



IMPORTANCE OF CONTACT AREAS AND CONTOURS IN PROSTHODONTICS: AN OVERVIEW

Prosthodontics

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ABSTRACT

Enhanced comprehension of the interproximal relationship enables clinicians to more effectively preserve or restore these structures. To preserve the natural form of the tooth while restoring the shape and contour of restoration must always be the prime requisite of any restoration. This paper is an attempt not only to make the reader understand about the normal anatomic contacts and contours but the potential hazards due to lack of proper contacts and contours while restoring.

KEYWORDS

INTRODUCTION:

Optimising the shape of teeth has always been the ultimate goal in restorative dentistry. It is essential not just for replacing absent tooth structure but also for restoring the ideal form and function¹. From the cariogenic aspect there may be only 20 occlusal surfaces but there are 60 contacting proximal and 64 facial and lingual surfaces susceptible to caries mainly due to faulty interrelationship between the contact areas, marginal ridges, embrasures and the gingiva².

Decay on the facial and lingual surfaces is especially in the gingival 1/3rd primarily by faulty interrelation between the tooth contour and the periodontal components. From the periodontal aspect, periodontitis may also be caused both inter-proximally and in the facial and lingual periodontium by these faulty interrelationships³.

The key to these proper relationships inter-proximally is the contact area and facio-lingually are the occluso-gingival and mesio-distal configuration.

Types Of Contacts:

Contact	Tapering	Ovoid	Square
1. Incisors	Incisal ridges	Mesial – ¼ of crown incisio gingivally.	Incisal ridges
	Labio-lingually it is labially.	Distal – 1/3 rd to ½ of crown lingually.	Labio-lingually it is in the center.
2. Canine	Mesial-Incisal ridge Distal – Middle	Close to incisal ridges	Close to incisal ridges
	Labio-lingually it is in the center	Centre	Centre
3. Bicuspsids	Junction of the occlusal and middle 1/3 rd .	Middle 1/3 rd	Occlusal 1/3 rd
	Labio-lingually it is at the buccal axial angle	Junction of buccal and middle 1/3 rd	Towards buccal axial angle
4. Molars mesial contact	Junction of the occlusal and middle 1/3 rd .	Middle 1/3 rd	Occlusal 1/3 rd
	Labio-lingually it is at the mesio-buccal axial angle of tooth.	Junction of buccal and middle 1/3 rd	Towards buccal axial angle
5. Molars distal contact	Distal contact of mandibular first molar is variable due to the position of distal cusp. Occluso-gingivally at the middle 1/3 rd Buccolingually at the middle 1/3 rd	Occluso gingivally at the middle 1/3 rd Buccolingually in line with the central groove of the occlusal surface.	If small contact occlusal 1/3 rd lingually. If large contact from lower border of the marginal ridge to the CEJ. 1/3 rd to 2/3 rd of the crown bucco-lingually.

Causes Of Disturbances In Contact³:

1. **Physiological** – midline diastema, spacing, rotation.
2. Plunger cusp, food impaction.

3. Fracture of teeth.
4. Proximal caries.
5. **Habits** – Unnecessary tooth picking, placing a nail or a needle between teeth.
6. Improper orthodontic force.
7. Jaw fracture
8. **Improper restoration** – improper cavity preparation, improper matricing, improper widening, overhanging restorations, improper contouring of the wax pattern of an artificial crown.
9. **Missing tooth** – drifting of teeth, supraeruption of opposing teeth.

Causes Of Disturbances In Contour³:

1. Physiological wear
2. Abrasion, erosion
3. Fracture of teeth
4. Enamel hypoplasia
5. Smooth surface caries
6. **Improper restoration** – improper matricing, overcontouring of restoration, overcontouring of the wax pattern of an artificial crown especially cervically on the buccal aspect.

Causes Of Disturbances In Embrasure:

1. Improper contacts
2. Improper contours
3. Periodontal disease

Causes Of Disturbances In Marginal Ridges:

1. Proximal caries, fracture of teeth
2. Placing the contacts too gingivally or occlusally
3. **Improper restoration** – absence of marginal ridge, creating a marginal ridge not compatible in height with the adjacent tooth, a marginal ridge with no adjacent triangular fossa, one planed marginal ridges in bucco-lingual direction.

Hazards Of Improper Contact Areas⁴:

1. Contact area that is too broad, bucco-lingually or occluso-gingivally will change the anatomy of the tooth and the interdental column. The normal saddle shaped area will become broadened. This is the most vulnerable area to periodontal disease. Furthermore these broadened contacts produces an interdental area that is difficult to clean and is more susceptible to decay. Broadening of contact reduces the embrasures which usually leads to improper movement or flow of masticated material. This leads to adhesion of debris and possible interproximal impaction of that debris, which causes Halitosis. Due to the periodontal problem there can even be loss of tooth.
2. Contact area that is too narrow, bucco-lingually or occluso-gingivally will allow the food to be impacted vertically or horizontally on the delicate interdental column. This will lead to greater susceptibility for plaque accumulation which in turn predisposes to the same periodontal and caries problems.
3. Contact area placed too buccally or lingually will result in flattened restoration at the expense of the buccal or lingual embrasures.
4. Contact area placed too occlusally will result in a flattened marginal ridge at the expense of occlusal embrasure.
5. Contact area placed too gingivally will increase the depth of the occlusal embrasures at the expense of the contact areas own size or at the expense of broadening or impinging upon the interdental

column.

6. Loose or open contact may be caused by the occlusal forces moving the teeth mesially or distally. It creates continuity of the embrasures with each other and with the interdental column. These defects will allow for the impaction of food and the accumulation of bacterial plaque with the accompanying periodontal and caries problems.

Hazards of Improper Contours⁴:

1. Facial and lingual convexities: Convex contours on the facial and lingual surfaces of the teeth afford protection and stimulation to the supporting structures during mastication. They direct the food towards the buccal vestibule, palate or tongue while stimulating the surrounding soft tissue by gentle massage rather than irritating it. Overcontoured curvatures can create a favorable environment for the accumulation and growth of cariogenic and plaque bacteria at gingival margin, apical to the height of contour. This results in chronic inflammation of gingiva.

It has been revealed that there is always more inherent danger in overconvex rather than underconvex facial and lingual surfaces.

Morris, reported the response of gingival tissue around teeth prepared for artificial crowns which had lost their temporary crowns were found to be surrounded by healthy gingiva without plaque in the cervical region compared with approximating unprepared teeth.

Commonly, porcelain fused to metal crowns are over-contoured because of inadequate facial reduction. Such overcontour interferes with the sealing cuff effect of gingiva against the tooth and the self-cleansing mechanism of the gingival sulcus.

2. **Facial And Lingual Concavities:** - Concavities occlusal to the height of contour are involved in the occlusal static and dynamic relations, as they determine the pathways for teeth in and out of centric occlusion. Mislocated concavities will lead premature contacts during mandibular movements and excessive concavities can invite extrusion, rotation or tilting of occluding cuspal elements into non-physiological relations with opposing teeth.

Concavities apical to the height of contour, therapeutically or pathologically exposed are essential for the proper maintenance of the accompanying new components of the adjacent periodontium and must be initiated in a restoration. Deficient concavities at these locations can create restoration overhangs and excessive concavities decrease the chance for successful plaque control in the extremely plaque retaining areas.

3. **Proximal Contours:** In addition to creating a proper contact area, it is also essential to restore a proper contour adjacent to the contact area. The proximal crown contours are generally flat or concave. This provides adequate embrasure space for the interdental gingiva and allows room from plaque removal. The transitional line angle is also generally flat or concave to form the opening for the embrasure space and house the interdental tissue. Fabricating a restoration that does not reproduce the concavities and convexities which occur here naturally will lead to restoration overhangs and underhangs, vertical and horizontal impaction of debris and impingement upon the adjacent periodontal structures. Too narrow embrasures predispose teeth and supporting structures to heavier stresses. Too wide embrasures offer little protection to the underlying soft tissue.

Hazards of Improper Marginal Ridges⁴:

1. Absence of marginal ridges in the restoration: By the absence of a marginal ridge, force 1 will be directed toward the proximal of the adjacent tooth. The horizontal components of force 1H and 2H will tend to drive the two teeth away from each other. Mean while the vertical component 1V and 2V can impact the food interproximally. The vertical component V2 will be more than required, there may occur slight tilting of the tooth B.
2. A marginal ridge with wide occlusal embrasures: Exaggerating the occlusal embrasure will direct forces 1 and 2 on adjacent proximal surfaces with the horizontal components 1H and 2H separating the teeth and the vertical components 1V and 2V driving the debris interproximally.
3. Adjacent marginal ridges not compatible in height: If a restored marginal ridge is higher than the adjacent one, it will allow force A

to work on the proximal surface of the restoration. The horizontal component AH will drive the restored tooth away from the contacting tooth and the vertical component will drive the debris interproximally. There will be some separation of teeth as the surface hold force B is too small to counteract force A⁵.

4. A marginal ridge with no adjacent triangular fossa: In this situation there are no occlusal planes in the marginal ridges for the occlusal forces to act upon, so there are no horizontal components to drive the teeth towards each other, closing the contact. Furthermore, the vertical force will tend to impact food interproximally.
5. A marginal ridge with no occlusal embrasure: The two adjacent marginal ridges act like a pair of tweezers grasping the food substance passing over it. Though there will not be any vertical impaction of food, the contours impact of higher concentration of vertical component of forces may lead to changes in alveolar bone after sometime.
6. A thin marginal ridge in its mesio-distal bulk will be susceptible to fracture or deformation leading to the problems of the previously mentioned faulty marginal ridge. Also, this thinness may leave either shallow or deep adjacent fossa or bulky anatomy with the same problems.
7. A one planed marginal ridge in the buccolingual direction can create premature contacts during both functional and static occlusion. This type of marginal ridge increase the depth of adjacent triangular fossa, magnifying the stresses in this area. Moreover, the one planed marginal ridge could increase the height of the marginal ridge in the centre, making it amenable to the adverse effects of horizontal components of force. Likewise, one planed marginal ridge will deflect the food stream away from normal, proximal embrasure movements.

Procedures For The Formulation Of Proper Contacts And Contours⁶:

Intra Oral Procedures:

1. Tooth Movement:
2. Matricing:-

II. Extra Oral Procedures:

1. Wax Patterns:
2. Cast adjustments:

CONCLUSION:

Proper reproduction of the size and location of the contact areas to imitate the natural dentition is essential for the success of treatment and the restoration of proximal surface. The health of the periodontal tissues depends on properly designed restorations. Overhanging restorations and open interproximal contacts should be addressed and remedied during the disease control phase of periodontal therapy.

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