A Clinical Evaluation of Kim et al. Prediction Scale of Impacted Lower Third Molar Extraction Difficulty

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ABSTRACT

Determining the difficulty of impacted lower third molar (L3M) is a continuous challenge for oral surgeons. [17], a modification of Pederson scale is one of the indices proposed to estimate the difficulty of (L3M) based on radiographic findings. Preoperative panoramic view were obtained for fifty patients who need (L3M) being extracted the difficulty was predicted according to [17]. A clinical evaluation of difficulty was considered according Parant scale (PS) and surgical time (ST). [17] revealed low to accepted sensitivity (23.8%, 58.8%) and low specificity (21.1%, 36.4%). Regarding the likelihood ratios, only the negative likelihood ratios for prediction of Parant categories were significant (3.61) while the other ratios were not. No significant correlation (P= 0.538, 0.229) exist between the index difficulties with PS and ST. Kim index is unreliable to predict extraction difficulty.

1. Introduction

While dealing with impacted lower third molars (L3M), the prediction of extraction difficulty is crucial to determine the best treatment options, draw plans of surgical procedure and limit the risks of intra and postoperative complications. Therefore, it is challenging for the clinicians to have an optimal scale that accurately predict L3M extraction difficulty [1]. Many clinical trials have been performed to evaluate these difficulties [2], [3- 6].

The classic difficulty scoring systems relied on radiographic variables only [7- 9]. However, the recent indices involved other associated clinical, non-radiographic variables [10], [11]. Although Pederson scale, among many scales, is widely used as a prediction tool of L3M extraction difficulty [12], many researchers have questioned its performance [5], [12]. Other indices were found to be invalid [4], [5], [11], [12] or having limited clinical use [5], [11], [13- 15]. Owing to these shortcomings, there is a continuous need for developing an index that has high predictability.

Recently, many difficulty-estimating indices have been proposed [16- 20] among them is [17]. It is a

modification of Pederson scale and based only on radiographical variables. The aim of this study was to evaluate the prediction accuracy of [17].

2. Material and Methods

Extraction difficulty of L3M were evaluated in fifty patients who presented to the private clinics of experienced oral surgeons (A.A., G.M.) located in Mosul city, Iraq from June to December 2021. All patients signed informed consents. The study conducted according to declaration of Helsinki and approved by the local ethical committee. Patients were categorized to ASA I or ASA II according to the American Society of Anesthesiologists. All surgeries executed according to standard protocols under local anesthesia. Preoperatively, the authors of this study predicted the difficulty of extraction depending on panoramic radiographs according to [17] (Fig. 1). Any disagreement among authors solved by consensus. Two outcome variables were considered to assess extraction difficulty (Table 1):
1.   The Parant scale (PS): Technical actions used for extraction.
2.   Surgical time (ST): Time elapsed from start of incision to final suture.

Statistical analysis using descriptive statistics of IBM SPSS Statistics 23, sensitivity, specificity and likelihood ratios were calculated considering the PS and ST as references. In addition, the correlation between the operative time and the difficulty of operation as proposed the scale were also assessed by analysis of variance test. A probability value (P) of less than 0.05 was considered significant.

3. Results

Fifty patients (24 male and 26 female) aged 17-42 years (mean age of 26.9 ± 6.35 years) were analyzed. Mandibular left (n= 27) and right (n= 23) wisdom teeth were extracted.

Table (2) illustrate the difficulty of fifty extraction as classified by preoperative [17] and postoperative PS and ST.

According to PS, extraction was easy in 19 (38%) patients. In contrast, extraction was of moderate difficulty with osteotomy performed in 16 (32%) patients whereas additional tooth sectioning (difficult extraction) was carried out in 15 (30%) patients. The minimum time of surgery was 1 min while the maximum ST was 40 min with a mean duration of 14.8 ± 10.28 min. Accordingly, difficulty of extraction was considered low in 32 (64%) cases, moderate and high in 13 (26%), and 5 (10%) cases respectively (Table 2).

By [17]; which consist of four categories; extraction was predicted as slightly difficult (3-4points) in 15 (30%) patients and moderately difficult (5-7 points) in 31 (62%) patients. Four cases (8%) recorded as very difficult (8-10 points) and there is no prediction for extremely difficult (11-12 points) extraction (Table 2). This index gave low to accepted sensitivity (23.8%, 58.8%) and low specificity (21.1%, 36.4%). Regarding the likelihood ratios, only the negative likelihood ratios for prediction of Parant categories were significant (3.61) while the other ratios were not (as they ranged between 0.5 and 2) (Table 3). No significant correlation (P= 0.538, 0.229) exist between the index difficulties with PS and ST (Table 4).

4. Discussion

Pell and Gregory's, and Winter's classifications are two classical classification systems of impacted L3M. They are based on tooth depth in respect to occlusal plane, the relation to the mandibular ramus and the tooth angulation in relation to the long axis of the adjacent mandibular second molar. Many variations of these scales over decades have been suggested to improve the prediction of the difficulty of the extraction

[19].

Many other clinical and radiographical parameters could be considered before surgery for correct evaluation and prediction of L3M extraction difficulty. They help in planning of correct treatment choices to improve patients' outcomes [12], [21].

Overtime, different scales were proposed as predictors of L3M extraction difficulty; yet, some of these scales have drawbacks. [22] in their meta-analysis study concluded that Pederson scale is not valid index in L3M. Likewise, [15] proposed a scale depending on the anatomy of L3M in cone beam tomography but it had a limited clinical implication. WHARFE index [23], [24] are rarely used in common practice owing to their complexity [12]. [9] is similar to Pederson index as it uses the same radiographical parameters. However, these indices have not been validated [18].

In addition to spatial position of wisdom tooth, [5], [14] consider also the root width and form. [11] proposed an index depends on four variables; two clinical and two radiographic. In contrast to Pederson index, it does not consider neither the relation of the tooth to the ramus nor its angulation.

In the present study, we considered PS and ST to determine extraction difficulty as in many previous studies they were considered as standard protocols to accurately assess surgical difficulty [16], [18], [20].

The proposed index had low specificity (21%, 36%) variable in their sensitivity (24%, 59%) and correlated weakly with the time of operation and Parant's scale in the present study. This may be related to some limitations; for instance, periradicular and pericoronal radiolucency, root proximity to adjacent second molar or inferior dental canal and the number of roots were neglected in final scoring. In addition to that, there was an absence of important clinical variables such as patient's age, tongue size, cheek flexibility, mouth opening and body mass index that could influence the level of difficulty in L3M surgery as reported by other researchers [11].

It is obvious that surgical difficulty is higher in older patients due to changes in the teeth and the tissues covering them. Incomplete root formation, more elastic boney tissues and pericoronal follicle space seen in patients younger than 25 years of age are usually associated with less difficult surgery.

The coronal width of L3M is another local anatomic parameter that was not considered in [17] study and might have enhanced the predictability of their scale. The wider the crown of the tooth, the longer time would be required to perform bone removal and tooth sectioning, resulting in a longer operation time. This simple parameter can be readily evaluated on the preoperative conventional radiograph.

It is clear that [17] focused only on radiographic parameters and depended on a modified version of Pederson scale with 4 instead of 3 categories of difficulty. Unlike our study, horizontal impaction was the most common pattern of impaction treated by these authors rather than mesioangular impaction, indicating the involvement of more difficult cases in their studies [17]. The authors to their working in a tertiary medical institution linked this finding and that relatively simple cases were presumably referred to be treated in private clinics elsewhere.

According to our best knowledge, the validity of [17] as prediction tools were not tested before.

Conflict of interest statement: the author declare that there is no conflict of interest related to this study.
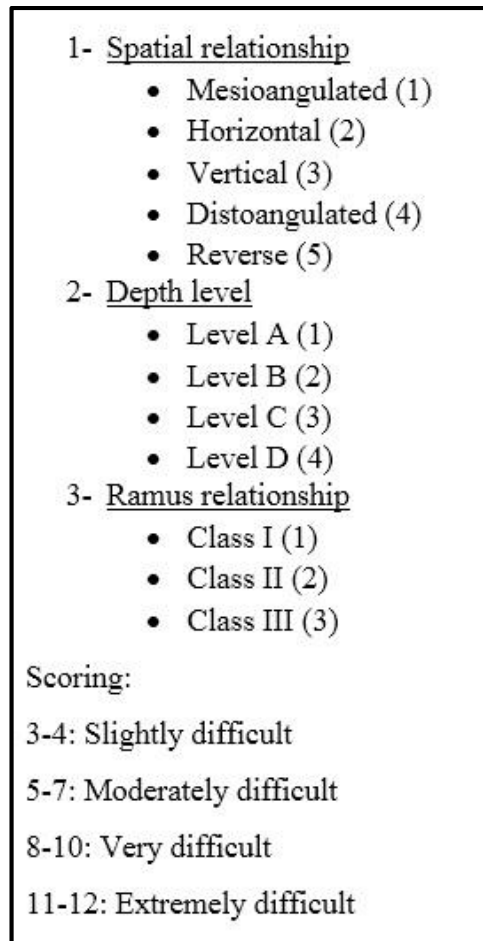
Fig. (1): [17]

Table (1): Classification of extraction difficulty: Parant scale (surgical technique) and surgical time.

Criteria of Parant scale	
Classification of difficulty	**Actions required for extraction**
Low	Extraction requiring forceps/elevator alone
Moderate	Extraction requiring osteotomy
High	Extraction requiring osteotomy and tooth section
Criteria of surgical time	
Classification of difficulty	Time elapsed between incision and final suturing
Low	<15 min
Moderate	15-30 min
High	>30 min

Table (2): Classification of extraction difficulty according to [17], Parant scale and surgical time.

	Parant scale			Surgical time			
	Low	Moderate	High	Low	Moderate	High	Total
[17]							
Slightly difficult	5	5	5	12	2	1	15

Moderately difficult	13	8	10	17	10	4	31
Very difficult	1	3	-	3	1	-	4
Extremely difficult	-	-	-	-	-	-	-
Total	19	16	15	32	13	5	50

Table (3): Sensitivity, Specificity and likelihood ratios of [17] for prediction of different categories of Parant scale and surgical time.

[17]	Parant scale	Surgical time
Sensitivity	23.8%	58.8%
Specificity	21.1%	36.4%
Positive Likelihood ratio	.502	.92
Negative Likelihood ratio	3.61	1.13

Table (4): Correlation of [17] with Parant scale and surgical time.

[17]	Parant scale		Surgical time		
	Person Correlation (r)	*P*	Surgical time min (SD)	Person correlation (r)	*P*
Slightly difficult	-0.080	0.583	11.53 (9.93)	0.173	0.229
Moderately difficult			16.32 (10.71)		
Very difficult			15.25 (6.55)		
Extremely difficult			-		

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