Original Article

Accuracy of Pederson and modified Parant scale for predicting difficulty level of mandibular third molars

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Abstract   To determine the accuracy of Pederson and Parant Scale for predicting the difficulty level of mandibular third molar extraction. Prospective cross-sectional, 6 months from January 2012 to June 2012. All consecutive patients who presented for the extraction of impacted third molars were included in the study. Orthopantomograms (OPGs) were advised and on these OPGs third molars were classified as easy, moderate or difficult according to standard Pederson scale. Similarly modified Parant scale was utilized to predict the difficulty of removal of third molars. Root pattern was also noted on the OPG. These parameters were then compared with peri-operative parameters like time taken for extraction and need for crown or root sectioning using Chi Square test. A *p* value of <0.05 was taken as significant. A total 50 patients were included in the study. Out of these 24 were males and 26 females with a male to female ratio of 1:1.08. The age ranged from 18-38 years with a mean of 26.32 ± 5.43 years. The pre operative predictions for Pederson's and Modified Parant's Score were compared with per operative findings using Chi-Square test. The results were insignificant in terms of Pederson Scale (*p* value>0.05) while significant results were obtained in case of Parant Scale (*p* value<0.05). Statistically significant results were seen for root pattern and level of difficulty (*p* value<0.05). These scales failed to predict difficulty level of tooth removal accurately especially in cases of distoangular impactions. When combined with root pattern, the accuracy of prediction gets significantly better.

Keywords: Difficulty, extraction, impaction, third molar.

Introduction

Third molars generally erupt between the ages of 18 and 24 years, although there is wide variation in eruption dates (Vilela and Vitoi, 2011). The mandibular third molar is the most commonly impacted tooth (Othman and Tin-Oo, 2009). It also presents the greatest surgical challenge and invites the greatest controversy when indications for removal are considered. The surgical removal of third molars has been, and still is, the most frequent operation performed by oral and maxillofacial surgeons both in private practice and in hospital settings (Fuster Torres *et al.*, 2008).

To estimate the surgical difficulty of removing lower third molars several classification systems have been established but they have proven to be of little clinical use (Almendros-Marqués *et*

al., 2006). Classification systems are primarily based on the preoperative assessment of panoramic radiographs but other factors such as demographic and operative variables have also been analyzed by authors (Almendros-Marqués *et al.*, 2006; Yuasa *et al.*, 2002).

The ability to predict the surgical difficulty of lower third molar extraction facilitates the design of treatment plan by minimizing complications and improving the preparation of patients and assistants in terms of the postoperative management of inflammation and pain (Akadiri and Obiechina, 2009). In recent years the utility of the Pell & Gregory and the Winter's classifications as well as of the Pederson difficulty index has been questioned by diverse authors (Gbotolorun *et al.*, 2007; Diniz-Freitas *et al.*, 2007). Modified Parant scale is considered to be a better alternative to the Pederson scale in terms

of accuracy and ease of application (Barreiro-Torres *et al.*, 2010; García *et al.*, 2000).

The aim of the present study was to evaluate the accuracy of Pederson and modified Parant Scale for predicting difficulty of mandibular third molar removal so that we may be able to provide a guideline for others oral surgeons and general dentists who are regularly involved in the extraction of lower wisdom teeth. If we could provide a predictable scale to our fellow colleagues, they may be able to plan their surgical procedure in a better way and this may help the patients as well, who will be ultimate beneficiaries.

Materials and methods

The study was carried out in Oral and Maxillofacial Surgery department of Rawal Institute of Health Sciences, Islamabad. All the consecutive patients who presented to the department for the removal of their impacted mandibular third molars were briefed about the nature of the study and informed consent was taken and only those patients who willingly agreed were included in the study. Orthopantomogram was taken as a standard and was advised to all the patients. Difficulty level was predicted preoperatively on the radiograph according to the Pederson Scale and Modified Parant Scale.

For Pederson scale we noted the position, depth and relationship to the mandibular ramus for the impacted molar. Position was further categorized as mesio-angular, horizontal, vertical or disto-angular and points were assigned from 1-4 respectively. Depth was categorized as Class A (occlusal plane of the impacted tooth at the same level as the adjacent tooth), Class B (the occlusal plane is between the occlusal plane and cervical line of the adjacent tooth) and Class C (occlusal plane of the impacted tooth is apical to the cervical line of the adjacent tooth) and points were assigned from 1-3 respectively. The relationship to the ramus was classified as Class 1 (tooth situated anterior to the anterior border of ramus), Class 2 (crown almost half covered by the anterior border of ramus) and Class 3 (Crown fully covered by the anterior

border) and similarly were scored as 1-3 respectively. Final Pederson score was calculated as 1-4 as 'Easy', 5-6 as 'Moderate' and 7-10 as 'Difficult'.

Modified Parant Scale was categorized I, II, III and IV, where I was simple forceps extraction, II was extraction requiring osteotomy only, III required crown sectioning and IV requiring root section. We further noted pattern of root as another parameter for difficulty and classified roots as fused, divergent, straight, curved or bulbous.

All extractions were carried out in the outpatient department under local anesthesia (Lignocaine with 1:100,000 adrenaline) using standard incisions and by the same surgeon to remove the operator bias. Time required for extraction was noted from incision to placement of last stitch. Other peri-operative parameters that we noted were requirement for tooth sectioning or root sectioning. At the end of the procedure the extraction was categorized as easy, moderate or difficult according to the time consumed and actual difficulty faced during the extraction. Post operatively patients were prescribed with anti-inflammatory medication and stitches were removed after 7 days. All the data was recorded on a specially designed Performa.

Statistical analysis

Data was analyzed using SPSS version 17.0. Frequency was calculated for gender and mean for age. All the per-operative parameters were compared with post operative parameters using Chi Square test. A *p* value of <0.05 was taken as significant.

Results

A total 50 patients were included in the study. Out of these 24 were males and 26 females with a male to female ratio of 1:1.08. The age ranged from 18-38 years with a mean of 26.32±5.43 years. Eighteen impacted teeth were mesioangular, 12 were distoangular, 8 vertical and 12 were horizontal. Eight teeth had fused roots, 6 curved, 32 straight while 4 teeth had bulbous roots. According to Pederson's pre-operative prediction, 20 impactions

were easy, 20 were of moderate difficulty and 10 were predicted as difficult. Modified Parant Scale predicted pre-operatively that 24 impactions would require osteotomy only, 14 would need tooth sectioning and 12 will require root sectioning too. These results were compared with per operative findings using Chi-Square test. The results were insignificant in terms of Pederson Scale ($p > 0.05$) while significant results were obtained in case of Parant Scale ($p < 0.05$). Results are displayed in Tables 1 and 2. We cross tabulated root pattern with per operative difficulty and statistically significant results were seen (Table 3).

Table 1 Showing comparison of pre operative Pederson's prediction with per operative findings

| Pederson's score | Per operative score | | | |
	Easy	Moderate	Difficult	Total
Easy	12	8	0	20
Moderate	8	10	2	20
Difficult	4	6	0	10
Total	24	24	2	50

Table 2 Showing comparison of Parant's Prediction with Per-operative findings

| Parant score | Per operative score | | | |
	Required osteotomy only	Required tooth sectioning only	Required tooth and root sectioning	Total
Requiring osteotomy	20	0	4	24
Requiring tooth sectioning	4	4	6	14
Requiring root sectioning	0	0	12	12
Total	24	4	22	50

Table 3 Showing relationship of root pattern with difficulty encountered per operatively

| Root pattern | Per operative score | | | |
	Easy	Moderate	Difficult	Total
Fused	6	2	0	8
Curved	0	6	0	6
Straight	18	12	2	32
Bulbous	0	4	0	4
Total	24	24	2	50

Discussion

One of the most important fundamentals in planning impacted third molar extractions is evaluation of preoperative surgical difficulty of impaction removal (Blondeau and Daniel, 2007; Renton *et al.*, 2001). Understanding of preoperative surgical difficulty is not only important for general practitioners to be able to refer patient to specialist but it also helps to inform patients about the possible intra operative and post operative complications and it also increases patients' level of satisfaction with the treatment received (Fuster Torres *et al.*, 2008).

It has been obvious from many studies that pre operative, intra operative & post operative indicators exist which contribute to evaluate post operative complications (Benediktsdóttir *et al.*, 2004). Preoperative radiographs have great importance in assessment of surgical difficulty given as indicated by many studies (Koong *et al.*, 2006). There are three imaginary lines in the form of Winter's classification, to determine the depth of the mandibular third molars in bone (Lima *et al.*, 2012). This method is taught to most undergraduate students, but is reported to be used little in practice.

Another method was given by Pell and Gregory and many studies have proven it to be unreliable (Yuasa *et al.*, 2002; Diniz-Freitas *et al.*, 2007; García *et al.*, 2000). It is generally acknowledged that the mesioangular impaction, which accounts for approximately 45% of all impacted mandibular third molars, is the least difficult to remove. The vertical impaction (40% of all impactions) and the horizontal impaction (10%) are intermediate in difficulty, whereas the distoangular impaction (5%) is the most difficult to remove surgically (Vilela and Vitoi, 2011; Hassan, 2010; Breik and Grubor, 2008).

Usually the distoangular impaction is considered the most difficult impaction to remove but in our study many cases classified as distoangular ones were extracted easily and with less time as compared to the mesioangular and vertical ones. The possible reason for that can be little requirement for tooth/root sectioning

and distal bone loss due to recurrent pericoronitis. Another reason can be favorable root curvature that can help in easy delivery of these impactions.

Various indexes have been proposed and are used by clinicians to classify difficulty of impacted third molar removal (Yuasa *et al.*, 2002). Pederson and modified Parant scales are two of such indices and can be used for evaluation before extraction, but its use is limitized as proven by many studies. Pederson index incorrectly identifies very difficult extractions as moderately difficult as it doesn't take in to consideration various variables that are paramount in determining surgical difficulty of impacted third molars like, bulk of soft tissues, size of tongue, root morphology relationship to the adjacent tooth and so on (Diniz-Freitas *et al.*, 2007).

Modified Parant Scale classifies third molars in to four grades viz grade I, requiring forceps removal, grade II requiring osteotomy only and grade III and IV requiring tooth and root sectioning respectively (Diniz-Freitas *et al.*, 2007; Barreiro-Torres *et al.*, 2010; García *et al.*, 2000). According to the studies, modified Parant scale is considered to be relatively more reliable than Pederson scale but it also shares similar problems that it doesn't account for clinical and radiological parameters discussed above (Diniz-Freitas *et al.*, 2007). In our study the results were unreliable for distoangular impactions and both scales failed to predict their difficulty correctly.

We included a third parameter in our study and that was root morphology. Root morphology was classified as straight, curved, bulbous and fused. The results obtained were significant which show that root pattern does affect the difficulty level in a positive way and whenever pre operative assessment is required, root morphology should be considered. Previous studies had shown that tooth/root morphology has a strong correlation with the difficulty encountered while extracting the third molars and this parameter should be kept in mind at the time of initial assessment (Akadiri and Obiechina, 2009; Santamaria and Arteagoitia, 1997).

Conclusion

These scales fail to predict difficulty level of tooth removal accurately especially in cases of distoangular impactions. When combined with root pattern, the accuracy of prediction gets significantly better.

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