Additional diagnostic steps

- Historically described as “special tests”
- Beyond clinical examination
  - Radiographs
  - Pulp tests
  - Periodontal charting
  - Articulated study models
  - Others: dietary analysis, plaque score, saliva analysis.
  - Photographs

Why?

- Gives you time to consolidate clinical findings.
- Gives patient time to consider issues you have raised during examination – cooling off period!
- Confirms clinical findings and diagnosis.
- Records
- “A picture speaks a thousand words”

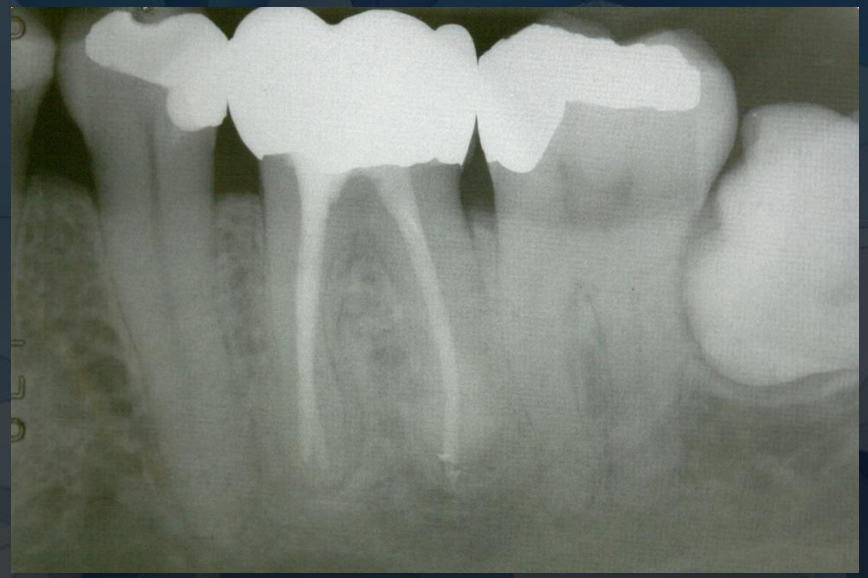
Radiographs

- OPG radiograph/panoramic film
- Plain film periapical and bitewings
- Plain film occlusal
- CT scan/3D imaging

Radiographs

- Supplement clinical examination
- Knowledge of anatomy, health/pathologic structures.

- Interproximal/deep/large restorations
- Overhangs
- Caries/secondary caries
  - ~30-40% demineralisation before visible on plain film.
- Radiolucent restorations
- Supporting structures
- Pulp/periapical tissues
- Previous RCF
- Perforations/Fractures



Plain film occlusal

- Identify bucco-palatal/lingual positioning of lesions
- Sialoliths
- Impacted canines

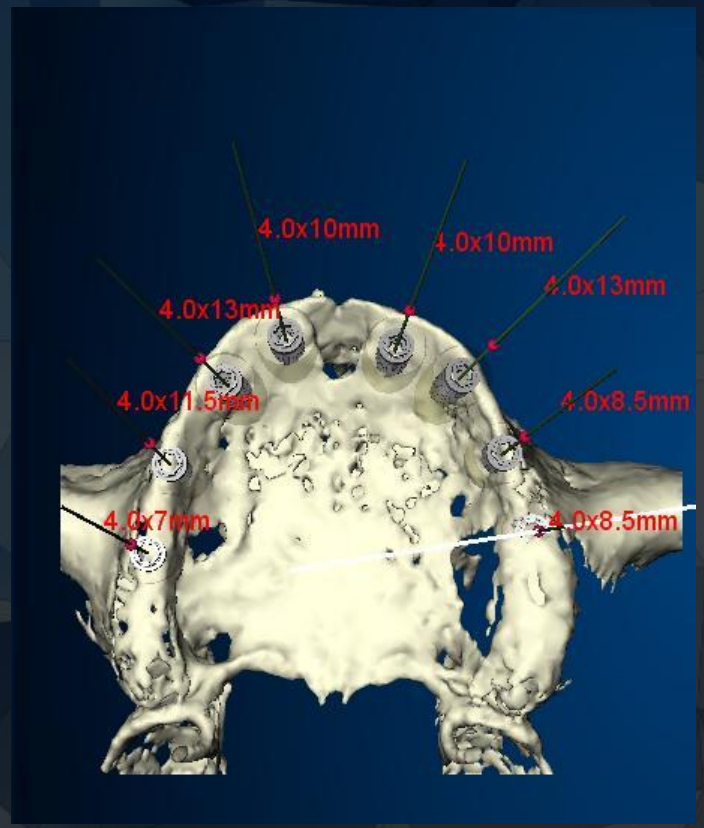
Radiographs

- Radiation – ALARA
- Diagnostic/Record keeping/Baseline
  - OPG radiographs
    - Active treatment –2 years.
    - Onward referral – last 6-12 months.
  - BW radiographs
    - Check for IP lesions, left & right posterior every 2 yrs

    - Guiding principle - not absolute

CT scan/MRI imaging

- 3D
- Conebeam vs convention CT
- TMJ imaging
- Planning for implants
- Fractures/Head & Neck Ca.
- Sinus lesions.
- Superimposed structures.



Case studies in assessment & diagnosis

Jess

- 56 yr old nurse
- Toothache for 18 months LHS
- 26 intermittent symptoms
- GP dentist x 2
  - Nil restorations
  - Dental radiographs nil abnormalities
- Medical GP referral
- ENT referral
- CT imaging

Jess

- Provisional Dx cracked tooth
- Endodontist
  - Size of lesion, duration of symptoms prognosis poor to hopeless
- Extraction 26 OMFS
- Prolonged healing
- Sinus augmentation
- Implant placement 26

Ling

- 36 year old graphic designer
- 26 sore and tender to bite
- 26 crowned 6 months ago
- Ongoing symptoms
- Disto-palatal marginal deficiency
- Prior to crown being placed was assessed by endodontist and deemed clinically health pulp and normal periapical tissues

Ling

Ling

- 26 section crown yielded granulation tissue in disto-palatal cavity
- Root resorption defect
  - Deep disto-palatal
  - Tooth unable to be restored
- Extraction 26
- Lengthy healing
- 26 implant

- Both Jess and Ling
  - 26 → coincidence.
  - Unusual presentation of their conditions.
  - Outcome similar → 26 Implant.
  - Initial management was reasonable, managed well by general dentists and subsequent specialists.
    - Avoided potential complaints
    - Accepted outcome
    - Worn out but not burnt out.
  - Perpective is they were both looked after well.

Pulp tests

- *Percussion/mobility – periapical & periodontal response to forces
- Thermal
  - Cold
  - Heat
- Electric

Pulp tests

- Pulp status – sensibility
- Assess nerve supply, an idea on health/pathologic status of pulp.
- Understand caries process and ability of pulp to “wall off”/form reparative/sceondary dentine
- Compare to adjacent teeth

http://www.columbia.edu/~jjp29/images/art_themes_cartoon_0004.jpg

Dry ice/CO_2

Clinical observations, compare to adjacent teeth

- Healthy unrestored tooth – responds
- Restored tooth – responds
- Heavily restored tooth – slow(er) or no response*
- Pulp pathology
  - Reversible Pulpitis – responds, lingers, sometimes heightened.
  - Irreversible pulpitis – heightened, lingering response.
  - Necrotic/pulpless – no response.

Electric pulp tests

- Nerve conductivity
- Good for heavily restored/ calcified/ obliterated pulps where cold tests suggest no response.
- Confirms no response for necrotic/pulpless teeth

Periodontal charting and assessment

- Perio chart Tab
- Perio e-form

Articulated study models

- Accurate study models
  - Alginate imps
    - ~~PVS~~
  - Buff stone
- Bite registration or articulate in maximum intercuspation.
- Articulator
- Facebow

Articulation

- Accurate study models
  - Pour-up ASAP
  - Blebs
  - Drags/Distortion
- Facebow recording
- Occlusal recording
  - Tooth-tooth contacts
  - Separation of teeth (bite wafer)

Articulated study models

- Visualise study models and dentition without interference of soft tissues.
- Facilitate communication and treatment discussion.
- Diagnostic waxup.

Additional digital scan/data collection

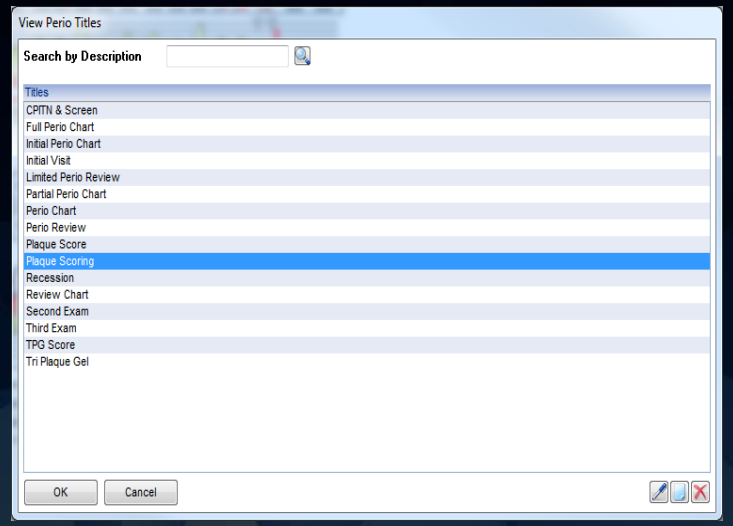
- Scan cases – arch/full mouth.
  - Limited to tooth based restorations.
  - Dentures continue conventional
- Ongoing integration 3-6 months.
  - Clinical protocols.
  - Development of facilities.
  - Staff familiarity and training.
- Conventional study models as directed by unit co-ordinator.

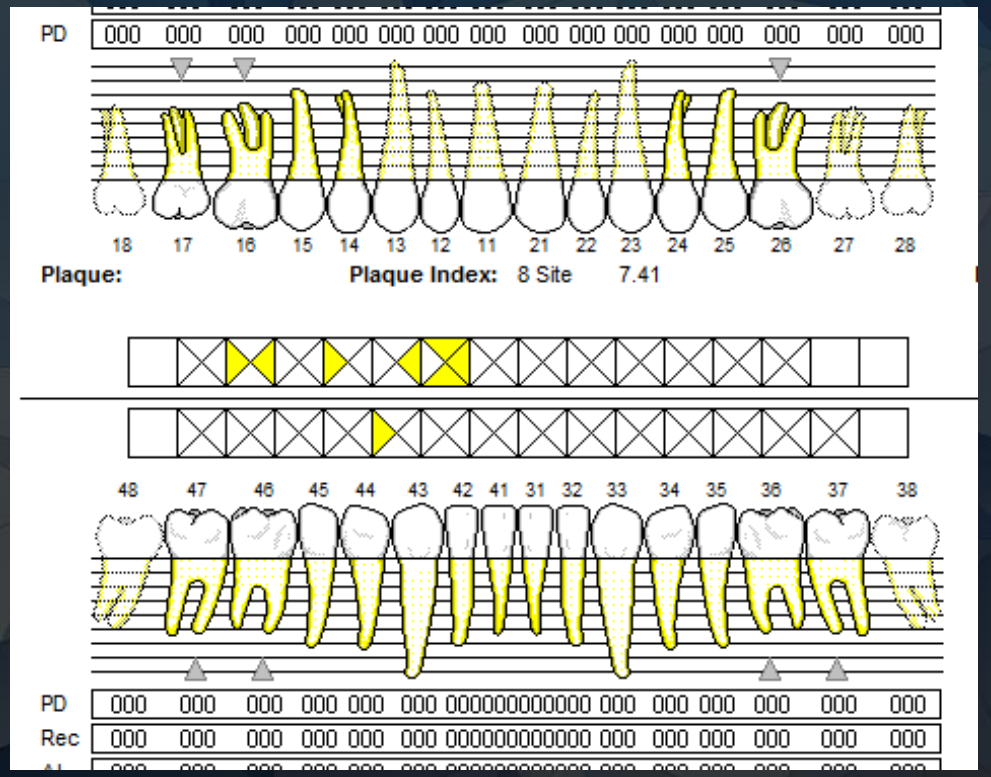
Dietary analysis, plaque score, saliva analysis

- **Dietary analysis assess for:**
  - Rely on patient
  - sugars, sticky carbohydrates that promote plaque → caries and periodontal disease.
  - Acids→ wear (multi-factorial)
  - Patterns of food intake

Plaque score

- Plaque score good for OHI demonstration.
- Substantiates description of “Good” vs “Poor” OH
- Demonstrates relative improvement between initial visit, subsequent cleaning/OH regimes and review → motivates patient





- Saliva analysis
  - Caries
  - Tooth wear
  - Problems with dentures, adhesive restorations

Photographs

- Records and documentation
- Monitor minor tooth wear
- Pre-bleaching
- Shade taking

Communicate reference points, incisal planes, midlines and inclination

Photographs

Photographs

- Extra-oral
- Face
- Profile
- Standing up – natural head position
- Neutral background

Photographs

- Anterior
- Retractors

Photographs

- Intra-oral
  - Retractors
  - Mirror occlusal
  - Mirror buccal/lingual

A word about photographs, privacy, social media

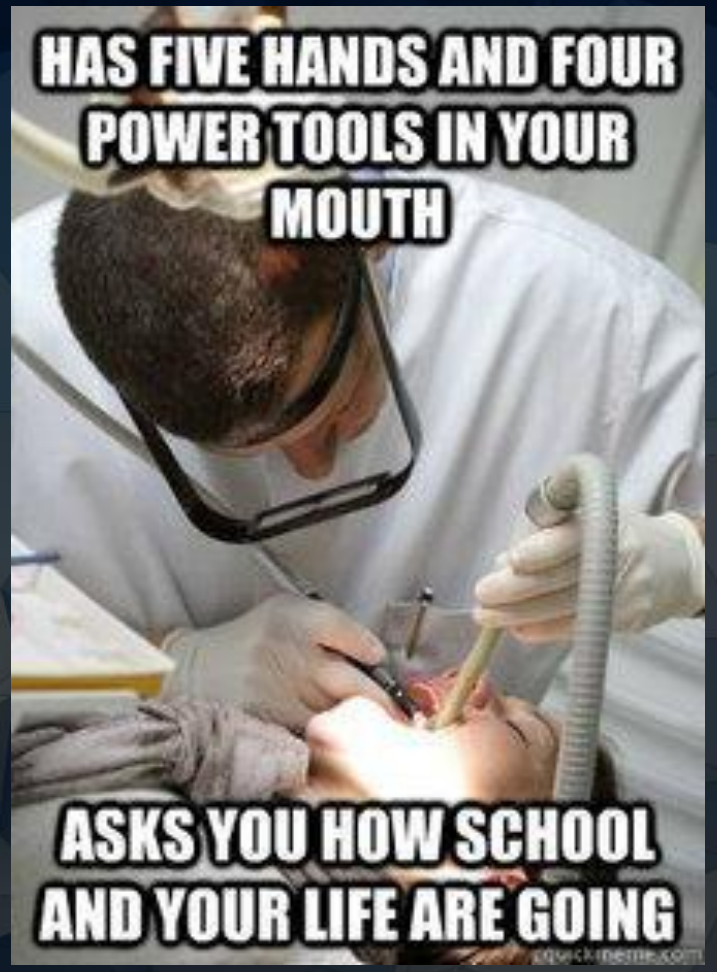
- OHCWA cameras
- *Personal cameras/phone cameras at this stage not to be used.
- Reasonable attempts to secure photos.
  - SD cards
  - Computers
  - Tablets
- Patient confidentiality and privacy.

Social media

- Perth is small (dental) community
- What you post/say - away from public access is up to you.
- Context
- Please consider privacy of patients & staff before posting – potential for public access; reflects on you, university, dental community.

Consolidate information

- Manage time
- Use down/waiting time to discuss clinical issues.
- Follow-up discussion
  - Another appt best especially where complex Tx.
  - Written correspondence.



Integrating tooth assessment

Integrating the assessment of teeth and determining prognosis

- Zitzmann *et al* 2010, Strategic considerations in treatment planning
  - https://onesearch.library.uwa.edu.au/permalink/61UWA_INST/c6psno/cdi_gale_infotracacademiconefile_A234673658
- Jotkowitz and Samet 2009, Classification and prognosis evaluation of individual teeth--a comprehensive approach
  - https://onesearch.library.uwa.edu.au/permalink/61UWA_INST/c6psno/cdi_proquest_miscellaneous_733363229
- Jotkowitz A, Samet N. 2010 Rethinking ferrule - a new approach to an old dilemma.
  - https://onesearch.library.uwa.edu.au/permalink/61UWA_INST/c6psno/cdi_pubmed_primary_20616834

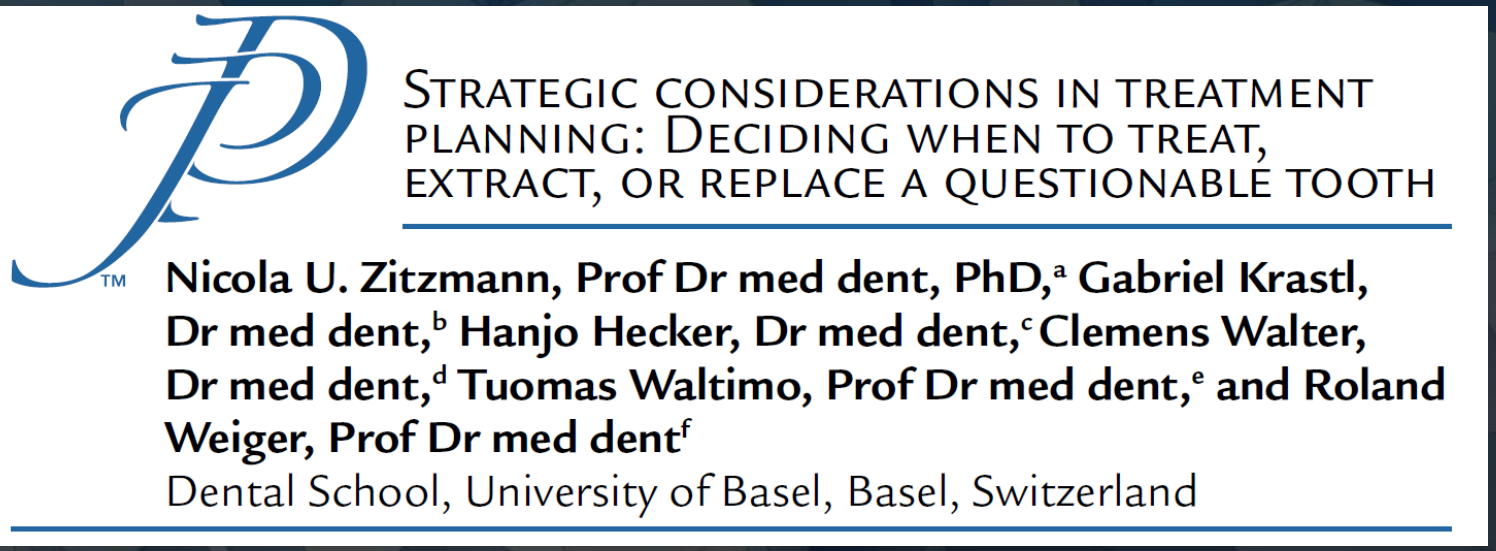
Definition: Prognosis

- The possible outcomes of a disease or condition and the anticipated frequency of those outcomes.
- A prediction of the probable course and outcome of a disease.
- The likelihood of recovery from a disease.
- A forecast or prediction

Prognosis of each tooth in the arch

- Systematic
- Identifies key teeth
- Assess if useful as;
  - Abutments for;
    - Bridge
    - Denture
  - Maintain;
    - Aesthetics
    - Function
      - Mastication
      - Occlusion
      - Speech

Zitzmann 2010 JPD



STRATEGIC CONSIDERATIONS IN TREATMENT PLANNING: DECIDING WHEN TO TREAT, EXTRACT, OR REPLACE A QUESTIONABLE TOOTH

Nicola U. Zitzmann, Prof Dr med dent, PhD,[a] Gabriel Krastl, Dr med dent,[b] Hanjo Hecker, Dr med dent,[c] Clemens Walter, Dr med dent,[d] Tuomas Waltimo, Prof Dr med dent,[e] and Roland Weiger, Prof Dr med dent[f]

Dental School, University of Basel, Basel, Switzerland

Factors	Good	Questionable	Hopeless
Periodontal	PPD ≤3 mm, BoP^-, PAL loss ≤25%, FI degree ≤I	Residual PPD ≥6 mm and BoP^+, PAL loss of approximately 50%, FI degree II or III, root proximity	Insufficient residual attachment
Endodontics	No clinical signs and absence of or decreasing radiolucency	No clinical signs and persisting radiolucency	Symptomatic situation and radiolucency, no further treatment feasible
Implants	Absence of BoP, suppuration, bone loss	BoP with/without bone loss	Mobility
Prosthetic	Sufficient residual tooth substance, adequate retention and resistance forms (ideally, 4-mm wallheight with 15- to 20-degreeconvergence angle,1.5- to 2-mm ferrule)	Reduced retention/ resistance form (<3-mm wall height and/or >25-degree convergence angle)	Insufficient residual tooth substance (<1.5-mm circular ferrule), no crown lengthening or extrusion feasible

PPD: probing pocket depth; BoP: bleeding on probing; PAL: probing attachment level; FI: furcation involvement (degree 0 to 3)

14, 15

14, 15

Options?

- Composite
- Crown
  - +/- Post
  - +/- Core
- Crown lengthen
- Extrude
- Extract

Abutment for partial denture?

QUINTESSENCE INTERNATIONAL

Classification and prognosis evaluation of individual teeth—A comprehensive approach

Nachum Samet, DMD[1]/Anna Jotkowitz, BDS[2]

Following a complete evaluation of the patient, treatment planning requires the analysis of individual teeth, accurate diagnosis, and prognosis evaluation. Currently, there is no accepted comprehensive, standardized, and meaningful classification system for the evaluation of individual teeth that offers a common language for dental professionals. A search was conducted reviewing existing literature relating to classification and prognostication of individual teeth. The dimensions determined to be of importance to gain an overall perspective of the individual relative tooth prognosis were the periodontal, restorative, endodontic, and occlusal plane perspectives. The authors present a comprehensive classification system by conjugating the literature and currently accepted concepts in dentistry. This easy-to-use system assesses the condition of individual teeth and enables a relative prognostic value to be attached to those teeth based on tooth condition and patient-level factors. *(Quintessence Int 2009;40:377–387)*

Patient or host factors

Biologic risk factors
Medical conditions that impair immune function and healing
Impaired salivary flow/function
Medical condition or disability limiting oral hygiene
High *Streptococcus mutans* and *Lactobacillus* salivary count
Positive for interleukin-1 genotype
Family history
Other missing teeth
Behavioral risk factors
Compromised or poor oral hygiene
Cariogenic diet
Low exposure to fluoride
Parafunctional habits
Ability and willingness to adhere to a long-term maintenance protocol
Smoking
Financial/personal risk factors
Motivation for treatment
Available resources for dental care
Willingness to commit finances, time, and effort
Attitude toward losing teeth
Understanding of one's condition and needed treatment
Esthetic expectations
Low dental IQ

Jotkowitz and Samet 2009

- Anatomic irregularities/ risk factors

- Irregularly shaped roots
- multiple canals and/or roots
- Thin and/or short roots,
- Excessively conical roots

Jotkowitz and Samet 2009

- Iatrogenic compromising factors

- Perforations
- Extensive post preparations
- Minimal tooth structure thickness left after preparation
- Dental materials that cannot be removed,
- No active pathology = prognosis iatrogenic dentistry may be fair – good.
- But;
  - further treatment is planned/tooth,
  - or tooth has signs/symptoms:
    - Other pathology
    - Clinical
    - radiographic,
  - → prognosis level drops

Jotkowitz and Samet 2009

	Class A – Good	Class B – Fair	Class C – Questionable	Class D – Poor / Compromised	Class X – Hopeless/Illogical to treat/non-slavageable
Periodontal condition	80%-100% bone support. Easily maintained.	50%-80% bone support. Can be well maintained.	30%-50% remaining bone support. Difficult to be well maintained.	<30% bone support. Cannot be cleaned or maintained well and has evidence of active periodontal disease.	< 30% bone support. Cannot be cleansed or maintained without acute outbreaks of periodontal infection.
'Restorability' Restorative condition	80%-100% remaining sound coronal tooth structure. Easily restored.	50%-80% remaining sound coronal tooth structure. Restoration results in no infringement of biologic width, has adequate ferrule, good crown-root ratio.	30%-50% remaining sound coronal tooth structure. Achieving adequate ferrule would compromise crown-root ratio to some extent or affect adjacent structures.	<30% sound tooth structure. Extent of lost tooth structure does not enable good ferrule to be achieved without totally compromising support of adjacent tooth structures or crown-root ratio.	No remaining supragingival sound coronal tooth structure. Loss of tooth structure deep into the root dentin/canals.
Endodontic condition	Can receive straightforward primary endodontic treatment, or already has good endodontic therapy.	Failing endodontic treatment can receive predictable re-treatment, or requires a difficult primary endodontic treatment.	Failing endodontic treatment that is difficult to predictably re-treat.	Failing endodontic treatment that cannot be predictably re-treated.	A vertical root fracture or a tooth that has been retreated several times endodontically and/or surgically without resolution
Occlusal plane & tooth position	Tooth in correct occlusal plane, position, slightly deviated from ideal.	Tooth out of correct occlusal plane, can be adjusted to function within correct occlusal plane.	Tooth out of occlusal plane and requires multiple procedures to function within occlusal plane.	Tooth severely out of occlusal plane, severely tilted that after extensive treatment will exhibit reduced crown-root ratio, prevent from serving as long-term unit in arch. Position impacts health of adjacent structures.	A tooth so far super-erupted or tilted out of the occlusal plane that it cannot be restored into correct position function, or would interfere with the restoration of that arch or the restoration of the opposing arch.

Jotkowitz and Samet 2009

- 14 years ago
  - Pre-dates new(er) perio classification – grading & staging.
- Considers worst case scenario
- Does not consider:
  - ‘rescue’ tooth scenario
  - Distribution of teeth towards removable partial denture