

Utility of PAR Index in Orthodontics: A Review.

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Abstract : The PAR index is primarily designed to look at the results of a group of patients, rather than an individual patient, as there are always a small number of patients where the index does not fully represent the result obtained. The index is, however, generally accepted by the British Orthodontic Society as a useful tool in this area. For its use to be accurate and reproducible, any individual providing a PAR scoring service must have first successfully passed an appropriate calibration test and have documentary evidence of this. Unless an individual is calibrated on the use of the index, the results they produce will not be valid or reproducible and should not be used to assess the standard of someone else's treatment. Re-validation is also advisable and evidence of attending a "refresher" course would be advisable. It is the responsibility of the "user" (e.g. specialist or PCT/LHB) to ensure that the person scoring the models has been properly calibrated. With respect to interpreting the results, a mean PAR score improvement of greater than 70% represents a very high standard of treatment. Less than 50% shows an overall poor standard of treatment and less than 30% means the patient's malocclusion has not been improved by orthodontic intervention. It must be stressed, however, that the index is designed to look at a large group of patients rather than an individual patient's outcome. This current review elaborates the utility of PAR index in Orthodontics.

Keywords- PAR index, PCT/LHB

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I. Introduction

The oral-facial region is usually an area of significant concern for the individuals because it draws the most attention from other people in interpersonal interactions and is the primary source of vocal, physical, and emotional communication. As a result, patients who seek orthodontic treatment are concerned with improving their appearance and social acceptance, often more than they are with improving their oral function or health. Enhancing these aspects of quality of life is an important motive for undergoing orthodontic treatment. The changes achieved by orthodontic treatment can be accessed by orthodontist by analyzing the treatment result and by psychological assessment of the patient. Orthodontists have routinely assessed one aspect of treatment outcome, i.e. improvement in tooth irregularity, by the use of pre- and post-treatment dental casts. Such evaluation remained largely subjective until the introduction of the PAR index. This quantitative analysis measures tooth irregularity within each arch and the degree of malocclusion between the arches in all three planes of space. The PAR index has been developed to provide a single score for all the occlusal anomalies which may be found in a malocclusion. The score provides an estimate of how far a case deviates from normal alignment and occlusion. The difference in score of the pre and post treatment cases reflect the degree of improvement and therefore result and success of treatment.

Patient satisfaction is a multifaceted dimension; however, people may have a complex set of important and relevant beliefs. Interest in patient satisfaction with various aspects of their health care has grown

significantly for orthodontists. The benefits provided by an orthodontic treatment, as well as the potential risks and negative side effects regarding this therapy modality, can contribute to patient's satisfaction with the final outcome. Orthodontists should improve the informed consent process and properly temper patient's expectations by limiting false impressions of a "new face" after treatment. It has been observed that patients tend to expect their new profile to fit more closely to socially accepted patterns than what should really be expected. Another major factor to be considered is that the perceived care and attention the orthodontist and staff provided to the patient increased the patient's confidence in the orthodontic treatment outcomes. The assessment of orthodontic treatment outcomes has traditionally been accomplished using the subjective opinion and experience of clinicians. Several indices have been devised in an attempt at providing a more objective assessment of malocclusion severity. The Par index is considered to be one of the most reliable indices to measure the treatment result and so we present a review of the PAR indices score clinically significant for patient.¹⁻⁵

II. Discussion

Dental-jaw deformities can affect all aspects of the individual's life from childhood up to adulthood. The need for orthodontic treatment arises from teeth appearance problems, functional problems, traumatic potency to periodontal diseases, and dental caries. The demand for orthodontic treatment means expressing inclination for treatment and improving the current condition of the teeth. So the assessment of treatment outcome has been an important facet of the orthodontic specialty for several decades. To overcome the subjective difference and to ensure uniform interpretation and application criteria, several indices have been developed. However, none has enjoyed universal acceptance. The assessment of orthodontic treatment outcomes has traditionally been accomplished using the subjective opinion and experience of clinicians. Several indices have been devised in an attempt at providing a more objective assessment of malocclusion severity. Out of many other indices one of the most popular index is PAR index.⁵⁻¹⁰

III. Par Index

The grading of orthodontic treatment can be a self teaching device and improve the quality of future treatment. The use of indices should be uniform interpretation and application of criteria. The concept is to assign score to various occlusal traits which make up a malocclusion. In 1986 the "Schanschieff Report" highlighted a varied standard of orthodontic care in the general dental services. The validity of orthodontic treatment under the NHS was questioned. **The Occlusal Index Committee** was appointed in 1987 following the "Schanschieff Report" to develop indices to measure orthodontic treatment need and outcome. This resulted in the development of IOTN and PAR. To fulfill all the required criteria the PAR index was developed to record the malocclusion at any stage of the treatment. The index was formulated over a series of six meetings in 1987 with a group of 10 experienced orthodontists (British Orthodontic standards working party). Over 200 dental casts representing pre and post operative stages casts were evaluated. The score derived were directly recorded on a computer database to facilitate multiple examiner comparison.¹¹ A single summary PAR score is generated to reflect the degree of deviation from normal alignment and occlusion. A score of zero indicates perfect alignment and occlusion whilst higher scores (rarely above 50) indicate increasing levels of irregularity and malocclusion. A score of 10 or less is deemed acceptable alignment and occlusion whilst 5 or less suggests almost-ideal occlusion. Richmond *et al.*, define normal occlusion and alignment as „all anatomical contact points being adjacent, with a good intercuspal mesh between upper and lower buccal teeth, non-excessive overjet and overbite".¹⁰

IV. Components of Par Index

The PAR Index consists of 11 components with weightings applied to overjet, overbite and centre line (Richmond et al., 1992).

1. Upper right segment x 1
2. Upper anterior segment x 1
3. Upper left segment x 1
4. Lower right segment x 1
5. Lower anterior segment x 1
6. Lower left segment x 1
7. Right buccal occlusio (antero-posterior, vertical and transverse) x 1
8. Overjet x 6
9. Overbite x 2
10. Centreline x 4
11. Left buccal occlusion (antero-posterior, vertical and transverse) x 1

The PAR ruler was developed to enable rapid assessment of a set of study models. Each component of the Index is marked on the ruler to allow rapid assessment and remind the examiner of each component. Before PAR, several other occlusal indices were developed to assess the outcome of treatment and treatment success. Summers Occlusal Index is an index of treatment need which has been used to assess the outcome of treatment. Unlike previous indices of treatment outcome, the validity and reliability of PAR has been evaluated extensively and published.⁴⁻¹⁰ The validity of an Index describes its ability to measure accurately what it purpose to Measure.¹² Validation involves comparing the scores with an acceptable gold standard, which is frequently the subjective consensus opinion of a group of experienced orthodontist.¹³

Richmond et al., (1992) described the PAR validation exercise, which was undertaken to assess the extent to which PAR reflected current British orthodontic opinion. The panel of 74 examiners included 22 consultant orthodontists, 22 specialist orthodontists, 11 community dental officers, 15 general dental practitioners and 2 public health orthodontic administrators. Rating scale measurements were recorded to reflect each examiner's opinion on the degree of change due to treatment of start agreement between the panel opinion and the PAR index was high. Multiple regression techniques were used to confirm that agreement was further improved by applying weightings to overjet x6, overbite x2 and center line x4. The collective opinion of the examining panel could thus be applied to the numerical scores generated by the weighted Index.

The findings of this PAR validation exercise confirmed that validity was further improved by the allocation of weighting to certain individual components of the index to reflect their significance. The component score was multiplied by its respective weighting to give a weighted score. The weighted component scores were then summed to generate an overall total weighted PAR score. The application of weighting factors to an occlusal index was not a new phenomenon. Weighting for occlusal indices was first used in the "Malocclusion Severity Estimate" by Grainger in 1960-1961.¹³⁻¹⁴ Weightings were also applied to the "Occlusal Index" (Summers, 1971), the "Treatment Priority Index" (Grainger, 1967) and the "Handicapping Malocclusion Assessment Record" (Salzmann, 1968).^{19,20} The PAR weightings described by **Richmond et al.**, (1992) were deemed to reflect current British orthodontic opinion and be flexible to change to reflect future standards or standards in other countries. PAR weightings have however remained unchanged in the UK since they were first introduced over fifteen years ago. Concerns about the high weighting applied to overjet and the equality of applying the same weightings to all malocclusions have been expressed in the literature by **Stuart K. et al.**, (2007).²¹ British opinion may not reflect the consensus opinion worldwide and consequently PAR has also been validated by American orthodontists. In the U.S., PAR is validated to reflect both severity of malocclusion and anticipated treatment difficulty by **DeGuzman et al.**, (1995).¹⁵

In DeGuzman's study, eleven orthodontists examined 200 sets of study models and scored them for malocclusion severity and perceived treatment difficulty. Weightings were calculated from partial regression coefficients to increase the association between the panel's opinion and the PAR score. The resultant total weighted PAR score represents both the perceived malocclusion severity and the treatment difficulty (Table1). The component weightings applied in America differ from the original weightings developed in the UK (Table 2). A weighting factor of 2 is applied for buccal segment occlusion in the U.S. The weightings for overjet and midline discrepancy are less in the U.S. with a greater weighting applied to overbite when compared to the UK.

TABLE 1 -AMERICAN WEIGHTINGS FOR MALOCCLUSION SEVERITY AND TREATMENT DIFFICULTY COMPONENT SEVERITY WEIGHTING DIFFICULTY WEIGHTING COMBINED WEIGHTING

Component	Severity Weighting	Difficulty Weighting	Combined Weighting
Overjet	5	4	4.5
Overbite	3	3	3
Midline discrepancy	3	4	3.5
Buccal Occlusion	2	2	2
Upper anterior alignment	1	1	1

TABLE 2 - WEIGHTING COMPARISON FOR U.K. AND U.S. PAR COMPONENT U.K. U.S. (COMBINED)

Component	UK	US (combined)
Overjet	6	4.5
Overbite	2	3
Midline discrepancy	4	3.5
Buccal Occlusion	-	2
Upper anterior alignment	-	1

Richmond et al., (1992) showed excellent intra- and inter-examiner reliability with intra class correlation coefficients of $R > 0.95$ and $R = 0.91$ respectively.¹⁰

The oral-facial region is usually an area of significant concern for the individuals because it draws the most attention from other people in interpersonal interactions and is the primary source of vocal, physical, and emotional communication. As a result, patients who seek orthodontic treatment are concerned with improving their appearance and social acceptance, often more than they are with improving their oral function or health. Enhancing these aspects of quality of life is an important motive for undergoing orthodontic treatment. The changes achieved by orthodontic treatment can be assessed both by orthodontist and by psychological assessment of the patient. Orthodontists have routinely assessed one aspect of treatment outcome, i.e. improvement in tooth irregularity, by the use of pre- and post-treatment dental casts. Such evaluation remained largely subjective until the introduction of the PAR index. This quantitative analysis measures tooth irregularity within each arch and the degree of malocclusion between the arches in all three planes of space. The PAR index has been developed to provide a single score for all the occlusal anomalies which may be found in a malocclusion. The score provides an estimate of how far a case deviates from normal alignment and occlusion. The difference in score of the pre and post treatment cases.¹⁰

V. Conclusion

The peer assessment rate PAR scoring was utilized to determine the occlusal anomalies found to be related inversely with psychological assessment scoring utilized to identify the level of satisfaction of patients was reported before start of orthodontic treatment. The patient's satisfaction grows significantly during the provision of treatment by utilizing the differences in peer assessment rate scoring between pre and post orthodontic treatments and found to be improved at post orthodontic treatment which reflected the success rate and was found to be higher. Treatment of study model of patients observed as an effective program for improving patient's satisfaction found to be growing significantly during the provision of treatment among patients undergone orthodontic treatment. Study model of patients may consider as a tool to combat the weakened treatment in occlusal anomalies while treating patients orthodontically. Furthermore, study model of patients may consider as a tool to combat the weakened treatment in occlusal anomalies while treating patients orthodontically.

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