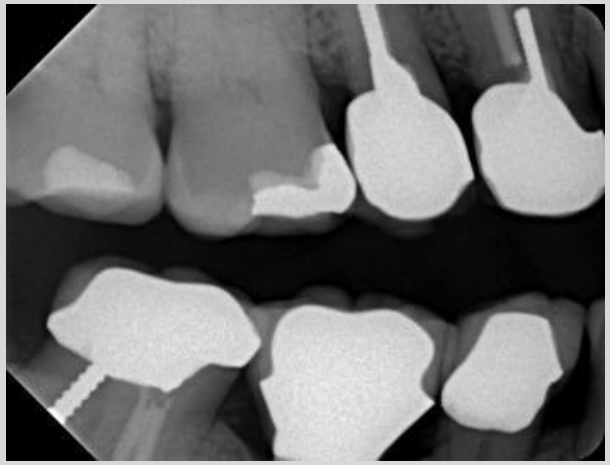
# OPENING OF INTERPROXIMAL IMPLANT CONTACTS

Study Club November

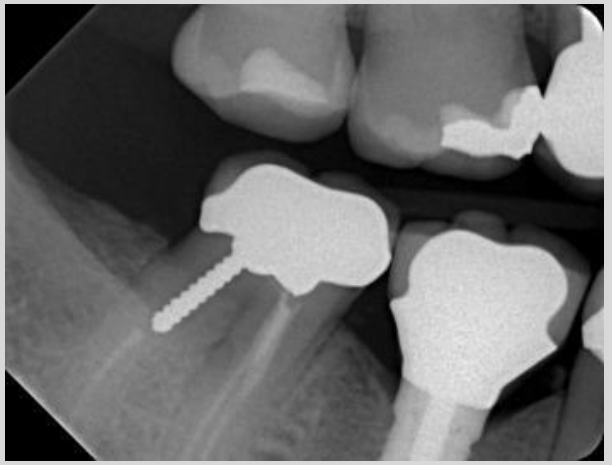
2021

# Development of open proximal contacts between implant restorations and natural teeth when before there was none???

Initial cementation radiograph of #30 with tight clinical contacts



Radiograph at one year post cementation showing an open mesial contact



Studies are showing opening of interproximal contacts between implant restorations and natural teeth are occurring more frequently than expected

# Consequences

- Food impaction
- Caries
- Periodontal issues-black triangles, loss of clinical attachment, gingival inflammation, or reduction of interproximal bone.
- The need for prosthetic repair
- Frustration for the patient and the restoring dentist

# Four primary forces that influence or chance the dentition's arrangement:

- Tongue and lips
- Personal behavior (habits) or orthodontic appliances
- Periodontal membrane
- Occlusal forces ****provides the major force vector associated with physiological tooth migration

# Review of muscles of mastication for jaw closure

- Medial pterygoid
- Masseter
- Superior division of the lateral pterygoid
- Temporalis muscles

On Mandibular closure forces created by these muscles are directed in different directions by the teeth's inclined planes.
The forward vector is referred to as the anterior component of force (ACF) which drives teeth mesially. This force increases proportionally to the magnitude of the bite force.
Forces exist to push teeth distally as well, however the mesial vector is 5 times stronger than the posterior force.

# Studies of forces

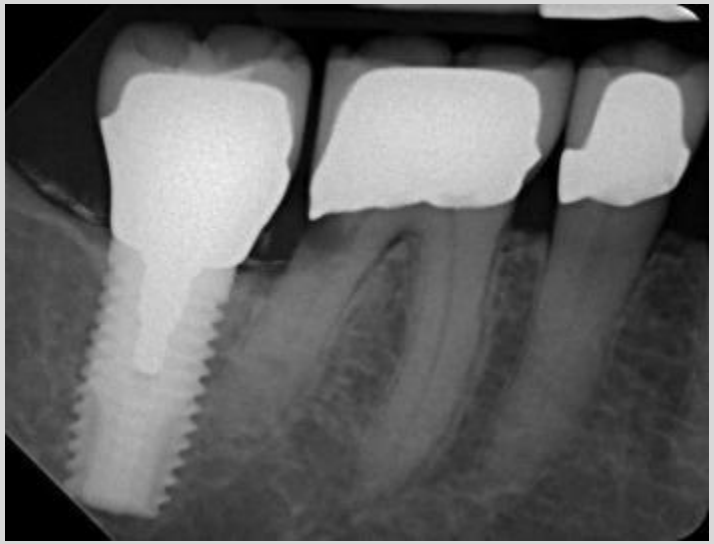
- In 1923, Stallard (The anterior component of the force of mastication and its significance to the dental apparatus H Stallard - Dental Cosmos, 1923) suggested that the arc of mandibular closure caused an ACF on mandibular posterior teeth that was transmitted via interproximal contacts between the teeth and that this vector drove teeth mesially as the contact points wore because of friction.
- Conroy (An investigation of the posterior component of occlusal force JJ Conroy - 1994 - apps.dtic.mil) subjected all the teeth individually in a mandibular quadrant to a controlled force and assessed the magnitude of the ACF via a custom bite force transducer connected to a strain indicator. He noted the ACF was transmitted via interproximal contacts and its strength decreased farther from the posterior teeth. He also confirmed a posterior component of force in this study.

# Proximal contacts

- Size and location vary with age, tooth position, biting force and crowding of teeth
- Typically oval and found toward the buccal of interproximal areas
- Larger contact areas are needed in the posterior teeth to resist attrition where there is increased biting force.
- Over time the shape of the contact areas change due to attrition and physiological drifting-oval contacts become kidney shaped which is associated with a flattening of the contact area, creating room for mesial drifting.

# Modification of contacts after extraction

- Tooth removal results in a reduction of the interdental tissue volume due to shrinkage of the papilla and bone loss between the tooth and future implant restoration.
- To compensate for the larger embrasure or concave shape of an adjacent tooth the contact should be longer, broader and wider in an occlusogingival dimention.



# Craniofacial growth

- Dental implants function like ankylosed teeth and do not move with additional jaw growth.
- Subtle facial growth may occur mesially, buccally and vertically even throughout adulthood.
- A study released in 2020 by  Oesterle, Larry J.; Cronin, Jr, Robert J.  states, while the effects of growth on implants in children have been well documented, the changes that occur in adults have not been studied with respect to single-tooth implants. It has been assumed that adults are stable and do not change; however, research in the last few years has indicated that adults do change with aging, and adult growth does occur. The changes in adults occur over decades rather than rapidly, as seen in children.
- Growth changes occur in both arches and result in adaptive changes in the teeth over time, both vertically and horizontally, and in alignment. These dental changes may result in a lack of occlusion vertically or malposition of adjacent natural teeth relative to the implant crown.

# Conclusions of interproximal opening

- Studies have indicated that an interproximal gap can develop 34% to 66% of the time after an implant restoration was inserted next to a natural tooth.
- Interproximal space typically occurs on the mesial aspect of a restoration and can occur as early as 3 months after restoration placement.

# Lack of solutions and proper studies

- So far studies have been observational and not experimental or controlled.
- Studies have not investigated types of therapy that may improve outcomes
- Studies did not use other quadrants without implants as control groups to evaluate interproximal changes where implants did not exist
- Physiological migration does not explain the occurrence of open distal contacts adjacent to implant restoration.
- It has been suggested to use retainers to reduce the incidence of open contacts, however there is no data in the literature for this.

## Suggested guidelines for management of open contacts adjacent to an implant restoration.

- The possibility of future open contacts should be communicated to patients before treatment, and this information should be included in a medicolegal consent form.
- Retrievability of implant restorations is strongly recommended because loss of interproximal contact is fairly common.
- Before impression procedures for implant restorations, modify both adjacent contacts with minor recontouring so they are flatter in profile and rounded, with minor undercuts and rough edges removed.
- If there is an open contact with no food impaction, provide no treatment and carefully monitor patient compliance.
- If there is an open contact with food impaction without pathosis, the first choice is modification of the implant restoration; the second choice is restoring the adjacent tooth.
- If there is an open contact with food impaction and caries, modify the adjacent tooth with a conservative restoration or a new full-coverage restoration to address the caries. If there is a periodontal or peri-implant problem, address it.
- Eliminate open contact areas to preclude potential problems, especially in patients with high caries rates or history of periodontitis.
- For maintenance and monitoring, use a peri-implant maintenance protocol (3 to 6 months), observe contacts surrounding implants, and reexamine occlusion in the area of the implant restoration.