ORIGINAL ARTICLE

VALIDITY OF LITTLE'S IRREGULARITY INDEX ON PHOTOCOPIED IMAGES OF DENTAL CASTS

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ABSTRACT

Crowding whether primary or secondary is one of the main reasons for seeking orthodontic treatment. Incisor irregularity is an easy and excellent indicator of the severity of crowding. Assessment of incisor irregularity on photocopied images can prove to be a good mean as an alternate to the conventional method of assessment on dental casts. In this study a sample of 58 dental casts were selected using non probability purposive sampling technique. The accuracy of assessment of incisor irregularity on photocopied images is judged by finding its comparison with direct method of assessment on dental casts which showed a good agreement when assessed using paired sample t test (p- value= 0.201) and the correlation was 0.775. An advantage of assessment of incisor irregularity on photocopied images is that the vertical errors that can occur in conventional method are precluded. Thus this study concludes that an alternate way of assessment of incisor irregularity on photocopied images is a reliable diagnostic tool which can be considered in our routine diagnostic procedures.

Key words: *Little's irregularity index, crowding, photocopied images, validity.*

INTRODUCTION

Crowding of permanent dentition is an unesthetic feature of most malocclusions. It can be either primary, which occurs during early mixed dentition as a result of inherent discrepancy of tooth size and jaw size due to eruption of large permanent incisors in place of small deciduous incisors or secondary, appearing in adolescence as a result of continuous growth of the mandible which grows beyond the sagittal growth limit of maxilla as a result of cephalocaudal growth gradient.[1] Crowding of permanent dentition can be assessed by either measuring the arch length tooth size discrepancy (ALTSD) or incisor irregularity.[2] Various methods have been devised to assess the degree of crowding. Common methods for the assessment of crowding are Little's irregularity index[2], Dental aesthetic index which determines the maximum incisor irregularity and the anterior arch length discrepancy of each arch visually using a probe.[3] Other methods include index of orthodontic treatment need[3] and index of complexity, outcome and need[4] which assesses the severity of displacement of the contact points in either dental arch and arch length discrepancy in the upper dental arch respectively. Computerised methods such as assessment of ALTSD and incisor irregularity on digital photographs have been in use and studies have been conducted to assess their reliability.[5] Among all the methods Little's irregularity index is the easiest method and does not require sophisticated manoeuvres to conduct the index. It can also readily provide us the extent of post treatment relapse of incisor crowding of orthodontic cases.[6,10] The assessment of incisor irregularity on photocopied images of dental casts can be one of the methods as an alternate to direct assessment on dental casts. For the assessment of incisor irregularity by direct method on dental casts, measurements should be taken parallel to occlusal plane, which is not usually precise as some three dimensional errors in measurements does occur. While

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on photographs and photocopied images these errors are nullified because of measurements along a single plane. Also it is convenient to maintain records in the form of photocopies as compared to dental casts. Present study may prove to be a step forward in finding the accuracy of this method.

METHODOLOGY

It was a cross sectional comparative study carried out on photocopied occlusal images of 58 mandibular dental casts at orthodontic department of Sardar Begum Dental College and Hospital, Peshawar. The sample was selected using non probability purposive sampling technique irrespective of gender dimorphism. Inclusion criteria for this study was dental casts with mild (1-4mm) to moderately (5-9mm) crowded mandibular dental arches with fully erupted all permanent teeth present from right first molar to left first molar. Those individuals with caries, trauma, attrition of the occlusal surfaces of the teeth, asymmetric mandibular arch forms, missing teeth, prosthetic replacements, severely crowded/spaced lower arches and periodontally compromised dentition were excluded from the sample. All dental casts were available in white orthodontic stone (Diestone Dentamerica^{R}). The mandibular dental casts were marked on the mesial and distal extremities of anterior teeth (incisors and canines) with a pointed 2H lead pencil and then photocopies of occlusal surfaces were obtained with photocopier Panasonic model FP 7824 on A4 sized white papers.

First incisor irregularity index was obtained for five contacts from mesial of right canine to the mesial of left canine directly on mandibular dental casts parallel to occlusal planes with the help of a digital calliper (Guo gen^{R}- made in China) with pointed measuring tips accurate to 0.1mm. The same dental casts incisor irregularity of five contacts were measured with the same digital caliper on the photocopied images. Readings on both dental casts and photocopied images were repeated twice at an interval of two days by each of the two examiners and the readings were then averaged for intra and interoperator reliability. The data was then analyzed on SPSS version 20. Paired sample t test was used to show the statistical significance of the difference of readings as obtained on the dental casts and on photocopied images. Pearson correlation was used to show the agreement of the readings on the dental casts and photocopied images.

RESULTS

Table 1 shows the mean incisor irregularity of the sample on the cast and photocopied images. Table 2 gives the correlation of the readings taken on dental casts and photocopied images. Table 3 depicts the statistical significance of the difference between the readings of the sample taken on dental casts and photocopied images.

DISCUSSION

Measurement of incisor irregularity is a quick and easy way of assessing crowded dental arches. A moderate correlation (-0.68) was found between incisor irregularity index and arch length discrepancy by Bernabe et al.[7] A shortcoming of little's irregularity

TABLE 1: DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
cast	58	.38	11.48	3.6740	2.93468
photocopy	58	.00	10.88	3.9962	2.67827

TABLE 2: PAIRED SAMPLES CORRELATIONS

Pair	N	Correlation	Sig.
Cast & Photocopy	58	.775	.000

TABLE 3: PAIRED SAMPLES TEST

Pair	Paired Differences					t	df	Sig. 2-tailed
	Mean	Std. Deviation	Std. Error mean	95% Confidence interval of the difference				
				Lower	Upper			
Cast - photocopy	-.32224	1.89790	.24921	-.82127	.17679	-1.293	57	.201

index is its failure to consider the rotations and axiversion of teeth leading to crowding. Validity of little's irregularity as a predictor of arch length discrepancy has been shown by various studies[8]. Gilmour and Little[9] showed that a score of 3.5mm is the maximum incisor irregularity consistent with minimal lower incisor crowding.

From Table 1 one can see that the mean incisor irregularity as measured on photocopied images is 3.99 as compared to 3.67 on dental casts. As vertical assessment errors were nullified on the photocopied images still the mean of the measurements of incisor irregularity in our readings was slightly more, this may be an error of operator's judgement, but the difference is overall nonsignificant as table 3 suggests.

As far as assessment of little's irregularity index on photographs is concerned, standardization of photographs is a cumbersome process while obtaining photocopies of dental casts is not very technique sensitive. Naif and David[5] in their article showed that photography is a valid tool to assess incisor irregularity but it requires standardization, calibration and operator's experience with the photography method. With our method of photocopied images the said problems are irrelevant as the standardization is automatically achieved when models are placed with their occlusal surfaces towards the scanner of the photocopier. However, there were difficulties with the recognition and marking of contact points on the dental casts as well as their appreciation on the photocopied images. Table 2 shows that the correlation of readings is 0.775 which is a strong indicator of good agreement between the readings. Surbeck et al[10] calculated the mean error between the readings taken directly on the casts and on the photocopied images and they found the mean error to be 0.04mm,but their method of assessment on photocopied images was more sophisticated as they employed computer digitization of the contact points. In a similar study by Huang L and Artun J[6] tried to show the relation of post treatment relapse of maxillary and mandibular teeth. Our method was simple and straight forward as the contact points were marked on the dental casts and then photocopies obtained with the occlusal surfaces towards the scanner of the photocopier.

CONCLUSION

1. The comparison of the readings of the incisor irregularity measured on the dental casts and the photocopied images of the occlusal surfaces showed no statistical significant difference (table 3).
2. Assessment of incisor irregularity index on photocopied images is a precise method and can be considered in place of conventional method of direct assessment on dental casts.

REFERENCES

1 Richardson ME. Late lower arch crowding in relation to primary crowding. Angle Orthod 1982; 52: 300-12.

2 Little RM. The Irregularity Index: a quantitative score of mandibular anterior alignment. Am J Orthod Dentofacial Orthop 1975; 68: 554-63.

3 Jenny J, Cons NC. Comparing and contrasting two orthodontic indices, the index of orthodontic treatment need and the dental aesthetic index. Am J Orthod Dentofacial Orthop 1996; 110: 410-16.

4 Daniel C, Richmond S. The development of the index of complexity, outcome and need (ICON). Journal of Orthodontics 2000; 27: 149-62.

5 Almasoud N,Beam D. Little's irregularity index: Photographic assessment vs study model assessment. Am J Orthod Dentofacial Orthop 2010; 138: 787-94.

6 Huang L, Artun J. Is the postretention relapse of maxillary and mandibular incisor alignment related? Am J Orthod Dentofacial Orthop 2001; 120: 9-19.

7 Bernabe E, Flores-Mir C. Estimating arch length discrepancy through Little's irregularity index for epidemiological use. Eur J Orthod 2006; 28: 269-73.

8 Morrison AS. Screening.In: Rothman KJ,Greenland S, editors. Modern epidemiology. Lippin cott-Raven Publishers: Philadelphia; 1998. p 499-518.

9 Gilmour CA, Little RM. Mandibular incisor dimensions and crowding. Am J Orthod Dentofacial Orthop 1984; 86: 493-502.

10 Surbeck BT, Artun J, Hawkins NR, Leroux B. Association between initial, posttreatment and postretention alignment of maxillary anterior teeth. Am J Orthod Dentofacial Orthop 1998; 113: 186-95.