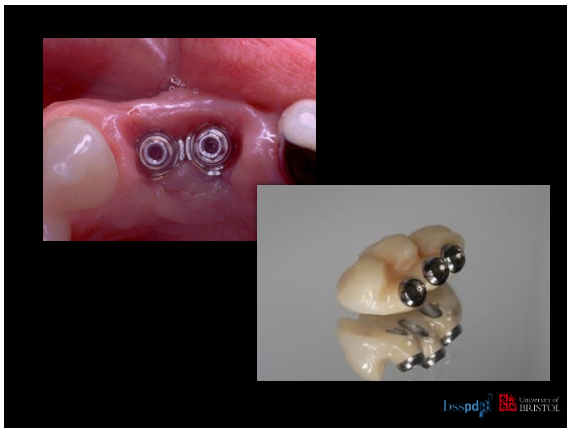
Cement vs screw retained?

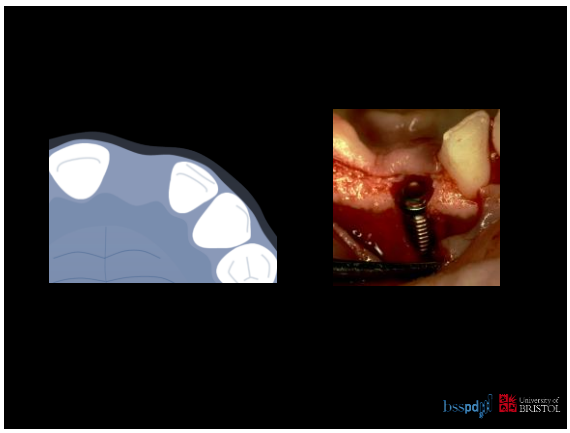
- Systematic review and meta-analysis of 9 studies to compare peri-marginal bone loss, no difference between cement and screw retained restorations.

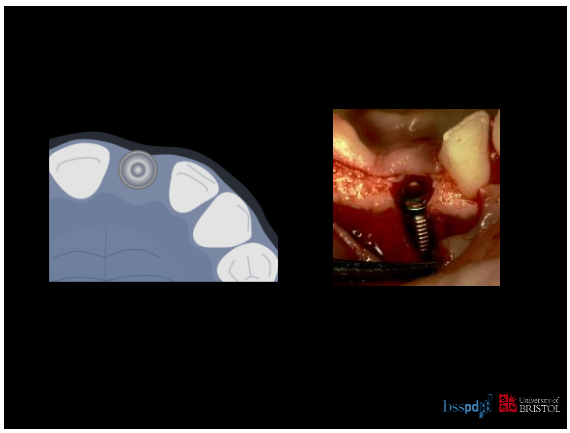
de Brandão ML, Vettore MV, Vidigal Júnior GM. Peri-implant bone loss in cement- and screw-retained prostheses: systematic review and meta-analysis. J Clin Periodontol. 2013;40(3):287-95.


http://www.tepe.com/tips-advice/implant-care/


Products | Tips & Advice | About Us | News | Contact
Proper care for your dental implants
Products suitable for implant care
http://www.tepe.com/tips-advice/implant-care/

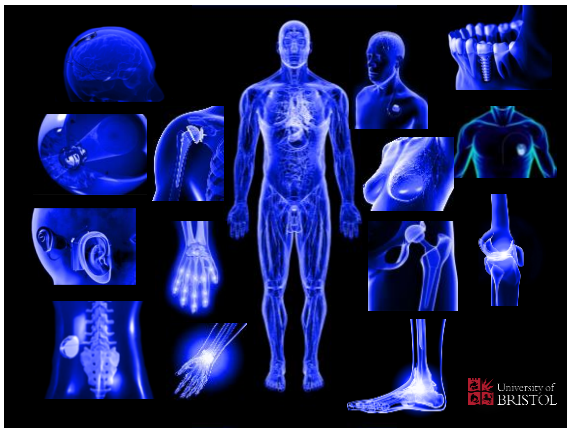


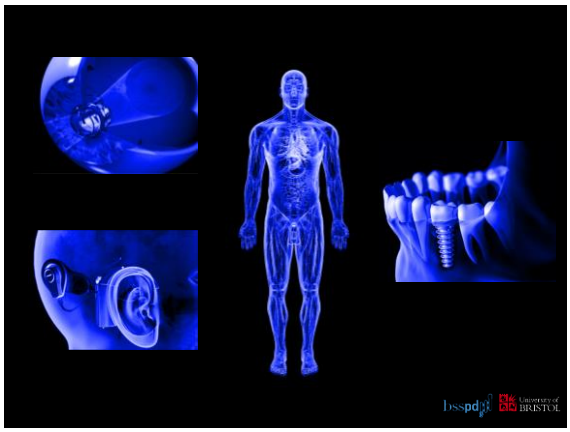




Is peri-implantitis one disease?

A new approach is needed?





Biofilm

Papaioannou W, Quirynen M, Van Steenberghe D. The influence of periodontitis on the subgingival flora around implants in partially edentulous patients. Clin Oral Implants Res. 1996;7(4):405-9.

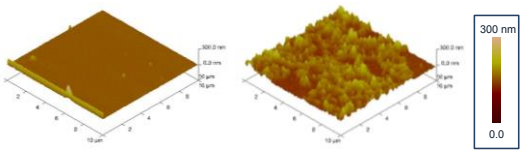
Kumar PS, Mason MR, Brooker MR, O'Brien K. Pyrosequencing reveals unique microbial signatures associated with healthy and failing dental implants. J Clin Periodontol. 2012;39(5):425-33.

SPT

- High long term implant survival rates can be achieved in patients adhering to SPT
- Peri-implant Mucositis and lack of adherence to SPT associated with high incidence of peri-implantitis
- Treatment of Mucositis should be considered preventive for peri-implantitis

Salvi GE, Zitzmann NU. The effects of anti-infective preventive measures on the occurrence of biologic implant complications and implant loss: a systematic review. Int J Oral Maxillofac Implants. 2014;29 Suppl:292-307.

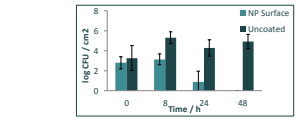
A new approach is needed?

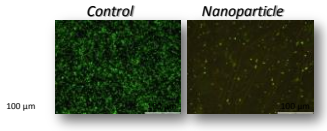


Uncoated titanium

Blank titanium post nanoparticle deposition

Wood NJ, Jenkinson HJ, O'Sullivan DJ, Davis SA, Barbour ME. Chlorhexidine-based antimicrobial nanoparticles as a Coating for dental implants. 2014.

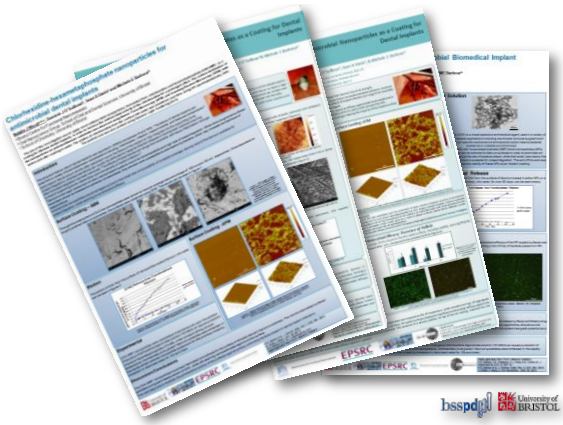




Streptococcus gordonii

Wood NJ, Jenkinson HJ, O'Sullivan DJ, Davis SA, Barbour ME. Chlorhexidine-based antimicrobial nanoparticles as a Coating for dental implants. 2014.

Bristol Centre for Functional Nanomaterials
A Centre for 4-year PhD Training
bsspd University of BRISTOL



bsspd University of BRISTOL

Maintenance and reduction of biofilm load

- Colonisation inevitable
- Maintenance need is constant
- Reduce and control the biofilm from the outset
- Aggressive treatment of mucositis
- Role for patient, and clinicians

bsspd University of BRISTOL

Peri-implant Mucositis

bsspd University of BRISTOL

Peri-implantitis

bsspd University of BRISTOL

Conclusions

- Many of the modern dogmas surrounding dental implants are not supported by evidence
- Teeth should be maintained whenever possible
- For high risk cases implant treatment should be delayed/avoided
- Proactive strategies are needed for patient care, anti-infective approaches need to be adopted

"Extraction of periodontally involved teeth may not be the end of problems for the patient but the beginning of new ones"

Donos 2014