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RE-EXAMINATION OF COMPLETE-DENTURE PATIENTS

I. DEVIATIONS BETWEEN OBSERVERS

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INTRODUCTION

In assessing therapeutic results and in comparisons between different methods of treatment the natural point of departure is a re-examination of treated cases. In these, relevant variables must be recorded, and the indices obtained then give the possibility of an evaluation. The objectivity and accuracy of this evaluation are in their turn dependent on the validity and reliability of the recordings made. One cannot, however, count on getting a true picture for every individual in an examined group. The diagnosis arrived at before the recording is made may be wrong. This appears clearly e. g. in studies of deviations between observers. It even seems probable that errors of method revealed via observer-deviations are of general occurrence in the recording of clinico-odontological variables *Markén* (1962).

The variables that come into the question in examinations of patient-groups with removable dentures have been studied from the point of view of errors above all in Sweden. Thus *Nyquist*

(1952) found good agreement both within observers and between observers in connection with the recording of stability, occlusion, articulation and vertical dimension in complete-denture wearers. *Hansson* (1955) re-examined cases with mandibular free-end saddle dentures. In the combination of three observers by pairs he obtained appreciable deviations in the recording of stability and retention. *Koivumaa, Hedegård & Carlsson* (1960) obtained different magnitudes of observer-deviations in the double recording of partial denture cases. Inconsiderable deviations arise with respect to adaptation to the supporting tissues, occlusion, stability in the occlusion position, active retention. Rather considerable deviations, on the other hand, were obtained with respect to articulation and stability in the lateral position. *Bergman, Carlsson & Hedegård* (1961) recorded complete-denture cases. Two primarily well co-trained observers attained, in this connection, almost complete agreement with respect to the variables clinically inflamed mucous membrane (stomatitis prothetica), the consistency of the ridge, the fit of the dentures, occlusion and articulation. *Bergman, Carlsson & Hedegård* (1964) found that two observers have shown only minor deviations in the recording of stability, occlusion, articulation, status of mucous membrane, ridge conditions in three different examination periods: primary examination, six months later, and two years later. Good constancy was thus obtained in the observers in relation to one another.

In view of a projected re-examination of complete-denture cases it has been considered desirable to undertake a study of errors with the two observers who are intended to carry out the re-examination referred to. The study is intended to throw light on the following problems: deviations between the two observers, independent recording contra simultaneous recording, homogenization tendency, authority situation.

METHODS AND MATERIAL

Recorded variables and their classification

The classification within the variables has where possible followed *Nyquist* (1952) and *Bergman, Carlsson & Hedegård* (1961).

Stability (upper and lower jaws separately): The denture was

pressed against the supporting tissues with the first and middle fingers of both hands. Attempts were then made to tilt or rotate the denture. If in this connection the denture did not move against the supporting tissues, the stability was assessed as good, otherwise as poor.

Adaptation to the supporting tissues (upper and lower jaws separately). This was judged through mirror inspection at the "ah"-line (upper jaw) and through inspection and palpation along the edges of the dentures (both jaws).

Retention (upper and lower jaws separately). During the patient's active movements of the musculature in lips and cheek (both dentures) and tongue (lower-jaw denture) the observers noted whether the denture was lifted from the supporting tissues or not. To this was added a vertical pulling of the denture to ascertain whether there was good or bad adhesion. Marked adhesion was been considered necessary for a recording of the upper-jaw denture as showing good retention. Demonstrable adhesion was noted as a positive factor in assessing the retention of the lower-jaw denture.

Occlusion. For correct occlusion correct intercuspidation without primary contacts on repeated habitual mandibular closure, and hard contact between the dentures on test with cement spatula were required.

Vertical dimension. This was determined by measuring the free-way space to the intercuspidation position. If this exceeded 5 mm, the vertical dimension was recorded as too low.

The appearance and consistency of the ridge have been used for an assessment of the tissues supporting the denture. For a good ridge it was required that this shall be well-developed in the vertical and lateral planes without displaceability of the mucous membrane towards the alveolar process. Deviations from this condition were recorded as poor or bad ridge.

Stomatitis prothetica. Absence of this, or clinically normal mucous membrane, was considered to exist where inspection showed a pale red mucous membrane. Where there were signs of chronic inflammatory changes, stomatitis prothetica was recorded, though without the group-division given by *Nyquist* (1952).

Speech assessed by listening to the patient during conversation and by special testing with words containing the consonants "s",

"d", "t". The speech was recorded as satisfactory where no interferences were noticed. The primary recording distinguished also between a certain interference and markedly bad speech.

Method

The eight variables were recorded for every patient on the same examination occasion by two observers (i. e. the authors) both independently and simultaneously. In this connection agreement when recording independently was noted as simultaneous opinion. In case of lack of agreement a joint examination was undertaken and the simultaneous opinion was then recorded after deliberation.

Before the collection of the material the classification of the variables and the procedure for their recording were discussed between the observers. On the other hand, no patients were recorded in advance, since primary homogenization of the observers has not been aimed at.

MATERIAL

The material consisted of 68 patients who about two years previously had got complete dentures at the Student Clinic of the School of Dentistry in Stockholm.

RESULTS

Table I shows that each of the observers — designated A and B — has made altogether 884 independent recordings. There has been agreement 699 times (79.1 %), disagreement 185 times (20.9 %). The disagreement has shown varying orders of magnitude in connection with different variables. It has been most marked with respect to occlusion, least marked in the matter of stability.

Division of the material into three groups (pat. 1—25, 26—43, and 44—68) shows varying disagreement within variables between groups.

In simultaneous recordings it has in all the 185 cases of disagreement been easy to reach agreement regarding the final recording. Neither A nor B seems to have acted as an authority in relation to his co-observer. This is numerically evident, as it emerges that A's primary diagnosis has in 100 cases and B's in

Table II. *Number of disagreeing diagnoses per patient*

Number per patient	0	1	2	3	4	5	6	7	8	9—13	Total
Number of patients	5	16	13	11	12	7	2	1	1	0	68

Table III. *Over- and under-recordings distributed among variables and observers*

Observer	A		B		Total
Variable	Over-recording	Under-recording	Over-recording	Under-recording	
Stability	7	4	4	6	21
Adaptation	6	9	9	12	36
Retention	9	5	9	7	30
Occlusion	6	5	4	5	20
Vertical dimension	5	1	2	6	14
Ridge	3	7	8	6	24
Stom. proth.	1	9	5	8	23
Speech	3	5	4	5	17
Total	40	45	45	55	185

Table IV. *Number of favourable and non-favourable cases according to independent and simultaneous examination*

Variable	Independent examination				Simultaneous examination	
	A		B			
	Favourable	Non-favourable	Favourable	Non-favourable	Favourable	Non-favourable
Stability	78	58	82	54	81	55
Adaptation	98	38	100	36	97	39
Retention	79	57	81	55	83	53
Occlusion	33	35	35	33	34	34
Vertical dimension	49	19	57	11	53	15
Ridge	86	50	82	54	80	56
Stom. proth.	57	79	51	85	49	87
Speech	47	21	46	22	45	23
Total	527	357	534	350	522	362

85 cases been decisive for the simultaneous recording of the 185 cases of disagreement. Fortuitous circumstances seem to decide who shall be the dominating observer in the individual simultaneous observation. This is further underlined by a study of the results in the groups I—III: The decisive observer alternates within variables except as regards adaptation to the supporting tissues, where A is consistently dominant.

To each of the groups I and III have been assigned 25 patients. The intention has been to allow the predominant part of the material to show whether the observers have tended towards a homogenization. It is possible that such a tendency can be traced, even if the recording of the condition of the ridge goes in the opposite direction. When the results in group II are introduced, however, a discontinuity in the homogenization is obtained.

As shown in Table II the number of recordings per patient and observer has been 13. Complete agreement between A and B within patient has been attained only five times. Disagreement with respect to one to four recordings dominates. Nine or more disagreeing diagnoses per patient do not occur.

In Table III the simultaneous opinion has been normative for the indication of the observer's over- and under-recordings. If, for example, A independently records good retention where the simultaneous opinion gives poor retention, A has under-recorded. If, further, B considers that stomatitis prothetica exists where the simultaneous recording gives clinically healthy mucous membrane, B has over-recorded.

It emerges from the table that B has both over- and under-recorded more often than A. The total result can, certainly, be read off in Table I farthest to the right, though the table does not, on the other hand, give the distribution between over- and underrecordings.

All recordings presented in Table IV note the cases within each variable as favourable (good stability, absence of stomatitis prothetica etc.) or unfavourable (poor retention, obstructed speech etc.). The table shows to what extent in this respect A and B have in the whole material estimated in the same way as in the simultaneous recording. One sees that the independent assessments are almost throughout (exception: stomatitis prothetica)

for both the observers close to the simultaneous result. This is a consequence of the circumstance that over- and under-recordings within observers have in a high degree cancelled each other out.

DISCUSSION

The deviations between the observers are in the case of independent examination marked. They thus deviate unfavourably from the results attained by *Nyquist* (1952), both within observer and between observers. The same holds in relation to *Bergman, Carlsson & Hedegård* (1961, 1964). In the two latter investigations the section on deviations between observers has been carried out by observers co-trained over a long period, i. e. appreciable homogenization may conceivably have existed already primarily. — A and B have obviously not been homogenized in any marked degree, but show, also in Group III, such considerable deviations that they even exceed the greatest in *Koivumaa, Hedegård & Carlsson* (1960) and *Hansson* (1955) in the recording of partial dentures.

There is also reason to ask what, from the point of view of homogenization, has happened to A and B in connection with the recording of the 16 patients in Group II. Unless incidental circumstances exist, a process of adaptation (unconscious) appears to have acted in the wrong direction.

It must be pointed out that a deficient homogenization is not always a disadvantage. For if one is making a simultaneous recording it is valuable for the individual observers not to be homogenized all too markedly. One cannot in this case be sure to what extent the simultaneous recordings eliminate real wrong diagnoses. It may thus be regarded as a certain advantage that the homogenization is incomplete and — above all — that neither of the observers has been influenced by the other as an authority. — On the other hand, homogenization is necessary before each one of a group of observers examines his respective part of a sample which is later to be treated centrally; see e. g. *Westin & Wold* (1943).

Against the background of A's and B's different recordings it is by no means unexpected to find that they have reached full agreement in 13 recordings with respect to only five patients of

altogether 68. Difficulty assessed borderline cases of course contribute to such a result, and the borders are hard to establish.

Primarily there are over- or under-recordings as these have been defined. Thus A and B would assess e. g. the therapeutic result relatively differently with respect to the individual patient. Here, simultaneous recordings probably give a more correct picture of the real state of affairs.

On the other hand, it proves that assessments of the different variables in the whole patient-group deviate but little, in independent recording, from the result arrived at in simultaneous recording. A good levelling out has taken place between over- and under-recordings for both A and B. Both the types of underlying incorrect diagnosis have been about equally frequent. This, as we know, is not always the case. Thus, for example, it is obvious that under-recordings strongly predominate in the recording of caries; see e. g. *Bergman* (1953), *Markén* (1962).

CONCLUSIONS

In the recording of variables which are relevant in examinations of complete-denture wearers there may be considerable deviations between observers.

If homogenization between observers is aimed at, e. g. before major field-investigations with several observers distributed among different investigation areas, a co-training with about forty cases (here Group I + II) do not guarantee sufficient homogenization.

In the case of assessments — variable by variable — there seemes to be a good chance that incorrect diagnoses in different directions will cancel each other out satisfactorily. Thus it appeares to be sufficient to use only one experienced observer for the recording of the variables studied when groups of complete-denture weares are being examined. It is possible to establish in a simple way the occurrence of an authority-bound observer during a period of co-training.

SUMMARY

In 68 patients who had been wearing complete dentures for about two years the following factors have been recorded: sta-

bility, adaptation to the supporting tissues, retention, occlusion, vertical dimension, appearance and consistency of the ridge, stomatitis prothetica, speech. Two observers have performed both independent and simultaneous examinations. In the case of independent examination considerable deviations between observers have been noted within each variable.

In the simultaneous examination it was possible to establish the absence of any dependence on authority. Both observers found it easy to follow each other's motivations in the final, simultaneous recording when there was primary deviation.

On comparing the first with the last 25 cases it was possible to establish the fact that the observers' homogenization had been inconsiderable.

All deviating recordings imply under- or over-recordings in relation to the results of the simultaneous recording. Over- and under-recordings have been about equally frequent. Consequently, the estimates of both observers within the variables and within the whole material have been close to the result at the simultaneous recording.

RÉSUMÉ

EXAMEN DE CONTRÔLE DE PORTEURS DE PROTHÈSES COMPLÈTES
I. DIVERGENCES ENTRE LES OBSERVATEURS

Chez 68 patients portant depuis environ deux ans des prothèses complètes, les facteurs suivants ont été enregistrés: stabilité, adaptation aux tissus de soutien, rétention, articulé et occlusion, dimension verticale, aspect et consistance de la crête, stomatite sous plaque prothétique, élocution. Deux observateurs ont procédé aux examens, d'une part indépendamment l'un de l'autre, d'autre part simultanément. Dans les cas où les examens étaient faits indépendamment, des divergences considérables ont été notées entre les observateurs pour chaque variable.

Dans les cas où les examens étaient faits simultanément, l'absence de toute subordination de l'un à l'autorité de l'autre a été établie. Aucun des observateurs n'éprouvait de difficulté à suivre l'autre dans son raisonnement lors de l'examen final simultané, lorsqu'il y avait divergence à l'origine.

En comparant le premier cas avec les 25 derniers cas, on pouvait constater le fait que l'homogénéisation des observateurs était négligeable.

Toutes les divergences dans les enregistrements impliquent que les observateurs ont soit surestimé soit sous-estimé les valeurs en question par rapport à l'enregistrement simultané. Les valeurs surestimées et les valeurs sous-estimées ont été à peu près aussi fréquentes. Par conséquent, les évaluations des deux observateurs pour les variables et pour l'ensemble du matériel ont été proches du résultat de l'enregistrement simultané.

ZUSAMMENFASSUNG

NACHUNTERSUCHUNG VON FÄLLEN MIT TOTALEM PLATTENERSATZ I. ABWEICHUNG DER BEURTEILUNG VON SEITEN VERSCHIEDENER UNTERSUCHER

Bei 68 Patienten, die ca. zwei Jahre totalen Plattenersatz getragen hatten, wurden folgende Faktoren registriert: Stabilität, Anpassung an die Unterlage, Ocklusion, Bisshöhe, Aussehen und Konsistenz des Kieferkammes, Stomatitis prothetica, Sprache. Zwei Beobachter haben sowohl unabhängig von einander als auch simultan Untersuchungen durchgeführt. Bei den unabhängigen Untersuchungen wurden bedeutende Abweichungen der Ergebnisse bei den Beobachtern innerhalb jeder Variabel festgestellt.

Bei den simultanen Untersuchungen konnte das Fehlen der Autoritätsabhängigkeit festgestellt werden. Beide Beobachter haben sich leicht nach den gegenseitigen Motivierungen bei der schliesslichen simultanen Registrierung gerichtet, soweit primär Abweichungen vorgelegen hatten.

Bei Vergleich zwischen den ersten bzw. den letzten 25 Fällen konnte festgestellt werden, dass die Homogenisierung der Beobachter unbeträchtlich gewesen war.

Sämtliche abweichende Beobachtungen stellen Über- oder Unterregistrierungen im Verhältnis zu den Ergebnissen der simultanen Registrierung dar. Über- und Unterregistrierungen waren in ihrer Frequenz ungefähr gleich. Dies hat dazu geführt, dass die Beurteilungen der beiden Beobachter innerhalb der Variabeln und innerhalb des gesamten Materials in der Nähe dessen lagen, was sich bei der simultanen Registrierung ergab.

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