



Research Paper

Accuracy analysis of Pederson's Difficulty Index in Impacted Mandibular Third Molar Surgery”

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I. INTRODUCTION

Tooth impaction is a common stereotyped dental condition affecting around 0.8—3.6% of the general population. A tooth typically erupts when half to three-quarters of its final root length has developed. Conventionally the teeth most commonly seen to be impacted are, consecutively, third molars, maxillary canines, mandibular premolars and maxillary central incisors.¹ The prevalence of third molar impaction ranges from 16.7% to 68.6%.² Impacted mandibular third molars are evidently the most difficult teeth for extraction because of their abeyant positioning, plausible potential of injury to the surrounding nerve and vessels and interference from soft tissues and adjacent tooth during the surgical procedure.³ The degree of Operative difficulty is usually dependent on age, gender, morphology of roots and the associated amount of bone to be removed and root or crown sectioning. Many informative classifications based on the technique of panoramic radiography and other factors like demographic data or operative variables have been devised to determine the surgical difficulty in removing mandibular third molar, which include Pederson difficulty index, Modified Parant scale and WHARFE etc. Pre-operative prediction of surgical difficulty of mandibular third molar extraction is a mandate to design a treatment plan which will aid in minimizing the intra operative and post-operative complications. Numerous conclusive studies, according to the development and implementation of mathematical models have been executed to describe the consequential difficulties.⁴ Hence this study aims to establish the accuracy of Pederson difficulty index compared with the surgeon's discernment of the difficulty of the mandibular third molar impaction surgery, to aid in better assessment of difficulty, so that the patient can be informed accordingly about the sequelae and surgical outcome.

II. MATERIALS AND METHOD

A total number of 50 healthy patients with impacted mandibular third molars, who reported to the department of Oral and Maxillofacial Surgery in M.M. College of Dental Sciences & Research, Mullana; and fulfilled the inclusion and exclusion criteria, were included in the study. The patients were evaluated preoperatively, by recording detailed history in the standard format; general physical examination, thorough clinical examination & radiological examination, after obtaining informed consent about surgery. The radiological examination was done using Intraoral periapical radiograph and Orthopantomogram. Radiographically Pederson's difficulty index was assessed preoperatively. INCLUSION CRITERIA: 1. Patients with a fairly good general health according to

American Society of Anaesthesiologist (ASA1 and ASA2) without any contraindication for minor oral surgery and /or local or general anaesthesia. 2.

Patients requiring surgery of impacted mandibular third molar. 3. Patients from both the sexes. 4. Patients between 18 to 40 years of age. 5. Patients who have given written informed consent for the study. EXCLUSION CRITERIA: 1. Non co-operative patients. 2. Medically compromised patients according to American society of Anaesthesiologist (ASA 3 and ASA4) 3. Unfit for surgery and/ or local anaesthesia. 4. Pregnant female patients. 5. Patients with bleeding disorder and connective tissue disorder. 6. Patients with the history of drug allergy. 7. Patients unwilling to be enrolled in the study or for follow-up. 8. Patients on anticoagulants/antiplatelet or immunosuppressant drugs. 9. Informed and written consent in both Hindi &English languages was taken for each patient and 10. Ethical committee clearance was obtained for the conduct of the study from the institutional ethical and research committee. Pederson Difficulty Index was assessed and recorded from radiographs for impacted mandibular third molars for Position of the impacted molar, Relative Depth and Relation with Ramus and available Space. All impactions were carried out under aseptic conditions by single operator using the same technique. Painting & draping of the perioral region was done with 5% Povidone- Iodine solution. Time taken during the impaction surgery was recorded from incision to last stitch. At the end, the impaction was categorized as easy, moderate and difficult on the basis of perception of difficulty faced by the surgeon during surgery. Measurement of pain was done by Wong- Baker Pain FACES Scale, during and after 24 hours, 3rd day and 7th day after surgery. Time taken in procedure was recorded from incision to last stitch. All results obtained were tabulated and analysed statistically.

III. RESULTS

A total of 50 patients were included in the study. The average age of the study population was 26.26 years and the median age was 25 years (table 1). Males were higher in proportion i.e. 32 males (64%) in the study as compared to females which were 18 (36%). Left Impacted Mandibular 3rd Molar (38) was the most common tooth, which were 30 in number (60%) operated in the study, followed by Right Impacted Mandibular 3rd Molar (48), which were 20 in number (40%) (table 2). The most common angulation of the impacted third molar was horizontal impaction.

Most of the patients had class II ramus relationship. In terms of Depth of impacted mandibular third molar, the most common was position A. Based on the Pederson's score, 25 patients had moderate score i.e. (50%) for the surgery, followed by a difficult score i.e. 16 patients (32%) and only 9 patients i.e. (18%) had an easy surgical score. Based on the surgeon's perception, 26 patients (52%) had moderate surgeon's score (table 3) (fig 1). The easy and the difficult surgeon's score were seen in 12 patients (24%) each (table 4)(fig. 2). The Intraoperative Pain scores (Wong baker FACES pain rating score) were compared and found to be similar across all the three groups (table 5)(fig. 3) There was no significant difference in the Intraoperative scores although the average pain scores were higher in the difficult impaction category. The intragroup analysis of the Wong baker FACES pain score in the follow up period showed a significant decrease. The trend of falling pain scores in the follow up period was seen across all the three groups. The Preoperative swelling distance was compared and found to be similar across all the three groups.

The Preoperative trismus index for all three groups was compared and found to be similar. Trismus index was compared after 24 hours, after 3rd and 7th day and was found to be similar across all the three groups. The average time taken for the procedure in the difficult impaction group was 620.75 seconds or approximately 10 min 20 seconds. An assessment of the Pederson's difficulty index score for impaction was done relative to the surgeon's perception for impaction. A Total of 12 patients were labelled as easy impactions on surgeon's perception, out of which Pederson's difficulty index score correctly identified 7 patients. For moderate impaction group as per the surgeon's perception, 22 out of 26 were labelled as moderate impactions correctly by Pederson's difficulty index score. All 12 patients labelled as difficult impaction as per the surgeon's perception, were accurately identified by the Pederson's difficulty index score. The overall concordance for Pederson's score for assessment of impaction was 82%. This finding was statistically significant.

Table 1: Age of Patients

<i>Age</i>	<i>Value/Estimate</i>
<i>Mean</i>	<i>26.26</i>
<i>Standard deviation</i>	<i>5.39</i>
<i>Median</i>	<i>25.00</i>
<i>Quartile 1</i>	<i>23.00</i>
<i>Quartile 3</i>	<i>28.00</i>

Table 2: Number of Impacted Mandibular Third Molar in Left & Right side of jaw

Impacted Third Molar	Number	Percentage
Leftside of jaw (38)	30	60
Right side of jaw (48)	20	40
Total	50	100

Table 3: Pederson Score for Impaction

Pederson Score for Impaction	Number	Percentage
Easy impaction	9	18
Moderate impaction	25	50
Difficult impaction	16	32
Grand Total	50	100

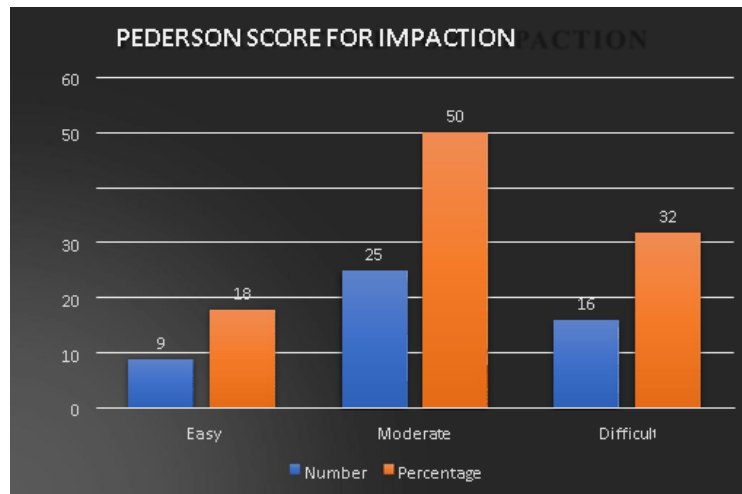


Fig. 1

Table 4: Surgeon's Perception for Impaction

Surgeon's Perception for Impaction	Number	Percentage
Easy impaction	12	24
Moderate impaction	26	52
Difficult impaction	12	24
Grand Total	50	100

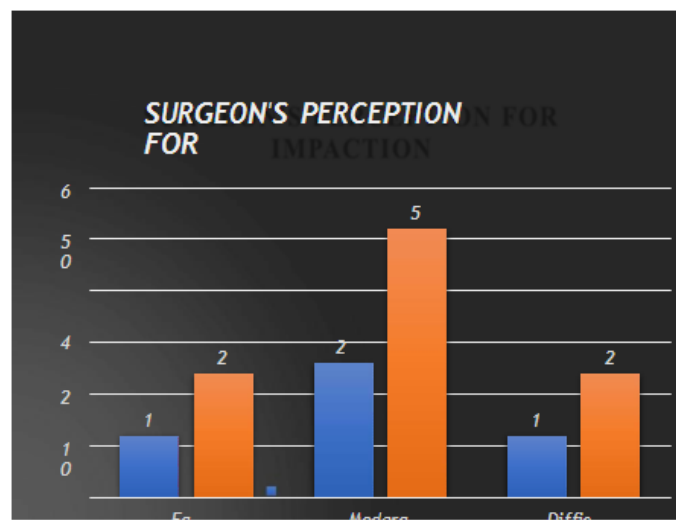


Fig.2

Table 5: Pain index analysis (based on Wong Baker FACES pain score)

	Easy impaction	Moderate impaction	Difficult impaction
Intraoperative	1.11	1.32	1.88
After 24 hours	3.33	3.04	3.69
After 3rd day	2.67	2.48	2.94
After 7th day	0.78	0.76	0.69
P value	<0.0001	<0.0001	<0.0001

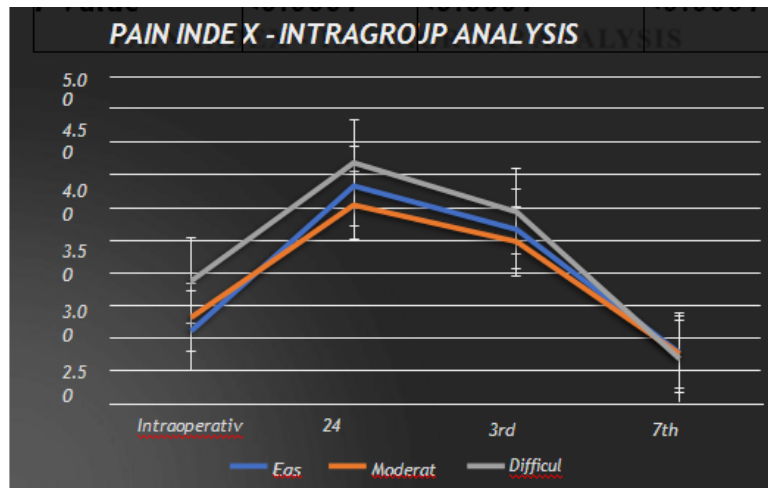


Fig. 3

IV. DISCUSSION

Impacted mandibular third molar is the most difficult to extract because of its anatomical position, potential risk of injury to the surrounding nerve and vessels, interference from surrounding soft tissues and adjacent tooth during the surgical procedure. Hence it is important to assess the difficulty of impacted third molar surgery prior. Identification of factors that influence the difficulty of impacted mandibular third molar extractions may be valuable for both planning and scheduling procedures, and in the training of students and residents. There have been many scoring systems to assess the difficulty level, for example, Pederson difficulty index, Modified Parant scale and WHARFE.⁵ The present study was conducted to establish the efficiency of Pederson difficulty index in actual surgical removal of impacted mandibular third molars so that a better assessment of surgical challenge can be obtained and thus, aid in informing the patient about the sequelae and surgical outcomes, in a better way. In the study being discussed, mean age of the patients were 26.26 ± 5.39 years with majority being males (64.0%) which was concurrent with a study conducted by Baqain et al and Bui et al, in which the mean age of the patients included was 21.6 ± 3.32 and 26.4 ± 8.4 years.^{6,7} In the current study, the most commonly operated tooth was the left impacted mandibular third molar which was also seen in studies conducted by Bui et al.⁷ However, in the study by Baquin et al, majority of the impacted molars were right sided.⁶ In the present study, the most common angulation of the impacted third molar was horizontal impaction whereas in a study done by Susarla et al. from USA, Vertical impaction (68.4%) was the most common angulation of the impacted third molar.⁸ In the study which is being discussed here, most of the patients had class II ramus relationship, similar to a study conducted by Susarla et al. However, in the study conducted by Bui et al. class I ramus (69.7%) classification was most commonly seen.⁷ In the study being discussed, based on the Pederson's score, 25 patients (50.0%) had moderately difficult score for surgery, followed by 16 patients (32.0%) having a very difficult score and only 9 patients (18.0%) had an easy surgical score whereas in the study conducted by Kharma et al,⁹ 51% of the studied patients had moderately difficult impaction based on the Pederson's score followed by, the slightly difficult impaction (37.0%) and, only 12% were having very difficult impaction for surgery, which was in accordance to the findings of this study. Furthermore, in the study by Diniz-Freitas et al¹⁰, majority (56.2%) of the extractions (59 out of the total 105) were moderate followed by difficult (23.8%) and easy (20.0%). In the study being discussed, the Intraoperative Pain scores (Wong Baker FACES pain rating score) were compared and found to be similar across all the three groups classified, based on Pederson's score similar findings were reported by Diniz-Freitas et al in their study. The average time taken for the procedure in the current study for the difficult impaction group was 620.75 seconds (approximately 10 min 20 seconds) while it was 6.9 ± 7.6 minutes in the study conducted by Susarla et al. In the study being discussed, taking surgeon's perception as gold standard, the sensitivity and specificity of Pederson's score for assessing easy

impaction were 58.33% and 84.74%, whereas in the study performed by Diniz-Freitas et al taking the modified 'Parant scale' as gold standard, Pederson scale had poor sensitivity: over 75% of difficult extractions were not identified. The authors of this study believe the major difference of the new index and Pederson index, is the incorporation of root morphology which should be always considered with any preoperative assessment, and as a consequence, the accuracy of prediction gets significantly better.

V. CONCLUSION

It can be concluded from the study conducted by the authors, that Pederson's difficulty index score for extraction of impacted mandibular third molar, has significantly high degree of association, and is in fair agreement with the surgeon's perception. Furthermore, the sensitivity and specificity of the Pederson's index (Gold Standard), when compared with surgeon's perception, is found to be moderately accurate for 'easy' mandibular third molar impactions. While for

'moderate' mandibular third molar impactions, as well as, 'difficult' mandibular third molar impactions, Pederson's difficulty index, was found to be highly accurate.

Hence, in conclusion, Pederson's index is a valid and efficient tool, to assess difficulty of extraction of impacted third molar teeth preoperatively, for the surgeon.

CONFLICTS OF INTEREST

Nil

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