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Full Length Research Paper

Maternal intentions and knowledge in the postpartum regarding the feeding habits and oral health of children

Luciana Reichert da Silva Assunção^{1*}, Karina Duarte Vilella¹, Jéssica Ellen Araújo¹, Maria Fernanda Pivetta Petinati¹, Débora Emi Shibukawa², Isabella Naomi Furuie² and Elaine Machado Benelli³

¹Department of Stomatology, Universidade Federal do Paraná, Jardim Botânico, Curitiba, PR, Brazil.

²Medical School, Universidade Federal do Paraná, Alto da Glória, Curitiba, PR, Brazil.

³Department of Biochemistry and Molecular Biology, Universidade Federal do Paraná, Jardim das Américas, Curitiba, PR, Brazil.

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The aim of the present study was to analyze the intentions and knowledge of mothers in the postpartum period regarding the feeding habits and oral health of their children. A cross-sectional study was conducted involving 286 mothers at a teaching hospital in Southern Brazil. The variables of interest were collected using a semi-structured questionnaire. Knowledge scores were analyzed numerically and dichotomized as adequate (score: >5) or poor (score: ≤5). Bivariate and multivariate Poisson regression analyses were performed and score ratios (SR) with respective confidence intervals (CI) were calculated. Most respondents were less than 25 years of age (55.6%), first-time mothers (56.4%) and demonstrated positive intentions regarding the majority of the aspects addressed. However, 65.4% of the sample demonstrated poor knowledge. Younger mothers, those with a lower income, those with less schooling, first-timers and those who reported intending to use sugar demonstrated less knowledge. Gathering information from the internet was associated with higher knowledge. The multivariate model revealed significant associations with having a university education (SR=1.23; CI: 1.12 to 1.35), having a high school education (SR=1.10; CI: 1.03 to 1.19), gathering information from the internet (SR=1.18; CI: 1.07 to 1.30), having given birth more than once (SR=1.13; CI: 1.06 to 1.21) and intending not to use sugar (SR=1.14; CI: 1.03 to 1.26). Schooling, number of child births, means of information and the use of sugar were independently associated with the knowledge score. There is a need to provide oral health education for women during the postpartum period in order to benefit oral health for both the mother and the baby.

Key words: Feeding behavior, infant, knowledge, mothers, oral health, postpartum period.

INTRODUCTION

Health behaviors are formed in the early years of life (Nourijelani et al., 2014). Therefore, mothers play an

*Corresponding author. E-mail: lurassuncao@yahoo.com.br. Tel: 55 41 3360-4025. Fax: 55 41 3360-4134.

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important role in the nuclear family regarding their health and the health of their children by passing on information and performing actions that can preserve the wellbeing and quality of life of their families (Moimaz et al., 2014). Since women had traditionally greater interaction with their children, the behavior of mothers exerts a direct social and behavioral influence on the health of children (Nourijelani et al., 2014).

Health education directed at women and children can have a positive impact during pregnancy and the postpartum period, which is a time of physiological, emotional and social transition for both mothers and infants (Chen et al., 2014). Thus, it is important for mothers to acquire adequate knowledge and positive health behaviors in this period (Mora and Nestel, 2007; Pentapati et al., 2013).

The introduction of healthy dietary practices is fundamental to child development and the prevention of adverse health conditions. Infants who were breastfed are at lower risk of developing autoimmune diseases, contracting infectious diseases and acquiring non-communicable diseases, such as obesity and chronic conditions (Verduci et al., 2014). World Health Organization recommends that complementary foods should be offered after the infant reaches six months of age (WHO, 1995), when the amount and composition of breast milk are no longer sufficient to meet the child's nutritional needs (World Health Organization, 2009). Adequate complementary foods offered at the right time help combat death due to diarrhea, pneumonia, measles and malaria (Jones et al., 2003). However, the premature introduction of complementary foods can be harmful to the child due to the greater risk of excess weight, obesity and chronic conditions in subsequent stages of life (Castro et al., 2014). On the other hand, if complementary foods are introduced too late, the child's growth and development can be compromised and there is an increased risk of malnutrition and nutrient deficiencies (UNICEF, 1998).

With regard to oral health, periodic nutritional and educational interventions have been shown to diminish the occurrence of cariogenic eating habits and delaying the introduction of sugar is potentially effective in establishing adequate eating habits in the first year of life (Vitolo et al., 2005). However, socioeconomic factors, such as a low household income, may be associated with a lower level of mother's schooling, lower degree of comprehension regarding the importance of health care and difficult access to health services (Nourijelani et al., 2014). Rothnie et al. (2012) found that younger women, first-time mothers and those with a low socioeconomic status did not have adequate knowledge regarding the oral health of their children.

Adequate oral health knowledge is an important precursor to adequate dental behavior (Abiola et al., 2011). Thus, it is important to identify gaps in knowledge and inadequate attitudes among mothers. The aim of the

present study was to analyze mothers' intentions and knowledge regarding the feeding habits and oral health of their children in the postpartum period. The inadequacies identified can serve as the basis for the establishment of educational and prevention strategies for this population.

MATERIALS AND METHODS

Women at postpartum period assisted at the Victor Ferreira do Amaral Maternity Hospital in the city of Curitiba, Brazil, between January and March, 2014 were asked to participate in the present study. This location was chosen because it is a teaching hospital linked to the Federal University of Paraná. Based on data from the hospital administration, 120 women, on average, were admitted monthly.

Four trained interviewers administered a semi-structured questionnaire to the mothers. This questionnaire had previously been tested for the determination of consistency in the questions and the possible need for changes on a sample of 30 women who did not participate in the main study. The questionnaire had 35 items divided among four sections. The first section (items 1 to 8) addressed socioeconomic and demographic characteristics of the respondent. The second section (items 9 to 15) addressed issues related to the respondent's oral health, such as visits to the dentist during pregnancy and self-perceptions regarding her teeth and mouth. The third section (items 16 to 28) addressed issues related to the respondent's perceptions and intentions regarding the eating habits of her child, including the importance of breastfeeding to the child's general health as well as the intention to use sugar and bottle feeding. The fourth section (items 29 to 35) addressed the respondent's notions regarding the child's oral hygiene.

The dependent variable was the knowledge score on aspects relating to children's eating habits and oral health. Eight statements were used to determine this score, for which 0 was attributed to incorrect responses and 1 was attributed to correct responses. Thus, the total score ranged from 0 to 8 points, with a higher score denoting greater knowledge. The definition of right or wrong for each statement was based on the specialized literature. "I don't know" responses and non-responses were scored as 0. The total was dichotomized as "adequate" (>5 points) or "poor" (≤5), based on the mean of the overall sample.

Associations between the dependent and independent variables were tested. The socioeconomic and demographic variables were age (categorized as less than 18 years, 19 to 25 years, 26 to 35 years and greater than 35 years), household income (categorized as four or more times the Brazilian minimum monthly wage [BMMW] = R\$724 at the time of the study), two to three times the BMMW and up to the BMMW), schooling (categorized as primary school, high school and university), occupation (categorized as paid activity and non-paid activity) and number of children (categorized as only one child and two or more children). With whom the respondent resided was also analyzed (categorized as with or without a partner). Associations between the dependent variable and sources by which the respondents maintained themselves informed were also tested. The oral and general health of the respondents during pregnancy, the respondents' self-perception of their oral health status and whether they received information regarding their children's oral health during pregnancy were analyzed. Mothers' intentions regarding breastfeeding, bottle feeding, pacifier use and the use of sugar in milk were also analyzed.

The Kolmogorov-Smirnov test demonstrated that the knowledge score had non-normal distribution. Thus, nonparametric tests (Mann-Whitney U test and Kruskal-Wallis test) were used for the bivariate analysis. A Poisson multivariate regression model was

Table 1. Distribution of responses to eight statements used to evaluate knowledge (Curitiba, PR, Brazil, 2014).

Statements	Responses			Total* [n (%)]
	True [n (%)]	False [n (%)]	Uncertain [n (%)]	
1. Breastfeeding is an important practice for the prevention of diseases in newborns.	242 (85.2)	0	42 (14.8)	284 (100)
2. Breastfeeding assists in the development of the face and teeth in infants.	54 (20.0)	168 (62.3)	48 (17.7)	270 (100)
3. An infant can begin to eat solid foods at six months of age.	170 (61.2)	9 (3.2)	99 (35.6)	278 (100)
4. Solid foods are important to the facial development of infants.	167 (60.2)	29 (10.4)	82 (29.4)	278 (100)
5. Infants acquire first contact with the outer world through the mouth.	235 (84.2)	37 (13.3)	7 (2.5)	279 (100)
6. Primary teeth are indispensable to the health of children.	163 (59.0)	88 (31.7)	26 (9.3)	277 (100)
7. Hygiene is important for the prevention of cavities in primary teeth.	264 (94.6)	2 (0.7)	13 (4.7)	279 (100)
8. Using a bottle with sugary liquids at night can lead to the development of cavities.	26 (9.2)	20 (6.9)	240 (83.9)	286 (100)

*Frequencies less than 286 due to missing data

constructed to investigate associations between the dependent (knowledge score) and independent variables, with the calculation of score ratios (SR) in each category in relation to a reference category and respective 95% confidence intervals (CI). Values equal to 1 indicate equality in the mean scores of the two groups, whereas values higher and lower than one, respectively indicate a higher and lower mean score in comparison to the reference group (Andrade et al., 2012). All independent variables with a p -value <0.25 in the univariate analysis were incorporated into the multivariate model. As the level of significance was set at 5%, variables with a p -value ≤ 0.05 after the adjustments were maintained in the model. The STATA program (version 12.0) was used for the statistical analyses.

This study received approval from the Human Research Ethics Committee of the Sector of Health Sciences of the Federal University of Paraná under process number 28785314.4.0000.0102. Informed consent was obtained from all participants prior the execution of the research.

RESULTS

Three hundred and ten women were asked to participate in the study, 24 of whom refused, leading to a total of 286 mothers interviewed.

The level of knowledge was categorized as poor in 65.4% of the sample. A greater number of correct responses were found for items related to the hygiene of primary teeth and the importance of breastfeeding to a child's health. A greater number of incorrect responses were found for items related to the benefit of breastfeeding to the child's facial formation and the association between bottle feeding and dental caries (Table 1).

Mean age of the participants was 26.2 ± 3.3 years (range: 14 to 38 years). The largest portion of the sample was in the 19 to 25-year-old age group (38.1%), had a high school education (55.4%) and a household income between two and three times the BMMW (45.4%). Moreover, 74.1% lived with their partner and 56.4% were first-time mothers. Television was the main means of communication by which the participants maintained themselves informed (37.4%). Younger mothers ($p = 0.002$), those with a lower income ($p = 0.035$), those with less schooling ($p = 0.001$) and first-time mothers ($p = 0.004$) had significantly lower knowledge scores, whereas

women who maintained themselves informed through the internet had significantly higher knowledge scores ($p = 0.008$) (Table 2).

Most participants had no general or oral health problems during pregnancy (69.7 and 68.8%, respectively), visited a dentist during pregnancy (62.6%) and felt that their teeth had a healthy appearance (65.4%). A total of 52.6% of the participants had received orientations regarding their oral health during pregnancy, but only 23.2% had received information regarding their child's oral health. No significant associations were found between these variables and the knowledge scores (Table 3).

The majority reported intending to breastfeed their children (96.8%), would not add sugar to milk (82.3%) and would offer a bottle (75.5%), but would not offer a pacifier to their children (63.6%). Mothers who reported the intention to add sugar to milk had significantly lower knowledge scores ($p = 0.049$) (Table 4).

Table 5 displays the results of the Poisson multivariate regression analysis. The model revealed significant associations with having a

Table 2. Associations between knowledge score and socioeconomic/demographic data and source of information (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
Age (years)			
18 or younger	50 (17.5)	4.3	0.002
19 to 25	109 (38.1)	4.6	
26 to 35	99 (34.6)	5.1	
36 or older	28 (9.8)	5.2	
Schooling			
University	29 (10.2)	5.52	0.001
High school	158 (55.4)	4.87	
Primary school	98 (34.4)	4.38	
Income			
4 or more times the BMMW	62 (23.8)	5.05	0.035
2 to 3 times the BMMW	118 (45.4)	4.82	
Up to times the BMMW	80 (30.8)	4.45	
Occupation			
Paid activity	145 (54.3)	4.9	0.277
Non-paid activity	122 (45.7)	4.6	
Resides with partner			
Yes	212 (74.1)	4.75	0.880
No	74 (25.9)	4.77	
Number of children			
One	149 (56.4)	4.51	0.004
Two or more	115 (43.6)	4.97	
Source of information			
TV	107 (37.4)	4.43	0.008
Radio	4 (1.4)	5.0	
Newspaper	3 (1.0)	5.0	
Internet	29 (10.1)	5.38	
Other	7 (2.4)	3.86	
More than one source	136 (47.6)	4.92	

BMMW: Brazilian monthly minimum wage; *Frequencies less than 286 due to missing data. Significant differences at 5% level in bold.

university education (SR = 1.23; 95% CI: 1.12 to 1.35), having a high school education (SR = 1.10; 95% CI: 1.03 to 1.19), gathering information from the internet (SR = 1.18; 95% CI: 1.07 to 1.30), having given birth more than once (SR = 1.13; 95% CI: 1.06 to 1.21) and intending not to use sugar (SR = 1.14; 95% CI: 1.03 to 1.26).

DISCUSSION

The attitudes of caregivers, especially mothers, seem to

exert a significant influence on the oral health status of children (Nourijelani et al., 2014; Adeniuy et al., 2009). The present study was conducted to determine the knowledge and intentions of mothers regarding the eating habits and oral health of their newborn children. The degree of knowledge was considered poor among 65.4% of the participants. This finding differs from data reported in studies conducted in other countries, such as Nigeria (Eigbobo and Onyiaso, 2013), India (Pentapati et al., 2013) and Australia (George et al., 2013), in which a

Table 3. Associations between knowledge score and general/oral health problems during pregnancy, self-perceived oral health, previous information and visit to dentist (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
General health problems during pregnancy			
Yes	86 (30.3)	4.84	0.734
No	198 (69.7)	4.72	
Oral health problems during pregnancy			
Yes	89 (31.2)	4.81	0.861
No	196 (68.8)	4.73	
Feels healthy with teeth and mouth			
Yes	187 (65.4)	4.74	0.859
No	98 (34.3)	4.78	
Previous information on oral health - mother			
Yes	150 (52.6)	4.82	0.269
No	135 (47.4)	4.68	
Previous information on oral health - child			
Yes	66 (23.2)	4.71	0.880
No	218 (76.8)	4.77	
Visited dentist during pregnancy			
Yes	179 (62.6)	4.82	0.312
No	107 (37.4)	4.66	

*Frequencies less than 286 due to missing data.

Table 4. Associations between knowledge score and intentions regarding eating habits and oral health (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
Intends to breastfeed			
Yes	274 (96.8)	4.75	0.862
No	9 (3.2)	4.67	
Would add sugar to milk			
Yes	50 (17.7)	4.32	0.049
No	232 (82.3)	4.86	
Would offer bottle			
Yes	206 (7.5)	4.77	0.579
No	67 (24.5)	4.64	
Would offer pacifier			
Yes	100 (36.4)	4.57	0.243
No	175 (63.6)	4.83	

*Frequencies less than 286 due to missing data. Significant difference at 5% level in bold.

large percentage of pregnant or nursing women demonstrated adequate oral health knowledge.

The item related to the importance of oral hygiene to

prevent dental caries in the primary dentition had the greatest number of correct responses, whereas most mothers were unaware of the association between dental

Table 5. Poisson multivariate regression model for associations between knowledge score and variables of interest (Curitiba, PR, Brazil, 2014).

Variable	Score ratio (crude) 95% CI	p	Score ratio (adjusted) 95% CI	p
Schooling				
Primary school	1	-	1	-
High school	1.11 (1.03-1.20)	0.009	1.10 (1.03-1.19)	0.009
University	1.26 (1.15-1.39)	<0.001	1.23 (1.12-1.35)	<0.001
Source of information				
TV	1	-	1	-
Radio	1.13 (0.89-1.45)	0.340	1.07 (0.76-1.50)	0.702
Newspaper	1.13 (0.80-1.57)	0.468	1.11 (0.85-1.44)	0.424
Internet	1.21 (1.10-1.35)	<0.001	1.18 (1.07-1.30)	0.001
Other	0.87 (0.70-1.06)	0.176	0.84 (0.70-1.00)	0.059
More than one source	1.11 (1.02-1.20)	0.008	1.07 (1.00-1.15)	0.065
First child birth				
Yes	1	-	1	-
No	1.10 (1.03-1.18)	0.004	1.13 (1.06-1.21)	<0.001
Would add sugar to milk				
Yes	1	-	1	-
No	1.13 (1.01-1.25)	0.039	1.14 (1.03-1.26)	0.015

CI: Confidence interval. Significant differences at 5% level in bold.

caries and night time bottle feeding with sugar added to the milk. In a qualitative study conducted in the United States, the 48 American and Mexican mothers interviewed demonstrated adequate knowledge regarding the role of sugar in the etiology of dental caries, but limited knowledge on the influence of the frequency of sugar intake (Hoeft et al., 2013). In a study conducted in Nigeria, only 30.2% of the women interviewed considered sugar to be one of the causes of dental caries (Abiola et al., 2011).

Socioeconomic and demographic factors exerted a strong influence on the degree of knowledge demonstrated by the women interviewed in the present study. The bivariate analysis revealed that younger mothers, those with a lower income, those with less schooling and first-time mothers had less knowledge regarding the eating habits and oral health of their children. Previous studies have also found that women with a higher level of education demonstrate greater knowledge regarding oral health (Pentapati et al., 2013; Abiola et al., 2011; Eigbobo and Onyiaso, 2013; Bamanikar and Kee, 2013). A higher level of education may also lead to greater access to information regarding health care and the use of health services (Fisher-Owens et al., 2007). In the multivariate analysis, mothers with more schooling had a 26% higher score ratio than those with less schooling.

Socioeconomic status was also evaluated based on

household income. Women from more economically privileged families had higher knowledge scores than those from less privileged families. Low income may also be associated with a lower level of schooling and inadequate understanding regarding the value of health as well as less access to health services (Nourijelani et al., 2014; George et al., 2013). Indeed, studies report a greater prevalence rate of dental caries among children from less privileged families (Nourijelani et al., 2014; Moimaz et al., 2014). However, income was not significantly associated with the knowledge score in the multivariate analysis, which suggests a greater association with other socioeconomic variables, such as schooling.

Younger mothers and first-time mothers had significantly lower knowledge scores, which is in agreement with data reported by Rothnie et al. (2012). However, age lost its statistical significance in the adjusted multivariate model, demonstrating that this variable was not associated with the degree of knowledge independently of schooling and number of child births.

The increase in the use of new information and communication technologies in developing countries has contributed substantially to the knowledge-building process (Nattestad, 2012). The present findings confirm this premise, as mothers who gathered information from the internet had higher knowledge scores than those who

used other sources of information. Moreover, mothers with a higher level of schooling had significantly greater access to the internet in comparison to those with less schooling (data not shown), which demonstrates the influence of other variables regarding access to this source of information. According to Antheunis et al. (2013), a large portion of users of health services in the Netherlands seek information regarding adverse health conditions and treatment through the internet. The internet is a dynamic form of knowledge building that allows users greater freedom in gathering information (Santana et al., 2011).

None of the items related to dental issues, such as previous information on oral health and visits to the dentist, exerted a significant influence on knowledge scores in the present study. A recent study reports that health information does not only come from healthcare professionals and other sources, such as electronic means of communication, are also related to the acquisition of knowledge (Oredugba et al., 2014). Moreover, although most of the women in the present study visited a dentist during pregnancy, the vast majority (76.8%) did not receive information regarding the oral health of their children. A previous study has reported that Latin women may not have sufficient knowledge regarding the oral hygiene of their children, including the technique and frequency of brushing primary teeth (Hoeft et al., 2010). The present findings underscore the need for educational measures regarding these aspects for mothers in the prenatal period.

The behavior of mothers exerts a strong influence on the health of children (Adeniuy et al., 2009). Thus, children of mothers with adequate oral hygiene and eating practices are more likely to have a lower frequency of dental caries (Nourijelani et al., 2014; Saied-Moallemi et al., 2008). In the present study, the association between intentions and knowledge was only significant with regard to the use of sugar, as mothers who reported they would add sugar to milk had lower knowledge scores. This intention may be strongly related to the concretization of eating habits in children (Swanson et al., 2011). However, knowledge and attitude cannot be analyzed as a simple linear cause-and-effect relationship (Adeniuy et al., 2009). Although adequate knowledge is a precursor for the occurrence of correct behavior, other aspects should be taken into consideration, such as beliefs and cultural factors (Okada et al., 2002).

The present study has limitations that should be addressed. As a non-probabilistic sample was used, the generalization of the findings requires caution. The fact that the study was conducted at a single hospital limited the characteristics of the sample, which does not allow the extrapolation of the findings to other populations. Moreover, the use of self-reports may have led to some systematic errors.

Despite these limitations, the results of the present study reveal important gaps in knowledge among

mothers in the postpartum period regarding the eating habits and oral health of their children. Educational measures are needed for this population, especially mothers with a lower socioeconomic status and those giving birth for the first time.

Conclusion

Schooling, number of child births, means of information and the use of sugar were independently associated with the knowledge score. There is a need to provide oral health education for women during the postpartum period in order to benefit oral health for both the mother and the baby.

Conflicts of interest

The authors declare that they have no conflict of interest.

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REFERENCES

- Abiola A, Olayink A, Mathilda B, Ogumbiyi O, Modupe S, Olubunmi O (2011). A survey of the oral health knowledge and practices of pregnant women in a Nigerian teaching hospital. *Afr. J. Reprod. Health* 15:14-19.
- Adeniuy AA, Ogunbodede OE, Jeboda OS, Folayan OM (2009). Do maternal factors influence the dental health status of Nigerian pre-schoolchildren? *Int. J. Paediatr. Dent.* 19:448-454.
- Andrade FP, Biazevic MG, Toporcov TN, Togni J, de Carvalho MB, Antunes JL (2012). Discriminant validity of the University of Washington quality of life questionnaire in the Brazilian context. *Rev. Bras. Epidemiol.* 15:781-789.
- Antheunis ML, Tates K, Nieboer TE (2013). Patients' and health professionals' use of social media in healthcare: Motives, barriers and expectations. *Patient Educ. Couns.* 92:426-31.
- Bamanikar S, Kee LK (2013). Knowledge, attitude and practice of oral and dental healthcare in pregnant women. *Oman Med. J.* 28:288-291.
- Castro PD, Kearney J, Layte RA (2014). Study of early complementary feeding determinants in the Republic of Ireland based on a cross-sectional analysis of the growing up in Ireland infant cohort. *Public Health Nutr.* 19:1-11.
- Chen L, Qiong W, Velthoven MH, Yanfeng Z, Shuyi Z, Ye L, Wei W, Xiaozhen D, Ting Z (2014). Coverage, quality of and barriers to postnatal care in rural Hebei, China: A mixed method study. *BMC Pregnancy Childbirth* 14:31-42.
- Eigbobo JO, Onyiaso CO (2013). Maternal knowledge and awareness of factors affecting oral health in the paediatric population. *Odontostomatol. Trop.* 36:15-24.
- Fisher-Owens SA, Gansky SA, Platt LJ, Weintraub JA, Soobader MJ, Bramlett MD, Newacheck PW (2007). Influences on children's oral health: A conceptual model. *Pediatrics* 120:e510-20.

- George A, Johnson M, Blinkhorn A, Ajwani S, Bhole S, Yeo AE, Ellis S (2013). The oral health status, practices and knowledge of pregnant women in south-western Sydney. *Aust. Dent. J.* 58:26-33.
- Hoefl KS, Barker JC, Masterson EE (2010). Urban Mexican-American mothers' beliefs about caries etiology in children. *Community Dent. Oral Epidemiol.* 38:244-255.
- Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS (2003). How many child deaths can we prevent this year? *Lancet* 362:65-71.
- Moimaz SAS, Fadel CB, Lolli LF, Garbin CAS, Garbin AJI, Saliba NA (2014). Social aspects of dental caries in the context of mother-child pairs. *J. Appl. Oral Sci.* 22:73-78.
- Mora JO, Nestel PS (2007). Improving prenatal nutrition in developing countries: strategies, prospects and challenges. *Am. J. Clin. Nutr.* 71:1353s-1363s.
- Nattestad A (2012). Knowledge management systems for oral health in developing and developed countries. *Periodontol.* 2000 60:156-161.
- Nourijelani K, Yekaninejad MS, Eshraghian MR, Mohammad K, Foroushani AR, Pakpour A (2014). The influence of mothers' lifestyle and health behavior on their children: An exploration for oral Health. *Iran. Red Crescent Med. J.* 16:e16051.
- Okada M, Kawamura M, Kayhara Y, Matsuzaki Y, Kuwahara S, Ishidori H, Miura K (2002). Influence of parents' oral health behavior on oral health status of their schoolchildren: an exploratory study employing a causal modeling technique. *Int. J. Paediatr. Dent.* 12:101-118.
- Oredugba F, Agbaje M, Ayedun O, Onajole A (2014). Assessment of mothers' oral health knowledge: towards oral health promotion for infants and children. *Health* 6:908-915.
- Pentapati KC, Archarya S, Bhat M, Rao SK, Singh S (2013). Knowledge of dental decay and associated factors among pregnant woman: A study from rural India. *Oral Health Prev. Dent.* 11:161-168.
- Rothnie J, Walsh CA, Wang MJ-J, Morgaine KC, Drummond BK (2012). An exploratory study of pregnant women's knowledge of child oral healthcare in New Zealand. *N. Z. Dent. J.* 108:129-133.
- Saied-Moallemi Z, Virtanen JI, Ghofranipour F, Murtomaa H (2008). Influence of mothers' oral health knowledge and attitudes on their children's dental health. *Eur. Arch. Paediatr. Dent.* 9:79-83.
- Santana SL, Lausen B, Bujnowska-Fedak M, Chronaki CE, Prokosch HU, Wynn R (2011). Informed citizen and empowered citizen in health: Results from an European survey. *BMC Fam. Pract.* 16:12:20.
- Swanson V, Power KG, Crombie IK, Irvine L, Kiezebrink K, Wrieden W, Slane PW (2011). Maternal feeding behaviour and young children's dietary quality: A cross sectional study of socially disadvantaged mothers of two-year old children using the Theory of Planned Behaviour. *Int. J. Behav. Nutr. Phys. Act.* 8:65-75.
- UNICEF (1998). Complementary feeding of young children in developing countries: a review of current scientific knowledge. Geneva: World Health Organization. 228 p. Available at: http://www.who.int/nutrition/publications/infantfeeding/WHO_NUT_98_1/en/
- Verduci E, Barberi GBS, Radaelli G, Lops A, Betti F, Riva E, Giovannini M (2014). Epigenetic effects of human breast milk. *Nutrients* 6:1711-1724.
- Vitolo MR, Bortolini GA, Feldens CA, Drachler ML (2005). Impacts of the 10 steps to healthy feeding in infants: a randomized field trial. *Cad. Saúde Pública.* 21:1448-1457.
- World Health Organization (1995). The World Health Organization's infant-feeding recommendation. *Bull WHO.* [access in 26 jan. 2014].73:165-74. Available at: http://www.who.int/nutrition/topics/infantfeeding_recommendation/en/
- World Health Organization (2009). Infant and young child feeding: model chapter for medical students and allied health professionals. Geneva: World Health Organization. Available at: http://www.who.int/maternal_child_adolescent/documents/9789241597494/en/

Full Length Research Paper

The effects of primary and secondary wound closure following surgical extraction of lower third molars on post-operative morbidity: A prospective randomized clinical trial

Nedal Abdullah Abu-Mostafa

Oral and Maxillofacial Surgery and Diagnostic Science Department, Riyadh Colleges of Dentistry and Pharmacy, Dental Hospital (Namuthajia) Riyadh, Kingdom of Saudi Arabia.

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The aim of this study was to compare the effects of primary and secondary wound closure on post-operative pain, swelling, and acute alveolar osteitis (AO) after surgical extraction of partially impacted lower third molars. A prospective randomized parallel clinical trial was conducted on 60 patients. Exclusion criteria included pericoronal infection and uncontrolled systemic diseases. Pain was estimated preoperatively. Facial measurements (FM) were obtained using a measuring tape for three lines between five defined points on the face. A single extraction with envelope flap was performed. Two types of wound closures were adopted, primary in Group 1 (G1) and secondary in Group 2 (G2). Pain, FM, and AO were evaluated on days 3 and 7. In both groups, FM and pain significantly increased on day 3, and then decreased on day 7. The amount of increase in FM, pain, and empty socket was higher in G1 than in G2. Tenderness and halitosis were more prevalent in G2 than in G1 on day 3. Five cases of AO were found in G1 (16.7%) and 4 cases in G2 (13.3%). No significant differences were found between the two groups regarding these variables. When the envelope flap is used, secondary wound closure has insignificant advantages over primary closure with respect to swelling, pain, and AO.

Key words: Primary closure, secondary, third molar, extraction.

INTRODUCTION

Surgical extraction of the lower third molar is the most common surgical procedure in oral and maxillofacial surgery (Yuasa and Sugiura, 2004). Morbidity following this procedure includes tissue reaction and complications. Post-operative tissue reactions involve

pain, swelling, trismus, and dysphagia (Garcia Garcia et al., 1997). The occurrence of postoperative pain and edema is related to many factors, mainly the inflammatory process, which is the immediate and early response to injury (Danda et al., 2010). A critical function

of this response is to deliver leucocytes to the site of injury, where they help clear the invading bacteria and degrade the necrotic tissue resulting from damage (Maria et al., 2012).

Complications may occur following extraction, including bleeding, alveolar osteitis, nerve injury, infection, delayed healing, and periodontal pocketing (Chiapasco et al., 1993; Halpern and Dodson, 2007). Alveolar osteitis (AO) or “dry socket” is defined as “postoperative pain inside and around the extraction site, between the first and third day after extraction, accompanied by a partial or total disintegrated blood clot within the alveolar socket with or without halitosis” (Blum, 2002).

The frequency of complications associated with the removal of impacted third molars is influenced by the surgical technique, experience of the surgeon, and the procedure’s duration (Danda et al., 2010; Sisk et al., 1986). Other factors include age of the patient, administration of preoperative or postoperative medications, patients’ compliance with postoperative instructions, oral hygiene, and the existence of a previous periodontal or periapical pathology (Erdogan et al., 2011).

Wound closure techniques following surgical extraction include total and partial closure. In total closure, the muco-periosteum is hermetically sealed so the wound heals by primary intension. In partial closure, a window exists and allows the wound to heal by secondary intention (Pasqualini et al., 2005), which starts from the base and borders and moves to the upper part by deposition of new tissue (Carrasco-Labra et al., 2012). The socket remains in communication with the oral cavity to facilitate drainage of inflammatory products (Danda et al., 2010; Bello et al., 2011).

This study used envelope flap for surgical extraction of partially impacted lower third molars and aimed to compare the effect of primary and secondary wound closure on post-operative pain, swelling, and AO. Furthermore, it compared these reactions and complications with previous similar studies that used another type of flap.

MATERIALS AND METHODS

A prospective randomized parallel clinical trial was conducted in the College’s dental hospital from February 2014 through January 2015. The study involved 60 male and female patients who had partially impacted lower third molars. Exclusion criteria include infection around the crown, bone pathology, uncontrolled systemic diseases, pregnancy or lactation, contraindications of epinephrine, and allergy to chlorhexidine (CHX), lidocaine, or ibuprofen. Fully impacted third molars and any extractions with operation time lasting more than 30 min were also excluded.

Sample size was estimated depending on a power calculation by Minitab release 14 statistical software for windows. At level of significance, $\alpha = 0.05$ with estimated standard deviation 1, maximum difference ≈ 1 and power 0.96, the sample size in each group should be at least 30.

The study followed the World Medical Association Declaration of Helsinki and was registered in the College’s research center, with a registration number of FRP/2014/94. The aims and procedures of

the study were explained to the patients before they signed an informed consent.

All required information was documented in the questionnaire regarding name, age, gender, mobile number, file number, and medical condition. The third molars were recorded and classified according to Pell and Gregory classifications.

On the first day directly before the operation (day 1), the patients were asked to estimate the intensity of pain by selecting the score on VAS (0, 1, 2, ..., 10) (Figure 1). A score of 0 represented no pain and 10 represented extremely severe pain. Facial measurements were obtained using a measuring tape while the patient was sitting upright and the mandible was in the physiologic rest position. Five points on the face were used: most posterior point at midline on tragus (A), lateral canthus of eye (B), most lateral point on corner of mouth (C), soft tissue pogonium, which is the most prominent point at midline on chin (D), and most inferior point on the angle of the mandible (E) (Figure 2). The author performed all the clinical assessments, however, the measurements for these three lines, (A to C), (B to E), and (A to D), were recorded three times, then the average was taken. Halitosis was reported if bad breath odor was smelled by the author.

The patients were divided randomly into two parallel groups by asking them to choose 1 of 60 playing cards. These cards, which had images of different shapes, had been mixed. The first shape included 30 cards and represented the first study group, while the second shape included 30 cards and represented the second study group.

Surgical procedure

Preoperatively, the patients rinsed with 0.12% chlorhexidine mouth wash. Local anesthesia was achieved by inferior alveolar nerve block and buccal infiltration of 2% lidocaine with 1:80,000 epinephrine. A single surgical extraction was performed by the author on every patient per visit. A standard surgical technique was followed in all cases: reflection of envelope flap by sulcular incision extending from the mesial papilla of the second molar to disto-buccal aspect of retro-molar area (Figure 3), bone osteotomy, and crown sectioning by bur and low-speed surgical hand piece under copious irrigation of normal saline. After extraction, bony margins of the sockets were smoothed, and the socket was irrigated with normal saline. The procedure duration was recorded using a stopwatch.

The wounds were sutured by 4-0 polyglycolic acid (PGA RESORBA, RESORBA Medical GmbH, Nurnberg, Germany); however, two different types of closure were performed. Group 1 (G1, Primary closure): the postoperative wound was totally closed by three interrupted sutures; the first suture distal to the second molar, the second suture across the distal incision, and the third suture across the socket. Group 2 (G2, Secondary closure): the postoperative wound was sutured by two interrupted sutures; the first suture distal to the second molar and the second suture across the distal incision (Figure 4). With this type of closure, the wound was left open to heal by secondary intention without removal of a wedge of the mucosa.

Post-operative medications included Ibuprofen (Brufen, Hamol Limited, Nottingham, England) 600 mg p.o. every 8 h for 3 days and 0.12% chlorhexidine mouthwash (Peridex, Oral Rinse, 3M, ESPE, USA) every 12 h for 7 days. No antibiotics were prescribed for the patients in either group.

Evaluations

On the third day post-operatively (day 3), the facial swelling was evaluated by measuring the same three lines of day 1 (A to C), (B to E), and (A – D). The measurements were performed three times



Figure 3. Envelope flap.



Figure 4. Secondary wound closure.

facial measurement in day 3 (FM2) and day 7 (FM3) were calculated in the same way. The percentages of increase in total facial measurements (PFM) between days 1 and 3 were calculated and compared between the two groups. $PFM \text{ from day 1 to day 3} = (FM2 - FM1) / FM1 \times 100$. The data of the study was analyzed using SPSS software version 20 for windows.

RESULTS

Sixty patients completed this study, 38 males (63.3%) and 22 females (36.7%). G1 included 18 males and 12 females, while G2 included 20 males and 10 females. The patients were divided into two groups, with both including 30 patients. The mean age of all patients was 25.5 years. The mean age of G1 and G2 was 25.3 and 25.7 years, respectively. The operation times ranged from 22 to 30 min and the mean was 25.9 min. The mean operation time of G1 and G2 was 25.4 and 26.4 min, respectively, and the difference was not significant ($P = 0.140$). The data regarding pain, and the total facial measurements were analyzed using one-way repeated measures test; the means are available as shown in Table 1.

In both groups, the means of the total facial measurements significantly increased on day 3 ($P = 0.000$), then decreased on day 7, but were still significantly greater than on day 1. P values for G1 and G2 were $P = 0.003$ and $P = 0.002$, respectively. The percentage of increase in total facial measurement from days 1 to 3 was greater in G1 than in G2; however, there was no significant difference ($P = 0.902$) according to an independent samples t test.

The means of pain in both groups significantly increased on day 3 ($P = 0.000$), then decreased on day 7. The mean of pain was greater in G1 than in G2 on day 3, but without a significant difference ($P = 0.543$) according to an independent samples t test.

The occurrence of tenderness, empty socket with food debris, and halitosis is available as shown in Table 2. The analysis of these variables was done using Chi-squared tests. On day 3, tenderness was greater in G2 than in G1, but without a significant difference ($P = 0.771$), while on day 7 the percentage was the same. Empty socket and food debris were greater in G1 than in G2 on day 3 and day 7, but there were no significant differences at $P = 0.748$ and $P = 0.472$, respectively. Halitosis on days 3

Table 1. Changings of the variables in postoperative review days.

Variable	Group 1 (Primary closure)			Group 2 (Secondary closure)		
	Day 1	Day 3	Day 7	Day 1	Day 3	Day 7
Mean pain	1.25	5.25	1.05	0.85	3.85	1.95
Standard deviation	1.71	2.15	1.28	2.25	2.62	2.21
Mean (FM)	35.38	37.08	36	36.22	37.68	37.03
Standard deviation	1.88	2.12	1.94	1.86	1.77	1.60

FM: Total facial measurement by collection of the measurements of the three lines; (A–C), (B–E), and (A–D).

Table 2. Frequency of signs and symptoms of AO in postoperative review days.

Variable	Group 1 (Primary closure)		Group 2 (Secondary closure)	
	Day 3	Day 7	Day 3	Day 7
Tenderness (%)	7 (23.3)	2 (6.7)	9 (30)	2 (6.7)
Empty socket and debris (%)	7 (23.3)	6 (20)	5 (16.7)	3 (10)
Halitosis (%)	7 (23.3)	5 (16.7)	9 (30)	9 (30)

%; Percentage of the signs and symptoms within the group.

and 7 was greater in G2 than in G1, without significant differences at $P = 0.771$ and $P = 0.360$, respectively.

Five cases of AO were found in G1 (16.7%) and 4 cases in G2 (13.3%). There was no significant difference at $P = 1.000$ according to Chi-squared tests.

DISCUSSION

Minimizing postoperative pain and swelling is a major concern for patients and clinicians as well. Postoperative pain increases with increased surgical difficulty, such as tooth sectioning and bone reduction (Lago-Méndez et al., 2007). On the other hand, operation time significantly affects postoperative swelling, trismus, and pain (de Santana-Santos et al., 2013). To avoid the variability in postoperative morbidity, the author performed similar surgical procedures for all patients: envelope flap, bone reduction, crown sectioning, and tooth delivery. Moreover, fully impacted third molars were excluded as procedure may require more bone removal and thus affect the operation time, which ranged from 22 to 30 min in this study without significant difference between the two groups.

Several studies have evaluated facial swelling after surgical extraction of lower third molars by depending on the visual scale (Danda et al., 2010; Maria et al., 2012; Pasqualini et al., 2005; Khande et al., 2011; Chaudhary et al., 2012), which correlates the patient's estimation of the presence of swelling, difficulty in mastication, and mouth opening. The present study evaluated swelling by measuring three lines on the face with a flexible tape as in the study of Bello et al. (2011). This type of evaluation is objective and avoids the patient's estimation of swelling, which can be affected by other factors like pain

and discomfort. Additional methods that have been proposed to measure facial edema include postoperative computerized tomography (CT), magnetic resonance imaging (MRI), and ultrasound evaluations (Erdogan et al., 2011).

The idea in this study was the use of the envelope flap in such comparison between the two types of wound healing following surgical extraction of an impacted lower third molar. Other studies have used the standard ward's incision to reflect the three-sided mucoperiosteal flap (trapezoid) that included a mesial releasing incision (Danda et al., 2010; Maria et al., 2012; Pasqualini et al., 2005; Bello et al., 2011; Khande et al., 2011; Chaudhary et al., 2012; Chukwunke et al., 2008). The envelope flap provides the operator with a sufficient amount of visualization, minimizes soft tissue trauma, and limits the compromising blood supply to mucosa and periosteum as well. Furthermore, postoperative swelling is significantly less with the envelope flap than flaps with a mesial releasing incision (Erdogan et al., 2011; Kirk et al., 2007) because a releasing incision blocks the route of lymphatic vessels and impairs local lymph transport (Szolnoky et al., 2007).

Secondary wound closure after surgical removal of a lower third molar has been achieved in different ways. Some investigators have preferred to create a window by removing a 5 to 6 mm wedge of mucosa distal to the second molar (Danda et al., 2010; Maria et al., 2012; Pasqualini et al., 2005; Khande et al., 2011; Chaudhary et al., 2012; Dubois et al., 1982). Insertion of a tube drain in the buccal fold is another technique (Chukwunke et al., 2008; Rakprasitkul and Pairuchvej, 1997; Sağlam, 2003). Conversely, this study used a simple technique as the wounds were left open by placing only two sutures-distal to the second molar and across the distal incision.

A similar technique was used by Bello et al. (2011), who were not comfortable with the ethical consideration of excising mucosa distal to the second molar to obtain partial closure.

The type of flap and wound closure are modifiable factors that have been investigated in the literature to reduce postoperative morbidity; however, controversy still exists. Thoma (1969), Howe (1971) and Killey and Kay (1975) were in favor of closed wound healing due to fewer complications and postoperative infections. In contrast, a significant increase in facial swelling has been reported in other studies associated with a primary versus secondary closure technique (Danda et al., 2010; Maria et al., 2012; Pasqualini et al., 2005; Bello et al., 2011; Khande et al., 2011; Chaudhary et al., 2012; Dubois et al., 1982; Holland and Hindle, 1984; Refo'a et al., 2011). In this study, primary closures had greater swelling than secondary closures, but without a significant difference. However, both types of closures were associated with significant swelling on day 3 postoperatively, which decreased on day 7. Postoperative facial swelling can be attributed to the accumulation of inflammatory exudate within facial tissues, hematoma collection, or both (Holland and Hindle, 1984; Alkan et al., 2004). Partial wound closure permits drainage and thus appears to minimize immediate postoperative edema and contribute to reduced patient discomfort (Dubois et al., 1982).

Carrasco-Labra et al. concluded that important differences in outcomes may not exist between secondary and primary wound closures after they performed a meta-analysis on 14 studies that compared the two types of closure.

In this study, the recorded cases of alveolar osteitis were greater in number with primary closures (16.7%) than secondary closures (13.3%), but there were no significant difference. In the same way, Danda et al. (2010) reported more cases of alveolar osteitis with primary closure (4.3%) than secondary closure (3.2%). In contrast, Bello et al. (2011) found more cases of AO with secondary closure (7.3%) than primary closure (4.9%), but without a significant difference.

Most studies that estimated the morbidity after third molar surgery have recorded more significant pain with primary closure than secondary closure in the following days (Danda et al., 2010; Maria et al., 2012; Pasqualini et al., 2005; Khande et al., 2011; Chaudhary et al., 2012; Dubois et al., 1982; Holland and Hindle, 1984; Refo'a et al., 2011). This result is consistent with this study as the primary closure group experienced more pain than the other group, but no significance was found. In contrast, Bello et al. (2011) reported more pain in the partial closure group than the total closure, with no statistically significant difference.

The incidence of tenderness, empty socket, food debris, and halitosis was reported in this study without significant differences between the two groups.

Tenderness and halitosis were more frequent in the secondary closure group, which can be explained by exposure of the socket walls to food and bacteria in the postoperative days. Breakdown of food results in a malodor that can freely leak into the oral cavity through the open wound. On the other hand, an empty socket and debris were reported more frequently with primary closure, because this type of wound is not self-cleansing as compared to secondary closure (Yuasa and Sugiura, 2004; Halpern and Dodson, 2007; Dubois et al., 1982). Furthermore, this type of wound acts like a one-way valve that allows food debris to accumulate in the socket by hindering removal and thus increases the possibility of further infection (Pasqualini et al., 2005; Figueiredo et al., 2007).

In conclusion, when the envelope flap is used for surgical extraction of partially impacted lower third molars, the secondary wound closure technique has insignificant advantages over primary closure with respect to swelling, pain, and acute alveolar osteitis.

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Conflicts of interest

The author declares no potential conflicts of interest with respect to the authorship and publication of this article. There were no external funding sources for this study.

REFERENCES

- Alkan A, Metin M, Arici S, Sener I (2004). A prospective randomised cross-over study of the effect of local haemostasis after third molar surgery on facial swelling: an exploratory trial. *Br. Dent. J.* 197(1):42-44.
- Bello SA, Olaitan AA, Ladeinde AL (2011). A randomized comparison of the effect of partial and total wound closure techniques on postoperative morbidity after mandibular third molar surgery. *J. Oral Maxillofac. Surg.* 69(6):24-30.
- Blum IR (2002). Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management: a critical review. *Int. J. Oral Maxillofac. Surg.* 31(3):309-317.
- Carrasco-Labra A, Brignardello-Petersen R, Yanine N, Araya I, Guyatt G (2012). Secondary versus primary closure techniques for the prevention of postoperative complications following removal of impacted mandibular third molars: a systematic review and meta-analysis of randomized. *J. Oral Maxillofac. Surg.* 70(8):441-457.
- Chaudhary M, Singh M, Singh S, Singh SP, Kaur G (2012). Primary and secondary closure technique following removal of impacted mandibular third molars: A comparative study. *Natl. J. Maxillofac. Surg.* 3(1):10-14.
- Chiapasco M, De Cicco L, Marrone G (1993). Side effects and

- complications associated with third molar surgery. *Oral Surg. Oral Med. Oral Pathol.* 76(4):412-420.
- Chukwunke FN, Oji C, Saheeb DB (2008). A comparative study of the effect of using a rubber drain on postoperative discomfort following lower third molar surgery. *Int. J. Oral Maxillofac. Surg.* 37(4):341-344.
- Danda AK, Krishna Tatiparthi M, Narayanan V, Siddareddi A (2010). Influence of primary and secondary closure of surgical wound after impacted mandibular third molar removal on postoperative pain and swelling—a comparative and split mouth study. *J. Oral Maxillofac. Surg.* 68(2):309-312.
- de Santana-Santos T, de Souza-Santos AA, Martins-Filho PR, da Silva LC, de Oliveira E Silva ED, Gomes AC (2013). Prediction of postoperative facial swelling, pain and trismus following third molar surgery based on preoperative variables. *Med. Oral Patol. Oral Cir. Bucal.* 18(1):65-70.
- Dubois DD, Pizer ME, Chinnis RJ (1982). Comparison of primary and secondary closure techniques after removal of impacted mandibular third molars. *J. Oral Maxillofac. Surg.* 40(10):631-634.
- Erdogan O, Tatlı U, Ustün Y, Damlar I (2011). Influence of two different flap designs on the sequelae of mandibular third molar surgery. *Oral Maxillofac. Surg.* 15(3):147-152.
- Figueiredo R, Valmaseda-Castellón E, Berini-Aytés L, Gay-Escoda C (2007). Delayed-onset infections after lower third molar extraction: a case-control study. *J. Oral Maxillofac. Surg.* 65(1):97-102.
- Garcia Garcia A, Gude Sampedro F, Gandara Rey J, Gallas Torreira M (1997). Trismus and pain after removal of impacted lower third molars. *J. Oral Maxillofac. Surg.* 55(11):1223-1226.
- Halpern LR, Dodson TB (2007). Does prophylactic administration of systemic antibiotics prevent postoperative inflammatory complications after third molar surgery? *J. Oral Maxillofac. Surg.* 65(2):177-185.
- Holland CS, Hindle MO (1984). The influence of closure or dressing of third molar sockets on postoperative swelling and pain. *Br. J. Oral Maxillofac. Surg.* 22:65.
- Howe GL (1971). *Minor Oral Surgery*. John Wright & Sons Ltd, Bristol.
- Khande K, Saluja H, Mahindra U (2011). Primary and secondary closure of the surgical wound after removal of impacted mandibular third molars. *J. Maxillofac. Oral Surg.* 10(2):112-127.
- Killey HC, Kay LW (1975). *The Impacted Wisdom Tooth*. Churchill Livingstone, London.
- Kirk DG, Liston PN, Tong DC, Love RM (2007). Influence of two different flap designs on incidence of pain, swelling, trismus, and alveolar osteitis in the week following third molar surgery. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 104(1):1-6.
- Lago-Méndez L, Diniz-Freitas M, Senra-Rivera C, Gude-Sampedro F, Gándara Rey JM, García-García A (2007). Relationships between surgical difficulty and postoperative pain in lower third molar extractions. *Oral Maxillofac. Surg.* 65(5):979-983.
- Maria A, Malik M, Virang P (2012). Comparison of primary and secondary closure of the surgical wound after removal of impacted mandibular third molars. *J. Maxillofac. Oral Surg.* 11(3):276-283.
- Pasqualini D, Cocero N, Castella A, Mela L, Bracco P (2005). Primary and secondary closure of the surgical wound after removal of impacted mandibular third molars: a comparative study. *Int. J. Oral Maxillofac. Surg.* 34(1):52-57.
- Rakprasitkul S, Pairuchvej V (1997). Mandibular third molar surgery with primary closure and tube drain. *Int. J. Oral Maxillofac. Surg.* 26(3):187-90.
- Refo'a Y, Ouatik N, Golchin F, Mahboobi N (2011). Comparing primary and secondary wound healing discomfort after mandibular third molar surgery: a randomized, double-blind clinical trial. *Gen. Dent.* 59(4):310-313.
- Sağlam AA (2003). Effects of tube drain with primary closure technique on postoperative trismus and swelling after removal of fully impacted mandibular third molars. *Quintessence Int.* 34(2):143-147.
- Sisk AL, Hammer WB, Shelton DW, Joy ED Jr (1986). Complications following removal of impacted third molars: the role of the experience of the surgeon. *J. Oral Maxillofac. Surg.* 44(11):855-859.
- Szolnoky G, Szendi-Horváth K, Seres L, Boda K, Kemény L (2007). Manual lymph drainage efficiently reduces postoperative facial swelling and discomfort after removal of impacted third molars. *Lymphology* 40(3):138-142.
- Thoma HC (1969). *Oral Surgery*. CV Mosby, St Louis.
- Yuasa H, Sugiura M (2004). Clinical postoperative findings after removal of impacted mandibular third molars: prediction of postoperative facial swelling and pain based on preoperative variables. *Br. J. Oral Maxillofac. Surg.* 42(3):209-214.



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