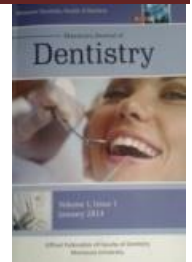




Measurement of curve of Spee among different types of malocclusion with manual and 3-D techniques



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Abstract:

Curve of Spee (COS) exaggerating is frequently noted in malocclusions which is dentally. Like exaggerated COS changes the imbalance of muscle, resulting ultimately to inappropriate functional occlusion. It could be beneficial if we got a thorough learning of significance of COS measuring, so that it can help in our treatment. The goal of this article is to get knowledge relating to the validity and accuracy of 3-shape laser scanner in COS measurement among malocclusion in different types

Introduction

COS is a phenomenon occurring naturally in the dentition of human. This curvature of normal occlusion is in demand for an effective system of mastication. Excessive COS is observed repeatedly in malocclusions of dentition if overbites is deep.^[1] Like excessive COS change the imbalance muscle, in the end leading to inappropriate functional occlusion.

Study models for orthodontic treatment planning and diagnosis have been traditionally held in physical plaster models form. Digital storage delete problems regarding to models physical storage with up to 17m³ of storage space in demand in order to traditional models storage for 1000 patients.^[2] The replacement with information of orthodontic plaster models has many benefits including:

1. Immediate conductivity of 3-shape date with no need for the plaster models retrieval from area of a storage;
2. It can be performing simple and accurate diagnostic set-ups of multiple patterns of extraction.

Digital models advantages for the problems quantification of orthodontic could be not positive if the efficiency, ease and validity of angular and linear measurement with digital models of occlusal features have not been in comparing to these included of plaster models, used routinely the current 'gold standard' in practice of clinician. This review is aiming at estimating the digital models reliability by agreement estimating with measurements on plaster models held-hand.^[3]

Graf Von Spee

F. Graf von Spee^[4] named the COS in 1890. Spee was a anatomist from German (1855–1937) an original article was written by him in 1890 and in 1980, it was represented recently. He used abraded teeth with skulls to name the occlusal line as the line on a cylinder tangent to the condyle anterior border, the 2nd molar occlusal surface, and the incisal edges of the lower anterior teeth. Most of predictions Spee have been made perpendicular to the midsagittal plane from a view of skulls.

Most of Spee's thoughts have been made from skulls midsagittal plane view to the perpendicular. Hitchcock,^[5] depended his study utilizing 3 propositions. First one: Spee indicated that the surfaces of molar lie in the circle arc that, posteriorly touches, continued, the condyle anterior border from a profile view. Second one: In cases with marked attrition it is effortless to clear the curve than in case with cusps of well-preserved. Third one: When another point in addition to molars have been included in

occlusion line of measurements, they can be on an arc common. Spee recommend which this ordering geometric^[6] reported the most efficient form in order to maintain maximum contacts of tooth during eating and considered it an important tenet in construction of denture. This explanation is going to the basis for theory of Monson of spherical in the arrangement ideal teeth in the arch of dentition.^[7]

Construction of Curve of Spee

Many authors were used many ways for the depth measurement of COS. The COS was contacted universally to the circle part. On 1899, Bonwill suggested 4 inches (101.6 mm) for the "triangle of the mandible." dimension of his Later, Monson suggested four inches as the circle radius. Although, Christensen recalled us that after measuring 300 mandibles, Wilson, present agreement in only 6% of them with the four-inch radius suggested by Bonwill. Infact, the curve mean radius, firstly suggested by Spee, 65–70 mm in adulthood was much lower. Same numbers were gotten by Orthlieb: (83.5 mm) and Hitchcock: (69.1 mm±).^(16, 22)

However, in the literature concerning the measurement of the COS there is little consensus. Baldrige^[8] used on both sides the perpendicular distances. Garcia and Baldrige found the ratio to be accurately expressed by the formulae:

$Y = 0.657x + 1.34$ and $Y = 0.488x - 0.51$, where x is the sum of left and right side, Y is the arch length differential in millimeters and in millimeters, maximum depths of the COS.^[9, 10]

Schmidt and Braun et al.^[9], used the sum of the maximum depth on sides of both. Sondhi et al.^[11], used the perpendiculars (sum of them) Traditionally, these measurements have been taken from models of study or photographs with a measuring coordinate machine and a caliper or divider.^[12, 14]

Dawson (1989) described COS reconstruction^[15] with technique of a flag (Analyzer of the Broadrick Occlusal Plane) which got in nearly the same radius for all patients. McConnell and Lynch redescribed the technique of flag lately.

As advanced knowledge, new devices of measuring became available, e.g. optical digitizers 3-dimensional (3D) that measure accurately small alteration. At present, models of 3D virtual for clinicians are available, to perform the necessary measurements, it is aided by committed software.

Age changes

The COS may physiologically get changed with age or in situations pathologically producing from extrusion, tipping and rotation of teeth. As the advances of age, in the COS there is a significant change and during mandibular protrusion, there is decreasing in posterior discusion.^[19] Hence, clinicians have to be aware that the adjustments occlusion with age have changed gradually, the COS of youth toward occlusal curvature of a more favorable individual, as patients grow older. Thus, if the COS is not preserved during whole mouth repair in these dentitions, it may progress to intervention along the movements of mandibule, which will endanger the masticatory system health.

Sexual variation

In maximum depth of curve of Spee, there are no significant differences either between the left and right sides of the lower arch or the sexes Marshall et al.^[6,16] would seen in their study.

Discussion

In orthodontic practices, the using of digital models has steadily increased with 19% practitioners surveyed reporting usage in a recent survey.⁽¹⁷⁾ This development has been confirmed by a range of perceived advantages inclusive requirements of reduced storage; easy transfer of data; quick access to digital information; financial savings versatility.

Conclusion

COS understanding in the orthodontics part is very necessary as with it, orthodontists treat in every patient they treat virtually. But, however, offering articles an in-depth understanding of its cause and factors effecting are very little in the review.

Digital models give a high degree of accuracy when direct measurement on plaster models compared to; variations between the approximations are likely to be clinically acceptable

References

1. Sal Carcara C, Preston B, Jureyda O. *The relationship between the curve of spee, relapse, and the Alexander discipline. Seminorthod* 2001;7:90-9.
2. McGuinness NJ, Stephens CD. *Storage of orthodontic study models in hospital units in the U.K. Br J Orthod* 1992;19:227-32.
3. Roberts CT, Richmond S. *The design and analysis of reliability studies for the use of epidemiological and audit indices in orthodontics. Br J Orthod* 1997;24:139-47.
4. Spee FG. *The gliding path of the mandible along the skull. J Am Dent Assoc* 1980;100:670-5.
5. Hitchcock HP. *The curve of Spee in Stone Age man. Am J Orthod* 1983;84:248-53.
6. Marshall SD, Caspersen M, Hardinger RR, Franciscus RG, Aquilino SA, Southard TE. *Development of the curve of Spee. Am J Orthod* 2008;134:344-52.
7. Ramfjord SP, Ash MM. *Occlusion. 3rd ed. Philadelphia: W. B. Saunders; 1971.*
8. Baldrige DW. *Leveling the curve of Spee: Its effect on the mandibular arch length. J PractOrthod* 1969;3:26-41.
10. Braun S, Hnat WP, Johnson BE. *The curve of Spee revisited. Am J OrthodDentofacialOrthop* 1996;110:206-10.
11. Sondhi A, Cleall JF, Begole EA. *Dimensional change in the dental arches of orthodontically treated cases. Am J Orthod* 1980;77:60-74.
12. Germane N, Staggers JA, Rubenstein L, Revere JT. *Arch length considerations due to the curve of Spee: a mathematical model. Am J OrthodDentofacialOrthop* 1992;102:251-5.
13. Braun ML, Schmidt WG. *A cephalometric appraisal of the curve of Spee in Class I and Class II, Division I occlusions for males and females. Am J Orthod* 1956;42:255-78.
14. Re J-P, Perez C, Giraudeau A, Ager P, El Zoghby A, Orthlieb J-D. *Reconstruction of the curve of Spee. Z Stomatologie* 1985;6:262-8.
15. Peter E. Dawson. *Functional Occlusion from TMJ to Smile Design. Mosby Elsevier; 2007. p. 200-4.*
16. Currim S, Wadkar PV. *Objective assessment of occlusal and coronal characteristics of untreated normals: A measurement study. Am J OrthodDentofacialOrthop* 2004;125:582-8.
17. Keim RG, Gottlieb EL, Nelson AH, Vogels DS III. *2008 JCO study of orthodontic diagnosis and treatment procedures, part 1: results and trends. J ClinOrthod* 2008;42:625-40.