Failure in crown & bridge Prosthodontics

Failure in crowns and bridges should be regarded as a disadvantages and balanced against advantage, some bridges are failure from the day they inserted while others last over 40 years.

Manifestations of failure

Failure might manifested itself in one or more of following patient complaint;

- Pain
- Inability to function
- Dissatisfaction with esthetics
- Broken teeth and/or restoration
- Inflammatory swelling
- Bad taste
- Bad breath
- Bleeding gums
- Anxiety

Patient complaint might be Immediate or Delayed

Causes of fixed prosthesis failure

- Improper case selection
- Faulty diagnosis and treatment plan
- Inaccurate clinical or laboratory procedures
- Poor patient care and maintenance following insertion

For purpose of discussion the reasons for failure of fixed prosthesis may be divided into **biological, mechanical, esthetic and Maintenance problems.** while mechanical in general, are more directly under the control and influences of clinician the biological problems are not easily controlled and in some instances may be unrelated to the prosthesis,
however it is true and many time that, the biological problems may be a consequence of the treatment procedure (pulpal) or of the restoration itself (periodontal or caries).

A) Biological problem

1. Caries;

It is the most common cause of failure of fixed restorations, its detection very difficult whether clinically or radiographically practically when complete coverage is used

Causes;

a) Open and over or under extended margin (short or long margin); her fluid seepage could occur lead to dissolution of cement that give an area for food debris impaction this defiantly result in caries.
b) Lose of retention as result of marginal seepage.
c) High risk patient (high caries index) because of poor oral hygiene.
d) Reduce salivary flow.
e) Perforation of restoration (structural durability)

2. Pulpal injury (problem)

Pulpal problem is not uncommon complication in bridge work.it might be the outcome of microbial, chemical, mechanical and thermal irritation. It should be always expected and most often associate with small teeth, in favor of structural duality and periodontal health a massive reduction is necessary so good evaluation is important. Teeth with questionable pulp go and do root canal treatment, anyhow, pulpal pain and discomfort should expected to last sometime to sex months. To verified pulpal pain vitality test should done

- *Full crown--------thermal*
- *Partial crown -------electrical*
- *Radio graphical-------to see periapical whether infected or not*

Causes of pulpal problem

I. Overheating and heat generation
- **a)** Lack of coolant.
- **b)** Very high speed
- **c)** Insufficient bure
- **d)** direct temporary crown

II. Improper or absence of temporary protection

III. Irritating cementing agent

IV. Over reduction ,insufficient tooth structure to protect pulp or microscopic pulpal exposure

V. Recurrent caries under full crown, microbial irritation.

VI. Traumatic occlusion.

3. Periodontal and soft tissue problems

Periodontal breakdown may lead to loss of abutment. ***Patient suffer from*;**

- *Mobility of abutment*
- *Periodontal pocket formation*
- *Periodontal abscess*
- *Pain which prevent mastication at the side of restoration*
- *Bad odor and taste*

The most common cause for periodontal problems are

I. Over contouring of crown.

II. Insufficient interproximal clearance, reduction or overcontour

III. Deficient interproximal contact

IV. Increased cervico occlusal length of connector

V. Improper tissue pontic relation---saddle design

VI. Overextended subgingival positioning of finish line

VII. Irregular or rough edges of crown that might cause irritation to the gingival tissue

VIII. Failure of contact ---food impaction

IX. Ill-fitting crown might cause irritation to gingival tissue

X. Presence of foreign body irritating soft tissue

XI. Improper pontic design (continuous food accumulation and soft tissue pressure

XII. Improper connector design

B) Mechanical problems

I. Looseness of crown or bridge (Cementation Failure):

Loss of retention is not a common cause of failure of individual crowns. However, because of the leverage forces on fixed–fixed bridges, one of the more common ways in which they fail is by one of the retainers becoming loose but the other remaining attached to the abutment tooth. The most common causes of Looseness are

a) Poor retention because of inadequate preparation or faulty preparation (converagence angle, length, surface area ,…….etc.)

b) Faulty cementation

The causes of Inadequate cementation might be

- Poor mixing of cement.
- Failure to have a dry field.
- Poor seating
- Type of cement

c) Faulty restoration

- Open or overhang margin
- Wear or perforation
- Deformation of restoration (structural durability)

d) Premature contact (torque)

e) Caries

f) Poor retainer design selecton such as ceramic crown in state of fused metal restoration.

II. Mechanical failure of crowns and bridges

a. *Porcelain fracture*

1. Ceramic crown……

- Faulty laboratory technique such as improper condensation , air bubbles, inadequate firing, ,faulty protocol for cad cam crown
- Faulty preparation

2. Porcelain fused to metal……

- Faulty technique…..poor coping design
- Metal framework flexing

b. *Distoration or fracture*

c. *Faulty structural durability of restoration*

d. *Occlusal wear or perforation*

e. *Failure of solder joint*

III. Restoration Failure

A-Retainer failure;

- Perforation
- Marginal discrepancy
- Veneering separation, fracture or wearing

B- Pontic failure;

- Pontic fracture (Porcelain) with unfavorable occlusal load
- Limited occluso cervical height due to over eruption

C- Connector failure;

- Improper designing of connector size and position
- Thin metal at the connector
- Incorrect selection of solder
- Porosity

IV. Marginal deficiencies of restoration

- ***a)*** *The cause might be*
- ***b)*** *Poor preparation (ill define finish line)*
- ***c)*** *Impression with Ill define margin (not clear) of preparation*
- ***d)*** *Technical faults*
- ***e)*** *Cementation errors*

V. Fracture of abutment tooth

Over reduction and tooth heath state might be the cause

VI. Design failure

A simple classification of these failures is as 'under-prescribed' and 'over-prescribed' bridges

➢ *under prescribe bridge design*

These include designs that are unstable or have too few abutment teeth – for example a cantilever bridge carrying pontics that cover too long a span or a fixed–movable bridge where again the span is too long, or where abutment teeth with too little support have been selected. Another 'under-design' fault is to be too conservative in selecting retainers, for example intracoronal inlays for fixed–fixed bridges. With these design faults little can be done other than to remove the bridge and replace it with another design

➢ *over prescribe bridge design*

Cautious dentists will sometimes include more abutment teeth than are necessary, and fate usually dictates that it is the unnecessary retainer that fails. The first lower premolar might be included as well as the second premolar and second molar in a bridge to replace the lower first molar, no doubt so that there will be equal numbers of roots each end of the bridge so as to comply with the redundant 'Ante's Law'. This is not necessary. The retainers themselves may be overprescribed, with complete crowns being used where partial crowns or intracoronal retainers would have been quite adequate; or metal– ceramic crowns might be used where all-metal crowns would have been sufficient. When the pulp dies in such a case, it is interesting to speculate whether this might not have occurred with a less drastic reduction of the crown of the natural tooth.

VII. Discomfort of the patient

a) Soft tissue irritation by pressure which might be from improper pontic design or food staff accumulation

b) Deficient interproximal contact that cause food impaction

c) Traumatic occlusion

- ➢ Faulty construction such as occlusal surface with high marginal ridge or deep incline plan
- ➢ Faulty diagnosis and treatment plan such as
- ➢ Use of teeth that lack of alveolar support
- ➢ Overloading of abutment
- ➢ Premature contact

d) Retention of food on occlusal surface (poor design)

e) Poor contouring of the retainer and pontic

- ➢ Overcontour.....overprotection and under stimulation
- ➢ Under contour.....over stimulation and under protection....gingival tissue trauma

f) Sensitive cervical margin to hot or cold application
- Long margin that might cause gingival recession
- Over displacement of gingiva
- Temporary restoration with long margin cemented for long period of time
- Retainer with short or open margin

g) Seating failure
- Too thick cement
- Insufficient pressure during cementation

C) Failure related to esthetic

One of the objective in replacing missing tooth is esthetic, definitely failure of this objective lead to failure of bridge. Shape, size, position and shade of restoration collectively play important role in esthetic value so factors that might cause faulty esthetic are;

a) *Improper shade selection*
b) *Poor harmony between restoration and natural teeth (improper contour might be the fault of dentist or lab technician)*
c) *Failure to mask metal color*
d) *Un necessary metal display*
e) *Improper cement selection*
f) *Irregular and rough surface ……discoloration*

D) Maintenance Failure

- *Poor oral hygiene and improper maintenance of a well done restoration may lead to failure of prosthesis.*
- *The patient must be fully informed about his responsibility in success or failure of restoration*
- *The dentist must recall the patient for periodic clinical and radiographic examination to detect early any harmful changes that might occur.*