PERPUSTAKAAN KAMPUS KESIHATAN
UNIVERSITI SAINS MALAYSIA

RUJUKAN

CLINICAL MEASUREMENT AND EVALUATION OF VERTICAL DIMENSION OF FACE.

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Laporan Akhir Projek Penyelidikan Jangka Pendek.

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3) Tajuk Projek:

Clinical Measurement and Evaluation of Vertical Dimension of face.

4)(a) Penemuan Projek/ Abstrak.

(Perlu disediakan makluman di antara 100-200 perkataan di dalam Bahasa Malaysia danBahasa Inggeris ini kemudiannya akan dimuatkan kedalam laporan Tahunan Bahagian Penyelidikan &Pembangunan sebagai satu cara untuk menyampaikan dapatan projekj tuan/ puan kepada pihak Universiti).

Abstract

The vertical dimension (VD) is very important because it refers to the vertical distance between the maxilla and mandible with the teeth in occlusion. In full denture contruction specialty in edentulous cases, it is very difficult accurately to reproduce the vertical dimension of the former dentate condition.

The objectives of the research were to compare and evaluate three methods of determining VD: (i) the Simplified Method of Hayakawa; (ii) the indicator Procedure of Hayakawa and (iii) the Dipoyono and Sugiatno Method.

The number of subjects used to test method was 30.In Addition to the measurements that were used to determine VD, additional information was obtained from the subjects about facial form and the palm of the hand. Mean deformation (in mm) were 57.3267 (The Simplified Method of Hayakawa) ; 56.98027 (The Indicator Procedure of Hayakawa) and 61.7167 (The Dipoyono and Sugiatno Method).This difference was significant ($p < 0.01$) as tested by pair t - test .

It was found that the methods of Hayakawa were very complicated to use but the Dipoyono and Sugiatno is simple and quick to use.

It is concluded that each of the three methods tested is useful for measuring VD but the method of Dipoyono and Sugiatno is simple and recommended for full denture clinical use.

Abstrak

Dimensi vertikal adalah penting kerana ia merujuk kepada jarak vertikal diantara rahang atas dan rahang bawah dimana kedudukan gigi berada di dalam oklusi.
Di dalam pembinaan gigi palsu penuh , adalah sukar untuk menghasilkan dimensi vertikal yang tepat dari semula jadi .
Objektif penyelidikan ini adalah membandingkan dan evaluasi 3 (tiga) cara pengukuran dimensi vertikal : (i) Simplified Method of Hayakawa ; (ii) Indicator procedure of Hayakawa dan ; (iii) Dipoyono -Sugiatno method.
Bilangan subjek yang digunakan untuk penyelidikan adalah 30.Tambahan pula ,pengukuran yang digunakan untuk mengenal pasti dimensi vertikal adalah daripada subjek mengenai bentuk muka dan telapak tangan.
Purata kesilapan (dalam mm) adalah 57.3267 (Simplified Method of Hayakawa) ; 56.98027 (Indicator Procedure of hayakawa) dan 61.7167 (Dipoyono-Sugiatno method).Kepentingan perbezaan ($p < 0.01$) diuji dengan pair t test .
Didapati cara Hayakawa adalah sangat susah tetapi cara Dipoyono dan Sugiatno adalah mudah dan cepat untuk digunakan .
Kesimpulannya , setiap 3 cara yang di uji adalah berguna untuk pengukuran dimensi vertikal tetapi cara Dipoyono dan Sugiatno adalah mudah dan digalakkan untuk penggunaan klinikal bagi pembuatan gigi palsu penuh .

(b) senaraikan Kata kunci yang digunakan di dalam abstrak :

Bahasa Malaysia	Bahasa Inggeris
Dimensi vertikal	Vertical dimension.
Tak ada gigi	Edentulous
Rahang Atas	Maxilla
Rahang Bawah	Mandible.

5) Output Dan faedah Projek.

(a) Penerbitan (termasuk laporan/ kertas seminar)
(sila nyatakan jenis , tajuk,pengarang, tahun terbitan dan di mana telah diterbit /dibentangkan).

(5.1.)Clinical Measurement and Evaluation of Vertical Dimension of Face.,Haryo MD.,IADR Malaysia section Kuala Lumpur.UKM, 18 January 2003.

(5.2.)Three methods of Vertical Diension of occlusion.Haryo MD., National Conference on Medical Sciences Medicine in the Genomic Era.8-9 May 2003. USM Kota Bharu Kelantan .

(5.3) Clinical Measurement and Evaluation of Vertical Dimension of Face. July 2003.CPC PPSG USM.

(b). Faedah Faedah Lain Seperti Perkembangan Produk,
Prospek Komersialisasi Dan Pendaftaran Paten.
(Jika ada dan jika perlu, sila gunakan kertas berasingan)

Tak ada.

(c) latihan Gunatenaga Manusia.

i) Pelajar Siswazah.

Tak ada.

ii) Pelajar Pra siswazah

Tak ada.

iii) Lain Lain.

Tak ada.

6.Peralatan Yang Telah dibeli :

-4.(empat) Removable disk Handy steno Apacer.

-1 camera Fuji S 1050 Zoom date. 38-105 mm.

UNTUK KEGUNAAN JAWATANKUASA PENYELIDIKAN UNIVERSITI

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Abstract

The occlusal vertical dimension(VD) is very important because it refers to the vertical distance between the maxilla and mandible with the teeth in occlusion. In full denture construction specialty in edentulous cases , it is very difficult accurately to reproduce the vertical dimension of the former dentate condition.

The objectives of the present were to compare and evaluate three methods of determining VD: (i) the Simplified Method of Hayakawa; (ii) the indicator Procedure of Hayakawa and (iii) the Dipoyono and Sugiatno Method. The number of volunteer subjects used to test each method was 30.In Addition to the measurements that were used to determine VD, additional information was obtained from the subjects about facial form and the palm of the hand.

Mean deformation (in mm) were 57.3267 (The Simplified Method of Hayakawa) ; 56.98027(The Indicator Procedure of Hayakawa) and 61.7167 (The Dipoyono and Sugiatno Method).This difference was significant ($p< 0.01$) as tested by pair t –test

It was found that the methods of Hayakawa were very complicated to use but the Dipoyono and Sugiatno is simple and quick to use.It is concluded that each of the three methods tested is useful for measuring VD but the method of Dipoyono and Sugiatno is very easy and simple so will be recommended for general clinical use.

Introduction

The establishment of vertical maxillomandibular relations is a phase of prosthodontic treatment for edentulous patients for which several different methods have been suggested. No systematic comparative studies of such methods ara available, so there is no certain scientific basis for determining a correct vertical dimension of occlusion.studies of growth and developtment have shown that the rest position of the mandible tends to remain relatively constant for reasonable lengths of time.However ,several short and long term intraoral and general factor can influence the postural rest position,such as wear and loss of teeth,general health factors and aging, and body and head posture .But most important from a clinical point of view is that the presence or absence of dentures or occlusion rims, and the vertical dimension of these,can affect the physiological rest position.The method used for determining the position (e.g. relaxation,swallowing or phonetics) also may modify its vertical level.Dentist must keep in this mind when using the rest position as a guide for establishing vertical maxillomandibular relations.Nevertheless, most patients will adapt to a vertical dimension that is established by means of a combination of esthetic,functional, and patient reported comfort considerations together with information derived from studying the patients rest position.

Compromises between comfort,esthetics and function often are advisable and may be necessary te reduce the known vertical dimension of occlusion that has been obtained from preextraction records.

Dentures may have favorable esthetics but still not be comfortable because of excessive leverage from the great amount of maxillomandibular space.

The interocclusal distance will be reduce with gradual wear of the natural teeth,usually without damage to the structures concored. The dentist attempting to restore youth by restoring the youthful vertical dimension of the face with dentures is likely to encounter great difficulty.The skin,hair joints eyes,ears and all organs of the body undergo degenerative changes that are natural and occur with the passing of years.

Therefore, a sacrifice in comfort often is necessary to restoring a youthful appearance for the sake of esthetics.Much pressure is brought to bear by many patients trying to stave off old age .If the dentist succumbs to this pressure, the prognosis will not be favorable. A great danger in this phase of denture construction is an excessive interarch distance,because premature striking of teeth causes recurring trauma to the tissues and longer leverage makes the dentures more easily displayed.

The interceptive occlusal contacts may result in clicking of the denture teeth.

Extrusion of natural teeth caused by a loss of opposing teeth may bring the alveolar process with it, and closure of part of the interarch space in that region occurs.

For full coverage of the denture bases, an abnormal amount if interarch space is needed to accommodate the artificial teeth . An acceptable vertical dimension of the face, in such a case may require surgery of the maxillary tuberocities,retromolar pads , and soft tissues irregularities, or reduced denture base coverage.

These factors should be studied by mounted diagnostic casts ,radiographs, and digital examination before the treatment phase of constructing dentures is started.

Reduced interarch distance lessens the biting force and consequently reduces soreness; therefore, it often is used to this end.Narrow knife edged ridges that cannot be made comfortable in any other manner may be treated by reducing the occlusal vertical dimension to decrease trauma and soreness.However , a reduced interarch distance may result in a facial expression that is not desirable ; and the vertical dimension of the face should be increased to a point that will be satisfactory and comfortable.With a reduced interarch distance, the lower third of the face is change because the chin has the appearance of being too close to the nose and too far forward.The lips lose their fullness and the vermillion borders are reduced to approximate a line . The corners of the mouth turn down because the orbicularis oris andits attachments are pushed too close to their origin.The reduced vertical dimension of occlusion decreases the action of the muscles, with a resultant loss of muscle tone.This gives the face an appearance of flabbiness instead of firmness. A reduced interach distance ofte n causes a crease to form at the corners of the mouth, which may be associated with angular cheilitis.

The reduced interarch distance leads to a loss of the cubicle space of the oral cavity .Normally the tongue at rest completely fills the oral cavity , and a reduced interach distance has a tendency to push the tongue toward the throat, with the result that adjacent tissues are displaced and encroached Such enchroachment may mean obstruction of the opening of the Eustachian tubes,which will interfere with ear function .

This can be the cause of much discomfort. It has been claimed that impaired hearing may be due to a reduced vertical dimension of face.
However,these claims are difficult to support.Even if it is not well documented, it often is suggested that TMJ pathoses may be attributed to a reduced interach distance of the occlusion or to occlusal disturbances that accompany the inevitable aging changes in denture bearing tissues.If it is suspected that these various pathological conditions are attributable to a reduced interach distance,the dentures should be contructed as treatment dentures.The vertical dimension of occlusion, should be built up gradually.Complete restoration of the original occlusal vertical dimension in one set of dentures will likely result in failure because the patient is unable to accommodate to this great change in so short time.
Given the advantages and disadvantages of establishing an open or a close vertical dimension,most experience prosthodontic prefer to have the vertical dimension a little too small rather than too great .This must include information to overoptimistic patients that it will not be possible to restore the facial appearance as it was at a young age , and that all wrinkles cannot be eliminated by the new dentures.(Douglas and Maritato,1965 ; Helsing G and Odont,1984 ; and Zarb et.al.,1997.)

Methods of determining the vertical dimension.

Vertical dimension of the face is defined as the distance between two arbitrarily selected points: one in the maxilla and one in the mandible.The diffrence between vertical dimension of the face in intercuspal position(IP)

and postural position (PP) is referred to as the free way space.(Helsing and Odont,1984)

This describes one way it can be measured, for comparison purposes,but the definition requires much information to be useful clinically.(Weinberg, 1982).

The selection of an adequate vertical dimension of occlusion for a patient who has no recorded pre –extraction measurements is very difficult, primarily because landmarks of reference are altered or lost.(Douglas and Maritato,1965).

There are many methods and landmarks in use today.

The methods for determining vertical maxillomandibular relations can be grouped roughly into two categories.The mechanical methods include use of pre extraction records and measurements, ridge parallelism, and others. The physiological methods include use of the physiological rest position, the swallowing phenomenon, and phonetics as a means for determining the facial dimension at which occlusion should be established.The use of esthetics and patient reported comfort adds to the mechanical and physiological approaches to the problem .

All determinations of the vertical dimension must be considered tentative until the teeth are arranged on their trial bases.At try-in ,observations of phonetics and esthetics can be used as a check agains the vertical relations established by mechanical or physiological means.

Mechanical methods (Zarb et.al.,1997)

1.Ridge relation

a.Distance from the incisive papilla to the mandibulas incisors

b.Parallelism of the ridges

2.Measurement of the former dentures

3.Preextraction records

a.Profile radiographs

b.Castsof the teeth in occlusion

c.Facial measurement

Physiological Methods

1.Physiological rest position

2.Phonetics and esthetics

3.Swallowing threshold

4.Tectile sense

5.Patient reported perception of comfort.

Mechanical methods

Ridge relation .

Incisive papilla to mandibular incisors.The incisive papilla is a stable alndmark that changes comparatively little with resoption of the alveolar ridge.The distance of the papilla from the incisal edges of the mandibular

anterior teeth on diagnostic casts averages approximately 4 mm in the natural dentition.

The incisal edges of the maxillary central incisors are an average 6 mm below the incisive papilla.Therefore , the mean vertical overlap of the opposing central incisors is about 2mm.It is important to remember that these are average measurements: they should be used with caution, and they do not appear to be relevant in patients with severe resoption .

Parellelism of the ridges.Parallelism of the maxillary and mandibular ridges, plusa 5 degree opening in the p[osterior region , often gives a clue as to the correct amount of jaw separation .This paraleelism is natural ,because the teeth in normal occlusion leave the residual ridges in the posterior region parallel to each other,provided there has been no abnormal change in the alveolar process.

Because the clinical crowns of the anterior and posterior natural teeth have nearly the same length,their removal tends to leave the residual alveolar ridges nearly parallel to each other.This would be ideal from a mechanical point of view, because the dentures would not tend to slide anteriorly or posteriorly .However, in the most people , th teeth are lost at different times, and when a person finally becomes edentulous, it often is observed that the residual ridges are no longer parallel.In addition, the edentulous ridges of the mandible and maxillae will become progressively more discrepant from the standpoint of width.

Measurement of the former dentures.Denture that the patient has been wearing can be measured, and the measurements can be correlated with observations of the patients face to determine the amount of change required.

This measurements are made between the borders of the maxillary and mandibular dentures by means of a Boley gauge.
Then , if the observations of the patients faceindicate that this distance is too short, a corresponding change can be made in the new dentures.

Preextraction records

Profile radiographs.Profile radiographs of the face have been much use in research of vertical dimension of occlusion, but because of radiation risks they cannot be considered adequate today for routine use in prosthodontic treatment for edentulous patients.

Casts of teeth in occlusion .

A simple method of recording the vertical overlap relation and the size and shape of the teeth it is to use diagnostic casts mounted on an articulator.The casts give an indication of the amount of space required between the ridges for teeth of this size.
Facial measurements.Various devices for making facial measurements have been used in many different forms. Devices have been made to record the ralation of the head to the central incisors vertically and anteroposteriorly by placement of a face bow with auditory meatus plugs in position and with spectacle suspension.Another method is to record the distance from the chin to the base of the nose by means of a pair of calipers or dividers before the teeth are extracted.

Physiological methods

Physiological rest position.registration of the jaw in physiological rest position gives an indication as to the relatively correct vertical dimension.This may not be an exact guide, however, when used with other methods, it will aid in determining the vertical relation of the mandible to the maxillae.A suggested methodos to have the patient relaxed when the wax occlusion rims are in place, with the trunk upright and the head unsupported.After insertion.of the occlusion rims into the patients mouth ,the patient swallows and lets the jaw relax.When relaxation is abvious, the lips are carefully parted to reveal how much space is present between the occlusion rims. The patient must allow the dentist to separate the lips without help or without moving the jaws or lips.

This interocclusal distance at the rest position should be between 2 and 4 mm when in the premolar region .The interarch space and rest position can be measured by indelible dots oradhesive tape on the face.If the difference is greater than 4 mm , the occlusal vertical dimension may be considered too small; if less than 2 mm, the dimension is probably too great .The occlusion rims ara adjusted until the dentits is satisfied with the amount of interach space and other requirements of an acceptable vertical dimension have been obtained such as patient comfort and phonetic and esthetic considerations.It is essential that an adequate interocclusal distance exists when the mandible is in its physiological rest position.However, it has been found in experimental research that a rapid adaptation takes place after changes of the

vertical dimension ,leading to another rest position and creation of a new interocclusal distance.This has been found to occur even after an increase that was greater than the original freeway space.Such funding indicate that the rest position is not a reliable basis for the determination, and thatsmall variations of the vertical dimension ara not so critical, because the adaptive acapacity of the masticatory system usually is great .

Phonetics and esthetic.

Phonetic tests of the vertical dimension consits more of listening to speech sound production than of observing the relationships of teeth during speech.The production of , ch, s and j sounds brings the anterior teeth close together.

When correctly placed, the lower incisors should move forward to a position nearly directly under and almost touching the upper central incisors.If the distance os too large, it means that too small a vertical dimension of occlusion may have been established. If the anterior teeth touch when these sounds are made, the vertical dimension is probably too great.Like wise, if the teeth click together during speech, the vertical dimension is probable too great.Esthetics also are affected by the vertical relation of the mandible to the maxillae.A study of the skin over other parts of the face can be used as a guide.Normally, the tone of the skin should be the same throughout.However, it must be realized that the relative anterioposterior positions of the teeth are at least equally

as involved in thevertical relations of the jaw as in the restoration of skin tone.

The contour of the lips depends on their instrinsic structure and the support behind them.Therefore , the dentist must initially contour the labial surfaces of the occlusion rims so they closely simulate the anteroposterior tooth positions and the contour of the base of the denture,which,in turn,must replace or restore the tissue support provided by the natural structures.

If the lips are not correctly supported anteriorly, they will be more nearly vertical than when supported by the natural tissues. In such a situation, the tendency is to increase the vertical dimension of occlusion to provide support for the lips, and this can be disastrous.The esthetic guide to the correct vertical maxillomandibular relation is, first, to select teeth that are the same size as the natural teeth and, second, to estimate the amount of tissue lost from the alveolar ridges.

Swallowing threshold.

The position of the mandible at the beginning of the swallowing act has been used as a guide to the vertical dimension of occlusion.The theory is that when a person swallows , the teeth come together with a very light contact at the beginning of the swallowing cycle.If denture occlusion is continually missing during swallowing, the dimension of occlusion may be insufficient.On this basis,a record of the relation of the two jaws at this point in the swallowing cycle is used the

vertical dimension of occlusion.The technique involves building a cone of soft wax on the lower denture base in such a way that it contacts the upper occlusion rim whenthe jaws are open too wide.Then the flow of saliva is stimulated by food, such as a piece of candy. The repeated action of swallowing the saliva will gradually reduce the height of the wax cone to allow the mandible to reach the level of the vertical dimension of occlusion .The length of time this actionis carried out, and the relative softness of the wax cone, will affect the result.We have not found consistency in the final vertical positioning of the mandible by this method, however.

Tactile sense And patient –perceived comfort

A method using the patients tactile sense as a guide to the determination of the occlusal vertical dimension is done using an adjaustable central bearing screw attached to one of the occlusion rims, and a central bearing plate attached to the other one.The central bearing srew is adjusted first so it is obviously too long.Then in the progressive steps,the srew is adjusted downward until the patient ndicates that the jaws are closing too far .The procedure is repeated in the opposite direction until the patient indicates that the teeth feel to long. The srew then is adjusted donward until the patient indicates that the length is about right, and the adjustments are reversed alternately until the height of the contact feels right.The problem with this method relates to the presence of foreign objects in the palate and the tongue space .There also some conflicting results of the precision of the method.

Tests of vertical jaw relations with the occlusal rims.

The vertical separation of the jaws, whichs is established in the mouth with the occlusion rims and mounted on the articulator, is the vertical dimension of occlusion.This preliminary relationship is established by the occlusion rims.It precedes the determination of the horizontal jaw relationship and the eventual preliminary centric relation record.

Some of the tests that aid the dentist in confirming the correct vertical dimension of occlusion with the occlusion rims have been listed .

The use of combinations such tests enables the dentits to make preliminary and tentative determinations of the vertical dimension of occlusion. None of these tests alone can secure of correct registration. The final determination,however, cannot be made by any method until the teeth are set in the wax trial dentures and the vertical dimension is verified in the mouth.

Aim

Background.

In edentulous cases , as there are no teeth, it is almost imposible to reproduce the occlusal vertical dimension of the dentate condition.The occlusal vertical dimension provided for an edentulous patient varies with each practitioner and also its range is considerably wide (Zarb,et.al,1997).Functional methods determining the occlusal vertical dimension by using the rest position of the mandible, bitting force, swallowing movement or phonetics are effective , but they are affected by the skill mental tension and posture of the patient and also by the quality and stability of the occlusal rims (Mc.Entee,1999 ; Dipoyono and Sugiatno ,2000). In other words , these method are complicated and easily lead to errors.The method for determining the occlusal vertical dimension from the aspect of appearance needs a little skill, but if the operator becomes accustomed to it, the occlusal vertical dimension will be determined quickly without bothering the patient or being affected by various situations(Hayakawa, 1999).The vertical dimension is very impostant because the vertical dimension of occlusal (VDO) refer to distance between the maxilla and the mandible when the teeth occlude(Hayakawa,1999; Zarb,et.al,1997) There are a lotof formula which are complicated and difficult to determine the vertical dimension but in this research we will used three methods.Those method will be described in methodology .

Objective.

1.To determine the vertical dimension of face by three methods.

2.To get data of clinical measurement and evaluation of vertical dimension of face.

Materials and methods

Ninety students with all permanents teeth are used in this study.The students are collected in Sekolah Menengah Kubang Kerian 2 Kota Bharu .

The measurements on the face concerning the all vertical dimension land mark.

Three formula are used in this research :

1.***Method no. 1***: Simplified method (Hayakawa ,1999)

SN- Gn = 16.0 + 0.65 X (p- Ch) (unit mm)

2.***Method No.2*** :Indicator Procedure(Hayakawa, 1999)

SN-Gn(the distance from SN to Gn) = 3.95 + 1.16 × (gender) + 1.45 × (profile) + 0.11 × (the length of the palm) + 0.91 × (p-Ch) + 0.10 × (p-p) + 0.10 × (Zy-Zy) − 0.93 × (p-SN) [unit mm]

gender male 1, female 0; profile convex 1, straight 2, concave 3.

Position the head so that the Frankfort horizontal plane is parallel to the floor. Hold the plate perpendiculary and ask the patient to look straight ahead.

Classify the profile of the faceas convex, staright or concave.

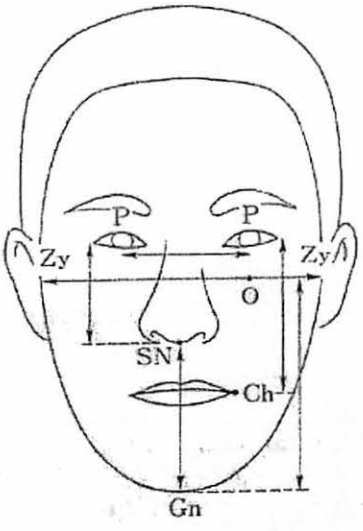
Measure the distance from the center of the pupil to the corner of the mouth(p-Ch) and the distance from the center of the pupil to the inferior border of the nose.

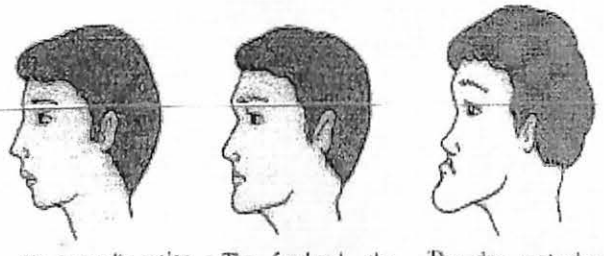
Measure the distance between the pupils(p-p) and the distance between the zygomatic points (Zy-Zy)

Measure the length of the left palm

Enter all the measured level , and the index values of the profile of the face and gender into the formula and then calculate the predicted distance from the inferior border of the nose to the inferior border of the chin(SN-Gn

The landmark showed like this picture :





The upper lip region protrudes.

The forehead, the base of the nose and the chin are in line.

The chin protrudes and the upper lip region retrudes.

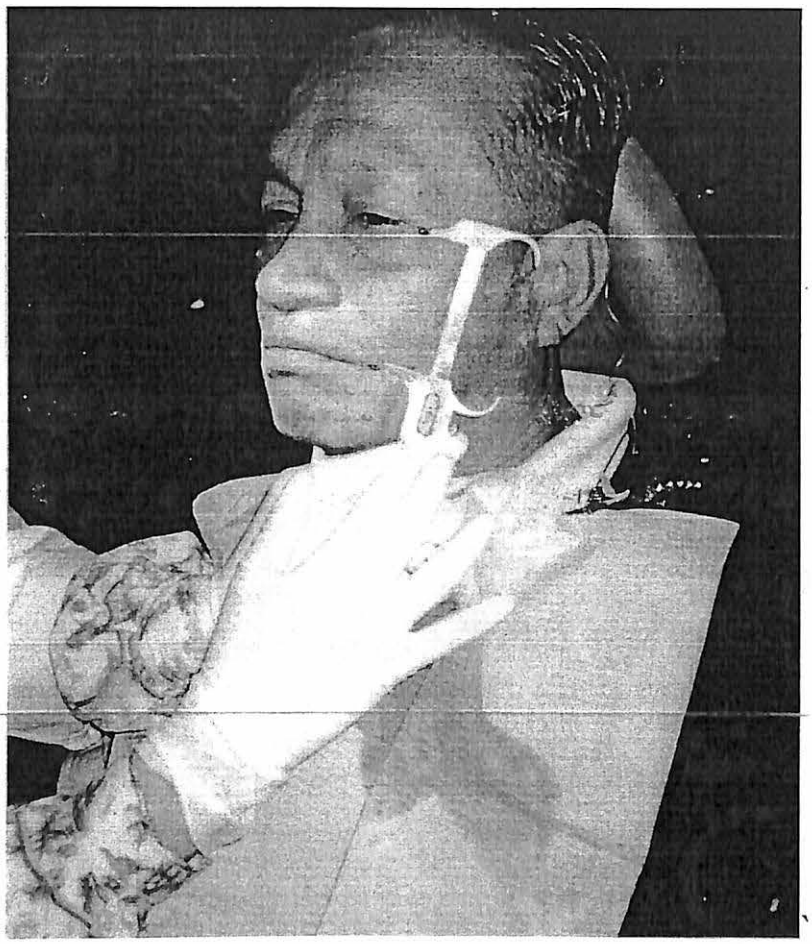
Profile of the patient Convex, straight and concave

3. ***Method no.3(real vertical dimension of occlusion).***

Pupil to mouth (cheilion) must equal with distance Chin to Nose. (Dipoyono and Sugiatno,2000).

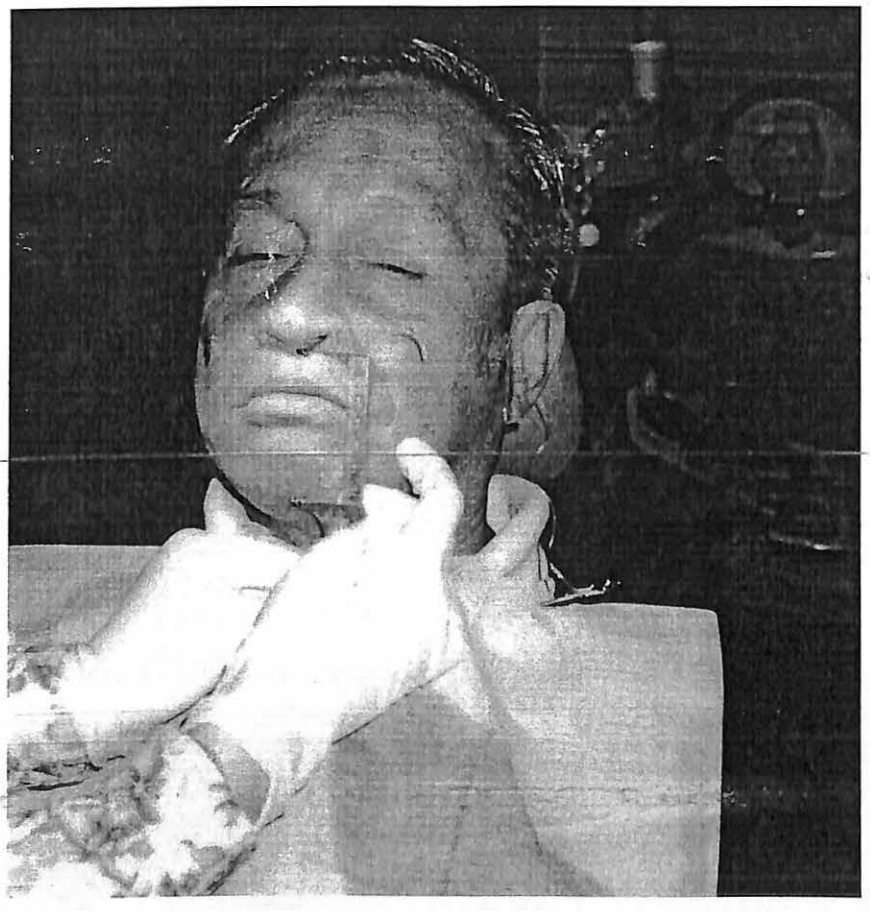
So the data of the vertical dimension of occlusion (VDO)is the vertical dimension of rest position (equal with pupil to mouth distance) must reduce 2 mm and so equal with chin to nose when upper and lower teeth occlusion.

The landmarks of that measurement are



Picture No.1 : The distance between pupil to mouth(cheilion)

The distance between Pupil to Mouth (cheilion) can see at this picture number 2 :



Picture No. 2 : The distance between Nose to Chin .

In the Dipoyono and Sugiatno system , the vertical dimension is include rest position ,so the occlusal rims must be reduced 2 mm for rest position. It is call the vertical dimension of occlusion (VDO).

Results

The measurement Vertical dimension of occlusion from three methods are showed on table 1.

Tabel 1: The Vertical dimension occlusion of three methods

No.	Method 1	Method 2	Method 3(real data of VDO)
1.	54.35	51.97	59.00
2.	56.56	54.94	60.40
3.	57.21	58.67	61.40
4.	58.25	59.27	63.00
5.	56.30	51.65	60.00
6.	56.56	54.44	62.40
7.	59.22	59.30	64.50
8.	67.67	70.77	77.50
9.	58.57	58.68	63.50
10.	60.52	60.70	66.50
11.	62.86	67.84	70.10
12.	55.32	55.32	58.50
13.	57.56	58.61	62.10
14.	60.52	60.51	66.50
15.	55.32	53.67	58.50
16.	55.06	55.23	58.10
17.	52.46	49.97	54.10
18.	61.82	65.28	68.50
19.	55.65	54.27	59.00
20.	53.89	55.05	56.30
21.	56.56	54.66	60.10
22.	56.56	51.88	60.40
23.	57.21	57.14	61.40
24.	55.91	53.32	59.40
25.	56.56	52.32	60.40
26.	58.51	55.39	63.40
27.	55.32	54.94	58.50
28.	52.40	48.63	54.00
29.	57.60	62.53	62.00
30.	57.60	62.53	62.00

Note: VDO= Vertical dimension of occlusion

Table 2: The Mean and Standard deviation of three methods.

Methods	Mean	Standard Deviation	Std.Error mean
1.	57.3267	3.11205	0.56818
2.	56.9827	5.14605	0.93954
3.	61.7167	4.73236	0.86401

Comparison the vertical dimension of occlusion three methods using t test showed on table 3.

Tabel 3: pair t test analysis

Variable	t	+/-mean different (95%CI)	Sig(2-tailed)
Pair 1Var1-Var3	-14.395	-4.39(-5,013 ,-3.766)	0.000*
Pair 2Var2-Var3	-10.851	-4.734(-5.626,-3.841	0.000*
Pair 3Var1-Var2	0.691	0.344(-0.674, 1.362)	0.495

Note: * significant.

Method 1 = Var1

Method 2 = Var2

Mathod 3 = Var3(real data of Vertical dimension of occlusion/VDO)

Discussion

After the loss of the teeth and supporting structures, the normal and auxiliary functions of the masticatory organ are impaired.The function of mastication becomes inefficient,speech is difficult, esthetics are very poor, and the patiens comfort is decreased immeasurably. In order to restore these altered functions satisfactorily, the teeth and the lost alveolar bone must be recreated in the dentures with measurement and specifications that are favorable to the patient.(Doglas and Maritato , 1965).

Vertical dimension can be defined prosthodontically as the vertical measurement of the face between two arbitrary points, one above and one below the mouth, in the midline. This describes one way it can be measured, for comparison purposes, but thedefinition requires much more information to be useful clinically (Weinberg ,1982)

This research has three methods of vertical dimension measurement, there are Hayakawa methods are two ways, and Dipoyono and Sugiatno method one way . All methods for determining the vertical dimension and using sample of Kubang Kerian Kota Bharu kelantan Malaysian High school has beeen done.

The difference of measurement result is shown in table 2.The measurement result at the use the first method is almost similar to those using second method. While the result with the use of third method is different from the two first .

This differenrce may be because of the two first method take Japanese as the object of research .

Table 2 referes the sample means of the first, second and the third methods. The highest value is on the third method, while the lowest is founded at the measurement using the second method.

The statistical calculation of pair t –test indicates the significant difference between the first method to the third method. Whereas ,there is no significant difference between the first and the second method.

The difference may be because the different samples, namely Melayu and Japanese.The racial difference may cause the different pattern of growth. It is because individual growth follows the racial pattern of growth .The different racial may cause the different rate growth,it turn it leads to the different characteristics of those racial(Jacob,1978)

After knowing that measurement of the vertical dimension has many methods with different characteristics, so the method of Dipoyono and Sugiatno (The distance from Pupil to corner of the mouth must be equal with distance from the nose to the chin) in determining the vertical dimension, is not so complicated and easy to run and will be to recommended for general clinical use..

Conclusion

1.The three methods tested are useful for measuring the vertical dimension.

2.The Dipoyono and Sugiatno method is very easy to use and will be recommended for general clinical use.

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