implant-abutment-connection
with press fit: morse taper connection
implant-abutment-connection with press fit: morse taper connection
implant-abutment-connection
with press fit: morse taper connection
implant-abutment-connection with press fit: morse taper connection

clearance fit
press fit of a morse taper connection
force transfer abutment to implant (virtual one piece implant)
force transfer abutment to implant (virtual one piece implant)
friction grip of a morse taper connection
rotation secured by friction grip of a morse taper connection
scenario: tooth non loaded
cantilever doesn’t cause micro-movement of the implant-abutment-joint.
Cantilever scenario:

- Non-loaded cantilever doesn't cause micro-movement of the implant-abutment-joint.
- Cantilever causes high load at the implant-bone interface.
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:
Changing rationales connecting teeth with implants by a suprastructure

implant-implant vs. tooth-implant connected prostheses
Changing rationales connecting teeth with implants by a suprastructure

implant-implant vs. tooth-implant connected prostheses
implant-implant vs. tooth-implant connected prostheses

Changing rationales connecting teeth with implants by a suprastructure
Changing rationales connecting teeth with implants by a suprastructure

implant-implant vs. tooth-implant connected prostheses
Indication:
Changing rationales connecting teeth with implants by a suprastructure

**Indication:**

crown restored tooth
Indication:

Changing rationales connecting teeth with implants by a suprastructure

crown restored tooth + inadequate bone amount

- patient’s refusal of bone augmentation
- patients financial limitations
Indication:

crown restored tooth +
Indication:

- crown restored tooth
- less risk factors
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

damped anchorage
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

damped anchorage

stiff anchorage
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

- Damped anchorage
- Stiff anchorage
Changing rationales connecting teeth with implants by a suprastructure

**Biomechanics:**

**Forces:**

- Intercuspidation
  - Mastication
  - Bruxism

**Biomechanics:**

**Forces:**

- Intercuspidation
  - Mastication
  - Bruxism

Saturday, May 23, 2009
mastication cycle: forces

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mastication cycle: forces

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mastication cycle: forces

Acting forces:
parameters vary in
- amount of force
- load position
- direction

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**mastication cycle: forces**

**Acting forces:**

parameters vary in

- amount of force
- load position
- direction
- bite velocity

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Saturday, May 23, 2009
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:
Changing rationales connecting teeth with implants by a suprastructure.

Biomechanics:

- **damped anchorage**
- **stiff anchorage**
- **non-rigid connection**
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: non-rigid connection
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: general consensus in 1982
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: general consensus in 1982

It was believed that the elasticity of a periodontal ligament would preclude the stiff connection of a tooth with a rigid osseointegrated implant by a suprastructure, the consensus arising from the desire to avoid an implant overloading.
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

damped anchorage

stiff anchorage
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

- Damped anchorage
- Stiff anchorage

Rigid connection
Changing rationales connecting teeth with implants by a suprastructure

**Biomechanics:** rigid connection
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: rigid vs. non-rigid


**Prospective evaluation of implants connected to teeth.**


30 patients received 2 implants, 1 on each side of the mandible, and were restored with 3-unit fixed partial dentures connected either *rigidly* or *non-rigidly* to an abutment tooth. Patients were followed for at least 5 years post-restoration.
Biomechanics: rigid vs. non-rigid


Prospective evaluation of implants connected to teeth.

- Paired t tests revealed no significant differences in crestal bone levels for implants or teeth at the 5-year recall.
- The percentage of patients who had measurable intrusion was 66% for the non-rigid group, and 44% for the rigid group;
- 25% of the non-rigid teeth had greater than 0.5 mm intrusion, compared with 12.5% for the rigid group.
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: rigid vs. non-rigid

**Naert IE**, Duyck JA, Hosny MM, Van Steenberghhe D.

Freestanding and tooth-implant connected prostheses in the treatment of partially edentulous patients. Part I: An up to 15-years clinical evaluation.

In 123 patients, 339 implants were connected to 313 teeth by means of fixed partial prostheses (test) and followed up for 1.5-15 years (mean: 6.5). In another ad random selected 123 patients, 329 implants were connected to each other by means of 123 freestanding fixed partial prostheses (control) and were followed up for 1.3-14.5 years (mean: 6.2).
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: rigid vs. non-rigid


• To avoid intrusion of abutment teeth, the connection, if made, should be completely rigid.
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: rigid vs. non-rigid


- To avoid intrusion of abutment teeth, the connection, if made, should be completely rigid.

Why?
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: rigid vs. non-rigid

Naert IE, Duyck JA, Hosny MM, Van Steenberghe D.
Freestanding and tooth-implant connected prostheses in the treatment of partially edentulous patients. Part I: An up to 15-years clinical evaluation.

• To avoid intrusion of abutment teeth, the connection, if made, should be completely rigid.

Why?

the precision attachments may be increase the friction or lock in an intrusive position relative to the tooth.

Both prevent the relocation of the intruded tooth.
Biomechanics: present

The connection should be completely rigid to avoid intrusion of abutment teeth.

It can be easily achieved in a one-piece bridge by aligning an implant abutment to the insertion path of the ground abutment tooth.
Changing rationales connecting teeth with implants by a suprastructure

**Biomechanics:** present

The connection should be completely rigid to avoid intrusion of abutment teeth.

It can be easily achieved in a one-piece bridge by aligning an implant abutment to the insertion path of the ground abutment tooth.
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: present

3 years
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: present

3 years
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

- damped anchorage
- stiff anchorage

Rigid connection
Biomechanics: rigid connection

2 possible scenarios: - tooth loaded
- tooth not loaded

damped anchorage

stiff anchorage
scenario: tooth loaded
scenario: tooth loaded

gap of periodontal ligament
scenario: tooth loaded

gap of periodontal ligament

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gap of periodontal ligament

scenario: tooth loaded
closed gap of periodontal ligament

cantilever

torque

scenario:
tooth loaded

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closed gap of periodontal ligament

torque = micro-movement of the implant-abutment-joint
scenario: tooth loaded

closed gap of periodontal ligament
scenario: tooth loaded

closed gap of periodontal ligament
scenario: tooth non loaded
cantilever doesn’t cause micro-movement of the implant-abutment-joint
scenario: tooth non loaded

gap of periodontal ligament
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: future

The trabecular framework retaining the implant will adapt to the amount and the direction of applied mechanical forces.

Mechanical strong implant systems can borne a single crown with a cantilever instead of an implant/teeth connecting three unit bridge.
Changing rationales connecting teeth with implants by a suprastructure

**Biomechanics:**

The trabecular framework retaining the implant will adapt to the amount and the direction of applied mechanical forces.

Mechanical strong implant systems can borne a single crown with a cantilever instead of an implant/teeth connecting three unit bridge.
Indication:

- crown restored tooth
- + less risk factors
Indication:

- Changing rationales connecting teeth with implants by a suprastructure
- Less risk factors
- Crown restored tooth

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Changing rationales connecting teeth with implants by a suprastructure

Biomechanics:

future

8 years

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Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: Future Trends

2 years
Changing rationales connecting teeth with implants by a suprastructure

Biomechanics: future

1.5 years