New proposal of flap drawing for the extraction of the third mandibular molar semi-included.

Cogswell triangular flap modified and transposed.

Ann. Ital. Chir., 2020 91, 1: 93-99
pii: S0003469X20031565

M. Michele Figliuzzi, Maria Altilia, Simone Altilia, Concetta Romeo, Fortunato Leonzio

Department of Health Sciences, Dental School, Magna Grecia University, Catanzaro, Italy

New proposal of flap drawing for the extraction of the third mandibular molar semi-included: Cogswell triangular flap modified and transposed.

OBJECTIVE: *The study proposes a new flap drawing derived from the modification of a triangular Cogswell flap to treat a semi-included third molar.*
MATERIAL AND METHOD: *Two groups of patients underwent surgery: in the study group the new flap proposal was carried out whilst in the control group the triangular Cogswell flap was used. The gingival tissue and the periosteum were detached and the extraction technique was standardised for all the cases.*
RESULTS: *At 7 days and at 14 days from the operation, the results showed a statistically significant difference in the increase in primary intention healing in the study group whereas no statistically significant difference was encountered between using the innovative flap or the triangular Cogswell flap in terms of swelling.*
DISCUSSION: *The patients who underwent the innovative flap operation presented an increased percentage of primary intention healing compared to the patients who underwent the baseline method.*
As known from the international literature, a correct operational conduct aims at reducing surgical trauma as much as possible in order to limit the immediate and delayed consequences of surgery.
Nevertheless the lengthening of healing times also leads to an increase of probability that post-operative complications and worse quality of life for the patients arise.
CONCLUSION: *The Cogswell triangular flap modified and translated represents a new method available to the oral surgeon, useful in soft tissue management for the extraction of semi-included third mandibular molars. Simple to carry out, it promotes primary intention healing with absence of an increase in complications such as swelling[26-30].*

KEY WORDS: Cogswell triangular flap, Mandibular molar, Oral surgery

Introduction

The extraction of the third molar is the most frequent intervention in oral surgery [1-5]. The dysodontiasis of the third mandibular molar generally appears between 18 and 24 years with a large variability [6-3]. The third molar is partially or completely included because of lack of space, retention caused by other teeth and their abnormal original position [4-6]. The incidence of dysodontiasis is also variable taking into account the population of reference, and it seems to be increasing because of the changes in the diet towards soft foods that requires less use of these teeth [7-9,10].
Aim of this study is to verify that a new kind of flap derived from the modification of the triangular Cogswell flap in the third molar surgery, permits the healing for first intention, comparing the wounds of first intention at 7 and 14 days with those obtained with the Cogswell triangular flap and the quality of life of the patients operated taking into account the parameter post-operative oedema registered at 2, 7 and 14 days of intervention.

Pervenuto in Redazione Ottobre 2019. Accettato per la pubblicazione Dicembre 2019.
Correspondence to: Michele M. Figliuzzi, Via De Maria 9, Vibo Valentia (e-mail: figliuzzi@unicz.it)

Short review of the possible flaps

Triangular Flap

Indicated in more complex surgical situations, this flap consists in a disto-vestibular releasing incision identical to the one of the marginal flap to preserve lingual nerve; the difference is given by the second releasing incision of the distal surface of the second molar directed mesially and towards to the mucous-gingival line, creating with this an angulation of 135 from the rear.

Laskin Triangular Flap

The first incision is realised at 2 cm between the internal and external oblique line distal to the second molar and continues as intrasulcular to the distal surface of the second molar making a releasing incision on *Cogswell Triangular Flap.*
The first incision is realized from the gingival sulcus distal to the second molar, in correspondence of the disto-lingual cusp, and it is directed distally and vestibularly for almost 2 cm; another intrasulcular cut interests the whole buccal surface of the second molar (gingival papilla excluded), and then it continues distally in lingual direction until encountering the other cut at almost a half centimeter behind the second molare

Material e Method

The sample at the beginning of the study was characterised by two groups of twenty people. In each group there were ten male and ten female patients. The average age was of 25 yrs old in each group. The first group was treated with Cogswell classical flap and the second one with the Cogswell modified and translated flap. The categorical variables are expressed as number of cases. The continuous variables are expressed as average (SD) (Table I).
We report in the following table the demographic characteristics of the sample at the beginning of the study.

Table I - *Sample characteristics: fourty patients divided in two groups were threated. The first group included ten men and ten women threated with the Cogswell classic flap while the second included ten women and ten men threated with the Cogswell modified and translated flap. The av erage age of each group was of twenty five years of age.*

	Cogswell classicn=20	**Cogswell modified and translatedn=20**
M/F	(10/10)	(10/10)
age (yrs)	25.7 (3.2)	25.4 (3.1)

Surgical Protocol

After the disinfection of the oral cavity with a mouthwash based on clorexidin 0,20% for about one minute, the patients underwent to local-regional anaesthesia with articain 1:200.000 with nerval block anaesthesia at Spix thorn and subsequently it was realized to them a strengthening plexus anaesthesia of the buccal nerve with Articain 1:100.000.
Then in the patients of the study group it was used the Cogswell modified flap and in the patients of the control group it was used the Cogswell triangular flap. Therefore the gingival tissue and the periosteum were detached.
From here the extraction technique was standardised for all the cases, in the group of study and in the group of control, with the realization of the vestibular osteotomy of the third molar until evidencing the furcation of the

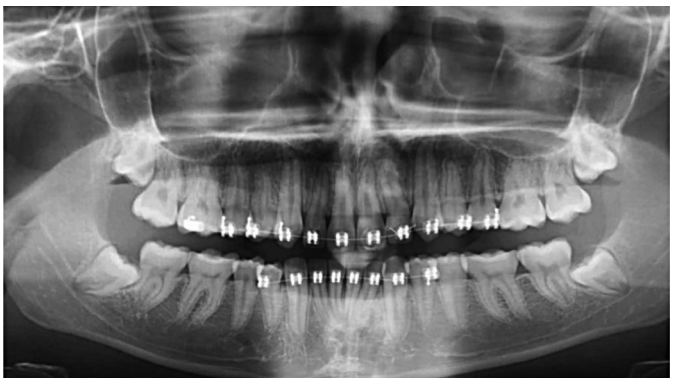

Fig. 1: Ortopanoramic Rx.

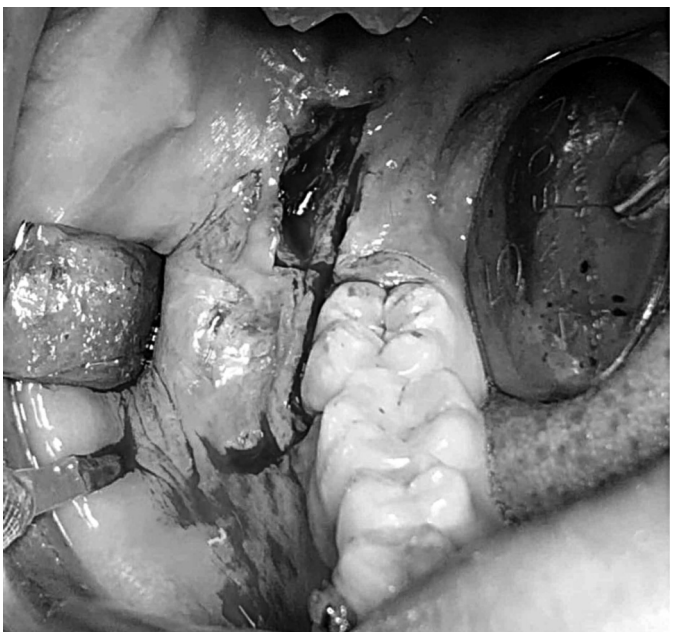

Fig. 2: Incision for the primary flap.

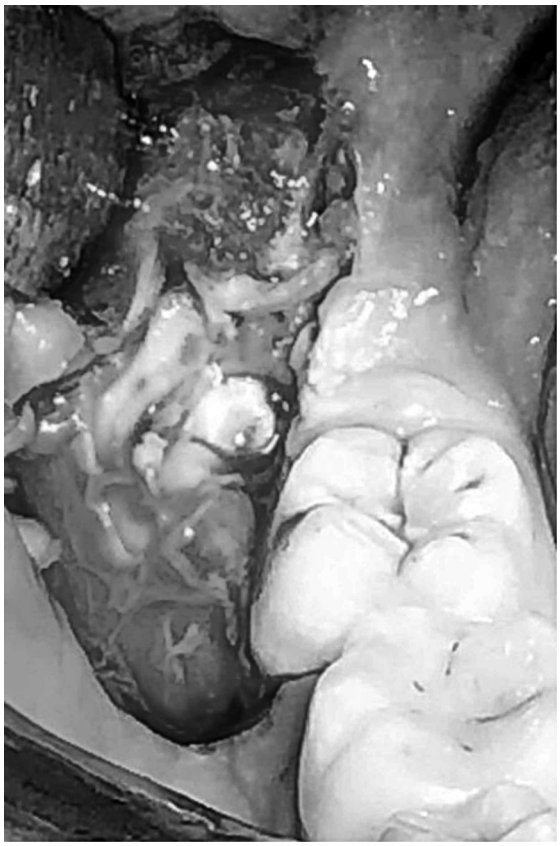

Fig. 3: Vestibular Osteotomy.

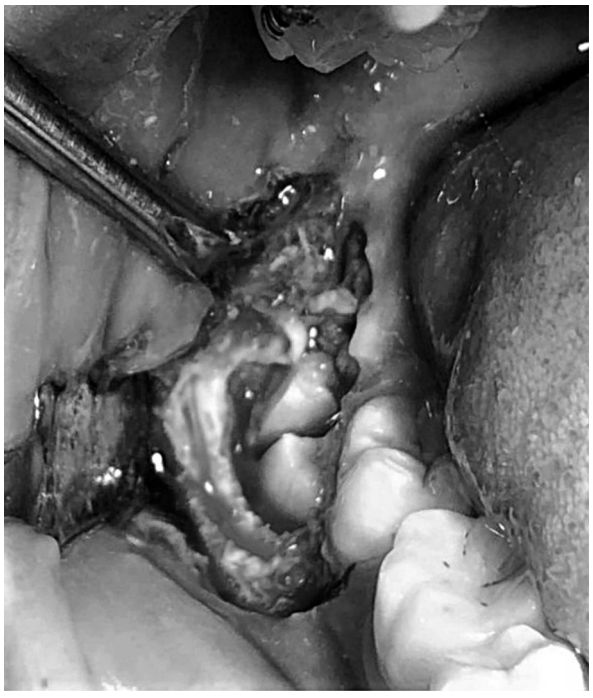

Fig. 4: Tooth separation.

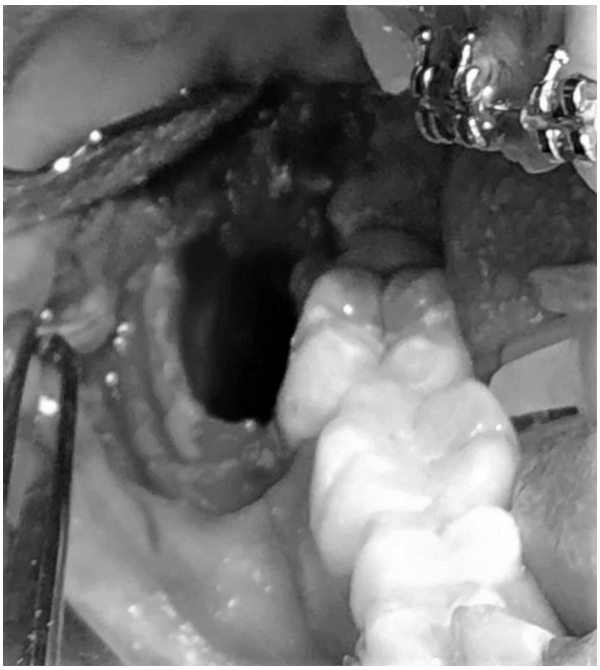

Fig. 5: Exstraction.

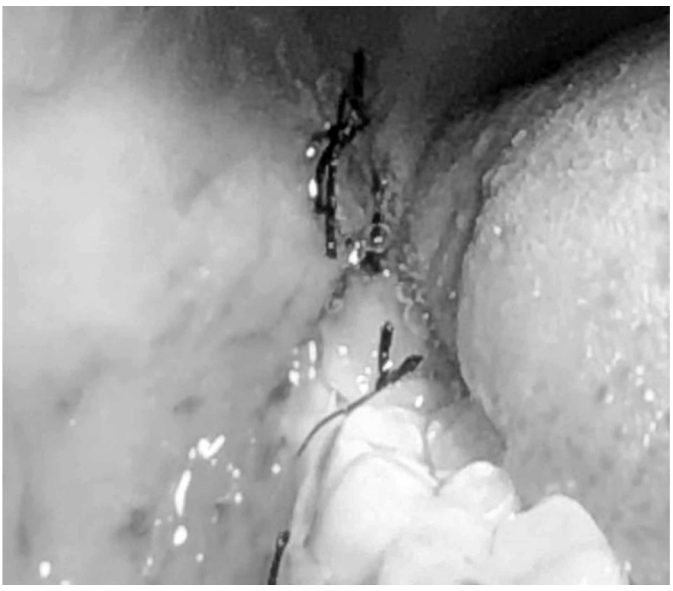

Fig. 6: Suture.

dental element, subsequent vestibular odontotomy, dislocation, extraction of radicular system and alveolar revision Incision for the primary flap.

Therefore the post-extractive cavity was medicated with fibrin sponge dipped in patient's blood and antibiotic (rifampicin).

Behavioral post-surgical protocol recommended to the patients: absolute rest in the armchair for two days and if lied down to put more pillows under the head to

maintain this higher than the chest; not to spit and not to perform rinse for 24 hours for not removing the clot, not to brush teeth and to blandly rinse with cloridrate clorexidine in concentration of 0.12% once a day beginning from the day after the intervention; ice applications in alternate half hours for the first 12 hours; liquid and cold diet for the first 24 hours.
Photographic control at 2 days, and at 7 days simultaneously to the suture removal, and finally at 14 days, for the evaluation of the surgical wound state and oedema.

Criteria of recovery evaluation

The wound healing is evaluated exclusively by an objective exam of the macroscopic morphologic aspect of the wound in its healing phase.
At 7 days, when the wound shows with margins perfectly united as immediately after the apposition of the sutures, it seems appropriate to define it as a wound healing for first intention. Conversely, when the wound shows opened, even for a little and even for a minimal tract, it is considered as a wound healing in a phase of second intention.
Since it is not uncommon that after the removal of the suture points, the wound could open because of the detachment from one to other of the margins, the wounds were also controlled at 14 days. An intact gum, with an uniform colour and a minimal depression was judged healed for first intention; a gum that otherwise , of uneven colour and with the bottom of the cavity not completely riephitelized or with the aspect of granulation tissue, was still judged in phase of healing for second intention.

Statistical Analysis

The categorical variables are expressed as number of cases (%), those continuous as average (SD).
To calculate the standard error of the estimation in a very small sample size, it was utilized the Bootstrap BCA (Bias Corrected Accelerated) method over 1000 resampling.
To confront the proportions between the two groups and the association, the Z test and Chi-square test were utilised.
To measure the dependence between the two nominal variables the Phi index of Pearson and the lambda index of Goodman and Kruskal were utilized.
There were considered statistically significant results associated to a $p< 0.05$.
For all the analysis it was utilised the software SPSS (ver 16.0) e Stata (ver.9.0).
In this first analysis we are going to verify the possible meaningful variation of the proportion of those who heal for first and second intention in the two groups.

Results

At 7 days from the intervention the subjects that were operated with innovative methodology heal in the most part of the cases for first intention (0.85 vs 0.35; $p< 0.05$) and those who were operated with classic methodology heal for second intention (0.65 vs 0.15; $p<0.05$) (Table II).
By means of a chi-square test in the same units, we obtain a statistically significant relation ($p=0.003$) between group and kind of healing, to confirm what obtained previously. The symmetry index Phi of 0.51 seems to reinforce the thesis of a discreet dependence between group and kind of healing. In particular Lambda index of Goodman seems to suggests a dependence of the group from the healing state (0.50).
We verified, then, the eventual significant variation of the proportion of those that heal for first and second intention in the two groups at 14 days from the surgery. Given the small sample size, the standard error was estimated through the Bootstrap BCA method.

Table II - *Proportion (IC95%) of healing at seven days: from the results obtained by the statistical analysis, at seven days from the intervention it appears that the majority of patients that were operated with innovative methodology, Cogswell modified and translated flap, healed in the most part of the cases for first intention (0.85 vs 0.35; p< 0.05) and that those who were operated with classic methodology, Cogswell classic flap, healed mostly for second intention (0.65 vs 0.15; p<0.05). As known from the international literature the first intention healing is the one most requested in dental and medical practice in general. The Cogswell modified and translated flap is a better alternative to take into account in semi-included third molar surgery.*

Healing	Cogswell classic	Cogswell modified and translated	p
I intention	0.35 [0.14-0.56]	0.85 [0.69-1.00]	0.0012[a]
II intention	0.65 [0.44-0.86]	0.15 [-0.009-0.31]	0.0012[a]

[a]Z test, p<0.05

Table III - *Proportion (IC95%)of healing at fourtheen days. The results at fourteen days from the surgery confirm the ones at seven days from the intervention: the patients who were operated with the innovative method healed in the majority of cases for first intention (0.55 vs 0.15; p<0.05) and those who were operated with the classic methodology healed for second intention (0.85 vs 0.45; p<0.05).*
It is relevant to see that compared to the results at seven days the number of subjects who continued to heal for first intention was lower in both of the groups. Anyway there is still a statistical significant difference between healing and flap design in both groups.

Healing	Cogswell classic	Cogswell modified and translated	p
I intention	0.15 [-0.009-0.31]	0.55 [0.32-0.78]	0.008[a]
II intention	0.85 [0.69-1.00]	0.45 [0.22-0.68]	0.008[a]

[a]Z test, p<0.05

TABLE IV - *Proportion (IC95%) of swelling in the two groups: From the results obtained it is not possible to observe any statistical significant difference between the patients threated with Cogswell classic flap and the patients threated with the Cogswell modified and translated flap. It should be noticed anyway how at one and two weeks from the surgery, the percentage of those in whom an abnormal swelling is noticed is identical.*

Healing	Cogswell classic	Cogswell modified and translated	p
2d	0.90 [0.78-1.01]	1	0.15
7d	0.20 [0.04-0.35]	0.20 [0.04-0.36]	1.00
14d	0.05 [-0.02-0.12]	0.05 [-0.02-0.12]	1.00

[a]Z test, $p<0.05$

Equally to what obtained seven days after the intervention, at 14 days from the surgery, the subjects who were operated with the innovative method healed in the majority of cases for first intention (0.55 vs 0.15; $p<0.05$) and those who were operated with the classic methodology healed for second intention (0.85 vs 0.45; $p<0.05$). (Table III.)

By means of the same units a chi-squared test, we obtain a statistically significant relation ($p=0.008$) between group and kind of healing, as confirmation of what obtained previously.

It is to underline how at 7 days from the surgery the difference of healing for first intention between the two groups is increased, even though for a little, compared to that obtained at 14 days (0.50 vs 0.40). The same reasoning can be repeated for the healing of second intention.

At the end we verified the swelling paramether and the eventual significant difference of the proportion of those who developed an abnormal swelling between the two groups. Given the small sample size the standard error was estimated through the Bootstrap BCA method.

From the results obtained it is not possible to observe any significant difference. It should be noticed anyway how at one and two weeks from the surgery, the percentage of those in whom an abnormal swelling is noticed is identical (Table IV).

Discussion

The dysodontiasis of third mandibular molar is a condition that requests a surgical therapy of extraction of the wisdom tooth, especially when this is semi-included, situation that favours the infection of the pericoronaric bag/lot and it is not possible that the dental element completes the eruption process.

The extraction, for different reasons, involves a period, more or less long, depending on the negative consequences that happen, of inability of the masticatory apparatus which affects negatively both the relational and working patient's activities [11-14,19,20].

Anyway it seems clear, as we can see from the international literature, that a correct operatory conduct, aimed at reducing as much as possible the surgical trauma, can limit the surgery's immediate and delayed consequences [1-5,15-18,22,26,30].

Nevertheless it is known that also the lengthening of healing times leads to an increase of probability that post-operative complications [21] and worse quality of life for the patients arise [19-25].

From what emerges from the analysis realized, the results demonstrate that the patients treated with the methodology proposed by us present an increased percentage of healing for first intention compared to the patients treated with the baseline methodology, both at 7 and at 14 days from the surgical intervention (Table II, III). The statistical analysis, anyway, demonstrate a big dependence between the kind of flap utilized and the kind of healing.

Furthermore, it does not exist any significant statistical difference about oedema, during the whole period in which the two groups underwent to programmed controls (Table IV).

In conclusion, the Cogswell triangular flap modified and translated represents a new methodology at disposition of the oral surgeon, useful in the soft tissues management for the extraction of third semi-included mandibular molars. Of simple realization, it promotes the healing for first intention in absence of increasing of complications like swelling [26-30].

Conclusions

From what emerges from the analysis realized, it is possible to conclude that the subjects treated with the innovative method, at 14 days from the surgery presented a higher healing for first intention in percentage than of the subjects threated with classic methodology (Table III).

In terms of abnormal swelling, it is not noticed any statistical significant difference, in any temporal instant between the two methods (Table IV).

Riassunto

Lo studio propone un nuovo disegno di lembo derivato dalla modifica del lembo triangolare di Cogswell nella chirurgia dei terzi molari mandibolari semi- inclusi.

Due gruppi di pazienti sono stati sottoposti all'intervento chirurgico: il gruppo dei casi è stato trattato con la nuova proposta di lembo mentre il gruppo dei controlli con il lembo triangolare di Cogswell. Il tessuto gengivale ed il periostio sono stati scollati a spessore totale mentre la tecnica estrattiva è stata standardizzata per tutti i pazienti.

I risultati ottenuti hanno mostrato a 7 ed a 14 giorni dall'intervento una differenza statisticamente significativa nell'incremento della guarigione per prima intenzione nel

gruppo di studio mentre nessuna differenza statisticamente significativa è stata riscontrata nell'utilizzo del lembo innovativo rispetto al lembo triangolare di Cogswell in termini di gonfiore.
I pazienti trattati con il lembo innovativo presentarono, quindi, un incremento nella guarigione per prima intenzione se comparati ai pazienti trattati con il lembo classico di Cogswell.
Come noto dalla letteratura internazionale, una condotta operatoria corretta ha l'obiettivo di ridurre il più possibile il trauma chirurgico in modo da limitare al massimo le complicanze immediate e tardive dell'intervento. Inoltre il prolungamento dei tempi di guarigione comporta l'aumento della probabilità di sviluppo di complicanze post-operatorie e peggiore qualità della vita per i pazienti.
Il lembo triangolare di Cogswell modificato e traslato rappresenta una nuova metodologia a disposizione del chirurgo orale, utile nella gestione dei tessuti molli per l'estrazione dei terzi molari mandibolari semi-inclusi.
Di semplice realizzazione, promuove la guarigione per prima intenzione, in assenza di incremento di complicanze come il gonfiore.

References

1. Woldenberg Y, Gatot I, Bodner L: *Iatrogenic mandibular fracture associated with third molar removal. Can it be prevented?* Med Oral Patol Oral Cir Bucal, 2007; 12(1):E70-2.

2. Chang SW, Shin SY, Kum KY, Hong J: *Correlation study between distal caries in the mandibular second molar and the eruption status of the mandibular third molar in the Korean population*. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2009 D; 108(6):838-43. doi: 10.1016/j.tripleo.2009.07.025. Epub 2009 Oct 20.

3. Aimetti M, Pigella E, Romano F: *Clinical and radiographic evaluation of the effects of guided tissue regeneration using resorbable membranes after extraction of impacted mandibular third molars*. Int J Periodontics Restorative Dent, 2007; 27(1):51-9.

4. Al-Khateeb TH, Bataineh AB: *Pathology associated with impacted mandibular third molars in a group of Jordanians.* J Oral Maxillofac Surg, 2006; 64(11):1598-602.

5. Almendros-Marqués N, Berini-Aytés L, Gay-Escoda C.: *Influence of lower third molar position on the incidence of preoperative complications.* Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2006; 102(6):725-32. Epub 2006 Jul 14.

6. Hugoson A, Kugelberg CF: *The prevalence of third molars in a Swedish population. An epidemiological study*. Community Dent Health, 988; 5(2):121-38.

7. Punwutikorn J, Waikakul A, Ochareon P: *Symptoms of unerupted mandibular third molars.* Oral Surg Oral Med Oral Pathol Oral Radiol Endod,1999; 87(3):305-10.

8. American Association of Oral and Maxillofacial Surgeons, 2001. *Parameters and pathways: Clinical practice guidelines for oral and maxillofacial surgery (AAOMS ParPath 01).*

9. Slade GD, Foy SP, Shugars DA, Phillips C, White RP Jr: *The impact of third molar symptoms, pain, and swelling on oral health-related quality of life*. J Oral Maxillofac Surg, 2004; 62(9):1118-124.

10. Figliuzzi MM, Giudice A, Pileggi S, Pacifico D, Marrelli M, Tatullo M, Fortunato L: *Implant-prosthetic rehabilitation in bilateral agenesis of maxillary lateral incisors with a mini split crest.* Case Rep Dent, 2016; 2016:3591321. doi: 10.1155/2016/3591321. Epub 2016 Apr 13.

11. Shepherd JP, Brickley M: *Surgical removal of third molars*. BMJ. 1994; 309(6955): 620-21.

12. Worrall SF, Riden K, Haskell R, Corrigan AM: *UK National Third Molar project: The initial* report. Br J Oral Maxillofac Surg, 1998; 36(1):14-8.

13. Scottish Intercollegiate Guidelines Network: *Management of unerupted and impacted third molar teeth: A national clinical guideline (sign publication) paperback.* Import, March, 2000.

14. Silvestri AR Jr, Singh : The *unresolved problem of the third molar: Would people be better off without it?* J Am Dent Assoc, 2003; 134(4):450-55.

15. Mettes TG, Nienhuijs ME, van der Sanden WJ, Verdonschot EH, Plasschaert AJ: *Interventions for treating asymptomatic impacted wisdom teeth in adolescents and adults*. Cochrane Database Syst Rev, 2005; 18,(2):CD003879.

16. Almendros-Marqués N, Alaejos-Algarra E, Quinteros-Borgarello M, Berini-Aytés L, Gay-Escoda C: *Factors influencing the prophylactic removal of asymptomatic impacted lower third molars.* Int J Oral Maxillofac Surg, 2008; 37(1):29-35. Epub 2007 Oct 30.

17. Moss KL, Beck JD, Mauriello SM, Offenbacher S, White RP Jr.: *Third molar periodontal pathology and caries in senior adults*. J Oral Maxillofac Surg, 2007; 65(1):103-8.

18. Yildirim G, Ataoğlu H, Mihmanli A, Kiziloğlu D, Avunduk MC: *Pathologic changes in soft tissues associated with asymptomatic impacted third molars*. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2008; 106(1):14-8. doi: 10.1016/j.tripleo.2007.11.021. Epub 2008 Apr 24.

19. Pandurić DG, Brozović J, Susić M, Katanec D, Bego K, Kobler P: *Assessing health-related quality of life outcomes after the surgical removal of a mandibular third molar*. Coll Antropol, 2009; 33(2):437-47.

20. White RP Jr, Shugars DA, Shafer DM, Laskin DM, Buckley MJ, Phillips C: *Recovery after third molar surgery: clinical and health-related quality of life outcomes*. J Oral Maxillofac Surg, 2003; 61(5):535-44.

21. Ruvo AT, Shugars DA, White RP Jr, Phillips C: *The impact of delayed clinical healing after third molar surgery on health-related quality-of-life outcomes.* J Oral Maxillofac Surg, 2005; 63(7):929-35.

22. Blondeau F, Daniel NG: *Extraction of impacted mandibular third molars: postoperative complications and their risk factors*. J Can Dent Assoc, 2007; 73(4):325.

23. Houston JP, McCollum J, Pietz D, Schneck D: *Alveolar osteitis: a review of its etiology, prevention, and treatment modalities.* Gen Dent, 2002; 50(5):457-63; quiz 464-65.

24. Garcia Garcia A, Gude Sampedro F, Gandara Rey J, Gallas Torreira M: *Trismus and pain after removal of impacted lower third molars.* J Oral Maxillofac Surg, 1997; 55(11):1223-226.

25. Halmos DR, Ellis E 3rd, Dodson TB: *Mandibular third molars and angle fractures*. J Oral Maxillofac Surg, 2004; 62(9):1076-81.

26. Contar CM, de Oliveira P, Kanegusuku K, Berticelli RD, Azevedo-Alanis LR, Machado MA: *Complications in third molar removal: a retrospective study of 588 patients.* Med Oral Patol Oral Cir Bucal, 2010; 15(1):e74-8.

27.Clauser B, Barone R, Briccoli L, Baleani A: *Complications in surgical removal of mandibular third molars.* Minerva Stomatol, 2009; 58(7-8):359-66.

28. Bruce RA, Frederickson GC, Small GS: *Age of patients and morbidity associated with mandibular third molar surgery*. J Am Dent Assoc, 1980; 101(2):240-45.

29. Hull DJ, Shugars DA, White RP Jr, Phillips C: *Proximity of a lower third molar to the inferior alveolar canal as a predictor of delayed recovery.* J Oral Maxillofac Surg, 2006; 64(9):1371-76.

30. Waisath TC, Marciani RD, Waisath FD, James L: *Body mass index and the risk of postoperative complications with dentoalveolar surgery: A prospective study*. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2009; 108(2):169-73. doi: 10.1016/j.tripleo.2009.04.028.