

Occlusion indicating materials: An insight

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Abstract

Occlusal rehabilitation mainly concerns restoration of form and function of teeth in harmony with the stomatognathic system. Failure to achieve occlusal harmony leads to dysfunctions like temporomandibular pain. Hence a thorough understanding of the synergy of teeth is very important. Occlusal interferences can be detected by different types of indicators and then corrected. The aim of this article is to discuss the various materials and methods used as indicators that help in making accurate adjustments rather than just chasing the coloured marks.

Keywords: occlusion indicator, occlusal interference, occlusal contact, occlusion

Introduction

Restoration of a harmonious occlusion is the key to any prosthodontic rehabilitation. An occlusal interference is

any tooth contact that inhibits the remaining occluding surfaces from achieving stable and harmonious occlusion. Any interference as small as 15 µ can trigger an untoward response and hence must be eliminated¹. Traditional concepts of traumatic occlusal interferences involve a single anterior or posterior tooth, which is in “supracontact” during maximum intercuspation or on excursive jaw movement. These two situations are collectively called occlusal interferences².

Over the years, many materials and methods have been put forth by various authors to detect these interferences. For precise examination of occlusion, a thorough knowledge on tooth contact patterns is very important.

Classification of tooth contact patterns:

1. Cuspid protected occlusion³: Canines contact on working side

2. Group function⁴: contact of canines, premolars and molars on working side
3. Full balance occlusion⁵: multiple contacts on working and non-working side
4. Others⁶: occlusal patterns other than those described above. Contact of incisor teeth, if any were also included.

Hellman described 4 types of tooth contact:

- a. Surface
- b. Cusp tip to fossa
- c. Ridge to groove
- d. Ridge to embrasure

He also stated that there are 138 possible contacts in the dentition with normal occlusion⁷. Occlusal indicators are used to locate and define contacts⁸ and the accuracy of these indicators is of prime concern in establishing occlusal harmony⁹.

There are 2 different methods of evaluating occlusal relationships¹⁰:

1. Qualitative: this method is used for localisation of occlusal contacts
2. Quantitative: used of determining the sequence and density of occlusal relationships.

Materials used as an occlusal indicators⁷:

Table 1:

Alginate impression material	Mylar paper
Polyether rubber impression bite	Silicon putty
Transparent acetate sheet	Wax
Articulating paper	Silk strips
High spot indicator	Occlusal sprays
Photo occlusion	Occlusal sonography
T-scan	

Alginate impression material¹¹

The impression material was applied to the occlusal surfaces of all lower canines, premolars, and molars on

both sides. Subjects were then instructed to close their mouth slowly and bite with light to moderate pressure until the impression material was set. All impressions were made at the same period of time during the day. After their careful removal, the left and right indexes were examined against light, and the number and location of perforations were registered as occlusal tooth contacts for each subject. The chi-square test was used to determine any statistically significant differences between the right and left sides for the observed number and location of contacts.

Mylar paper^{12,13}

The shim stock 8 mm in width and was positioned over the tooth evaluated. When the participants close in Intercuspal Position, teeth holding the shimstock were considered to have occlusal contact with their antagonists. In this manner, proceeding tooth by tooth around the dental arch, the dentist identifies the teeth with contact. Metallic shimstock-films is made of metallic polyester-film of 12microns thick. A combination of color coating and metallic film offers extra advantage of high spot precision over conventional shimstock films.

Polyether rubber impression bite¹⁴

Silicone impression material method for examining occlusal contact patterns was used before and after orthodontic treatments. The locations of the contacts were then transferred to study models. Although this method had good accuracy, it was impractical.

Silicon putty¹⁵

Silicone putty interocclusal records were made in the intercuspal and in the retruded contact position immediately after each set of impressions were made. Each record was repeated until two identical records of each position were obtained. The interocclusal records were trimmed and placed on the casts. The location of tooth contacts was observed as perforations in

the silicone putty records. Liqua-Mark, a color indicator, was painted into the perforations of each record with a fine camelhair brush to produce discrete markings on the casts. Different colors of the color indicator were used to differentiate between the intercuspal and retruded contact positions.

Transparent acetate sheet¹⁶

It is based on occlusal sketch technique that aimed to provide a simple and reliable means of recording and transferring information about the location of marked occlusal contact. It may also be used by the technicians to verify occlusal contacts when articulating casts and fabricating indirect restorations.

Wax¹⁷

Contact points are recorded by placing wax on occlusal surfaces of the maxillary posterior teeth and patient closing into maximum intercuspation. The wax occlusal records were examined in front of a light screen. Drawbacks included inaccuracy and problems of manipulation.

Articulating paper

The width, thickness and dye type of the articulating paper helps it to leave a mark⁸. The color coating of many articulating papers consists of waxes, oils and pigments, a hydrophobic mixture which repels saliva. High spots can be detected easily as dark marks and contacts as light marks. Articulating papers come in strips and horse shoe shaped sheets (Bausch articulating paper Inc, Nashua, NH, USA).

The major disadvantages of articulating papers have been that they can be easily ruined by saliva are thick, and they have a relatively inflexible base material; all of these factors result in a greater number of pseudo contact markings. Some articulating films have an additional emulsifier which gives these films certain bonding properties on moist occlusal surfaces. It can be bonding

agent like transculase (Bausch articulating paper Inc, Nashua, NH, USA), or wetting agents like lecithin. The first test is made with blue articulating paper (200microns). Spots are immediately evident. The bonding agent, transculase, is also transferred as a fine coating. The next step is to take a thin film (preferably red, 8microns) because of its intensity and excellent contrast with blue. The colour transfer of these film are considerably improved with the help of transculase coating^{18,19}.

Silk strips⁸

Silk strips are the best material for indicating occlusal contacts. Articulating silk is made from high quality natural silk. Natural silk consists of so-called fibrils, a tube-shaped protein structure which, because of its composition, has an extremely high color reservoir capacity. This silk is highly tear-resistant and, because of its low thickness and good flexibility, adapts perfectly to cusps and fossae. Silk because of its texture donot produce pseudo markings but they can lose their marking abilities when the stain component dry. Hence it is advisable to store in cool, closed environment¹⁹.

Occlusal sprays

Locating occlusal contacts is a challenge on highly glazed surfaces. Untreated articulating papers donot leave a mark and silk ribbons leave a smudge mark, hence articulating sprays are a reliable alternative in such cases¹⁰. These are universal color indicators to test occlusal contacts.

They are easy to administer (Arti-Spray, Bausch articulating paper Inc, Nashua, NH, USA) and leaves a thin colored film which can easily be removed with water, leaving no trace of residues. They are applied at a distance of 3-5 cm onto the occlusal surface. When testing occlusion, all contact points will be immediately visible. These are available in colors like red, blue, green and white⁷.

Photo occlusion

A thin photoplastic film layer is placed on the occlusal surface of the teeth; the patient then is asked to occlude on the film layer for 10 to 20 seconds. The film layer is removed from the mouth and inspected under a polariscope light²⁰.

Occlusal sonography

This technique uses sounds generated during occlusal contacts. The sound was measured in a subject before and after occlusal adjustment and was reported that a significant decrease in duration of occlusal sound was found after adjustment²¹. In early 80s commercial device known as dental sound checker was used for this purpose²².

T-scan

The T-Scan instrument was designed to examine and record occlusal contacts by computer analysis of information from a pressure sensitive film. The T-Scan system digitally records both the location and timing of tooth contacts. Electrical resistance develops with the applied force. When the patient occludes on the sensor, the particles come together in the force applied areas, diminishing the electrical resistance.

The first occlusal contact that results when the mandible is closed on a correct centric relation axis is known as the *centric relation prematurity*. This procedure (T-Scan) combines bimanual manipulation with the simultaneous recording of the sequence of resultant tooth contacts using a computerized occlusal analysis system²³.

Discussion:

Occlusal adjustment refers to selective trimming of teeth in order eliminate premature contacts and achieve occlusal harmony.

Indications²⁴:

1. Evidence of trauma from occlusion, by changes in periodontium

2. Symptoms of TMJ dysfunction and habit neurosis like bruxism
3. Excessive tooth mobility
4. Excessive tooth wear
5. Need for extensive restorative work
6. Pre-restorative treatment

Different materials have been used since years for registration of occlusal interferences. Selection of appropriate technique depends on the clinical situation, affordability, reliability and thorough knowledge about the material by the clinician. Proper skill with which effective result can be attained is what will make a difference rather than chasing the blue marks.

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