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Efficacy of secondary closure technique after surgical removal of impacted lower third molars

Swetha Bhat

Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 77

Email: swethavb95@gmail.com

Senthilnathan Periasamy

Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai 77

Email: senthilnathan@saveetha.com

Abstract---The purpose of this study was to evaluate and compare the postoperative healing, using primary versus secondary closure techniques after impacted mandibular third molar removal. The study consisted of 86 patients, under 40 years of age were divided into two groups as Group A and Group B in the randomized fashion. In Group A, closure was done by primary intention and in Group B, by secondary closure. A comparison between both groups was done with a follow-up period of 6 h to 6 days with regards to postoperative pain and swelling. The swelling in group I was greater than that in group II, with a statistically significant difference ($P < 0.05$). The pain was worse in group I than in group II; a difference that also was statistically significant ($P < 0.05$). The study showed that the patients in the secondary closure group had a significantly lesser amount of pain and swelling postoperatively than the primary closure group.

Keywords---secondary closure, primary closure, mandibular third molar, impacted teeth, postoperative healing, pain, swelling.

Introduction

An impacted tooth is one that fails to erupt into the dental arch within the expected time [1]. The incidence of the impacted mandibular third molar is 20% to 30% in population and it can be symptomatic and asymptomatic [2]. The surgical objective is to quickly and carefully remove the impacted tooth with reduced complications [3]. Surgical removal of impacted mandibular third molar contributes a major chunk of an Oral Surgeon's work load. In spite of the various

precautions taken, the postoperative period following surgical removal of third molar is frequently associated with pain, swelling and temporary restriction of mouth opening along with decreased masticatory capability [4], and may result in a number of complications including pain, swelling, bleeding, alveolar osteitis (dry socket) or nerve dysfunction. As removal of third molars may range from easy to extremely difficult depending on the location, depth, angulation, and density of the bone, postoperative complications have become the focus of attention for patients and clinicians. Many methods and medications have been tried in order to relieve this temporary post operative discomfort so that the patient does not lose working hours and the quality of life is unaffected.

Through the years, there have been different opinions regarding the type of closure techniques advocated. Primary closure of third molar flaps is derived from basic surgical principles, and the socket is covered and sealed hermetically by a mucosa flap. In the secondary closure technique, the socket remains in communication with the oral cavity to facilitate drainage of inflammatory products [5]. Some authors are in favor of closed healing, whereas other authors report that primary healing frequently causes greater pain and swelling than secondary healing. Other authors are of the opinion that postoperative progress does not differ in the two types of healing [6]. Previously our team has a rich experience in working on various research projects across multiple disciplines [7–21] Now the growing trend in this area motivated us to pursue this project. The present study compares the primary and secondary wound closure after surgical removal of the impacted mandibular third molars by assessing the extent of facial swelling, the severity of pain and degree of trismus.

Materials and Methods

Study set up

This prospective clinical study consisted of 86 patients who reported to the department of oral and maxillofacial surgery, Saveetha Dental College and Hospital, Chennai from October 2020 to March 2021 for the surgical removal of impacted mandibular third molar.

- **Preoperative**
The patients were randomly divided into two groups of 43 each. In Group 1: Patients underwent primary closure of the wound and in Group 2: Patients underwent secondary closure of the wound. Factors such as angulation and difficulty index were assessed using orthopantomograph and periapical radiograph. Clinical variables were age, gender, smoking habit, history of pericoronitis
- **Postoperative**
The postoperative treatment protocol for all patients included prescription of 500 mg Amoxicillin every 8 hours and 500 mg paracetamol + 100mg aceclofenac (Zerodol P) every 12 hours for 3 days. Assessment of severity of pain (using a visual analogue scale from 0 to 10) and 3 facial measurements (horizontal, oblique and vertical) in order to determine facial swelling, using measuring tape was taken. The horizontal measure is the distance from the corner of the mouth to the attachment of the ear lobe following the bulge of

the cheek, the vertical measure is the distance from the outer canthus of the eye to the angle of the mandible and the oblique one is the distance from the corner of the mouth to the angle of the mandible.

Selection criteria

Inclusion criteria:

- Patients requiring surgical removal of impacted mandibular third molars for either prophylactic reasons or therapeutic reasons
- Patients with either partial or complete bony impaction of mandibular third molars, irrespective of the angulation.
- Enrolment in the study was limited to patients of both genders under 40 years of age.

Exclusion criteria:

- Patients using antibiotic premedication for using medication that would affect wound healing
- Patients were allergic to lidocaine or drugs used in dentistry.
- Pregnancy
- Uncontrolled underlying systemic disease like liver or renal disease, hyperthyroidism, diabetes mellitus
- Patients undergoing more than one extraction during the same surgical procedure.

Study parameters

- Age of the patient
- Gender of the patient
- Type of impaction (Fully or partially bony)
- Postoperative VAS pain scores
- Preoperative and postoperative swelling

Surgical procedure

Surgical removal of the impacted third molars was performed with the patient under local anesthesia using 2% lidocaine with 1:200,000 epinephrine. The inferior alveolar, lingual, and long buccal nerves were anesthetized. A standard Wards incision was placed to gain access to the third molar. A full-thickness flap was reflected. Osteotomy was performed with the bur followed by tooth sectioning when necessary under constant irrigation with saline. The bony margins of the sockets were filed and smoothed, and the gingival margins were freshened after removal of the teeth and irrigated with saline. Closure - The primary closure of the socket was performed by placing 2 sutures on the distal arm of the incision and 1 on the mesial arm of the incision. Secondary closure of the socket was performed by removing a wedge of mucosa distal to the second molar and by placing 1 suture on the mesial arm of the incision and another suture on the distal arm of the incision. The sockets were secured using 2-0 silk sutures.

Data collection

The data related to the stay parameters were obtained from among the patients who reported to the Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Chennai from October 2020 to March 2021. An approval for the designed study was obtained from the Institutional Ethical Committee of Saveetha University. An informed verbal and written consent was obtained after explaining the nature of the procedure and the potential complications involved.

Data analysis

The IBM SPSS (version 23.0) software was used to tabulate and analyse the collected data. Non parametric data was analysed using descriptive statistics measuring frequency and percentage.

Results

Demographic distribution

Out of the total 86 patients, 37 (43.02%) were females and 49 (56.9%) were males. Maximum number of patients belonged to the age group of 19-30 years with a mean of 26.06 ± 5.6 years. Forty three patients belonged to the test and control group each. Out of the total 86 patients, 66 (76.7%) were partially bony and the remaining 20 (23.3%) were partially bony.

Pain (VAS score)

The VAS values obtained for both treatment groups decreased significantly over time. At days 3 and 7, VAS values obtained from patients who underwent secondary closure were lower than those from patients who underwent primary closure [Figure 1]; with a difference of means in the primary closure group and secondary closure group being 1.7 on the 3rd day and 2.8 on the 7th day which was statistically significant ($P < 0.05$) [Table 1].

Table 1

This table represents the VAS pain score obtained from patients who underwent primary and secondary closure following surgical removal of impacted third molars

	Primary closure (mean)	Secondary closure (mean)	TEST VALUE	P
VAS-3RD DAY	7.4	5.7	7.203	0.000
VAS-7TH DAY	5.7	2.9	9.635	0.000

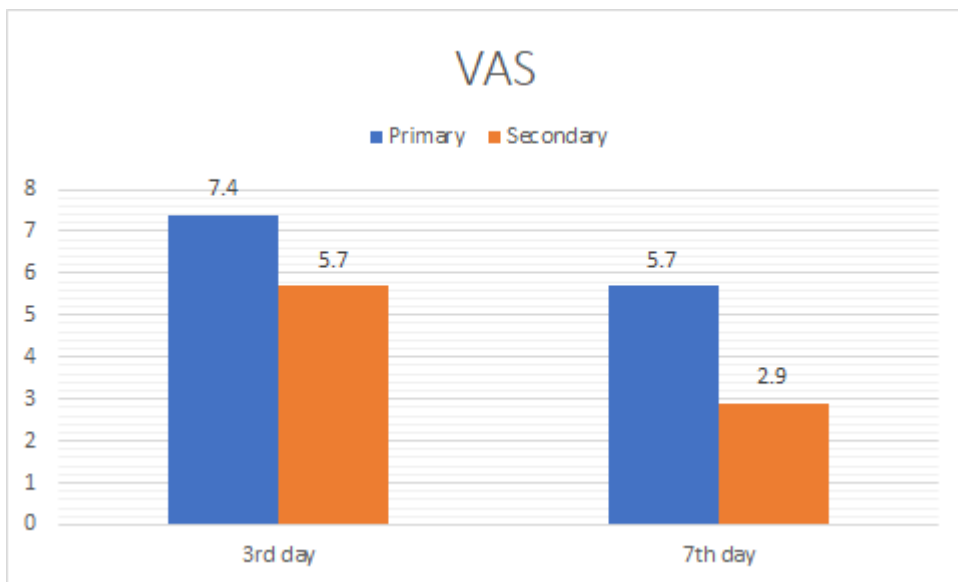


Figure 1. The above bar graph represents the VAS in the test and control group preoperatively, on day 3 and day 7. X axis represents the day of measurement, Y axis represents the VAS score.

Swelling

The mean pain score was found to be 2.09 ± 0.7 in the primary group and 1.13 ± 0.12 in the secondary group on the seventh postoperative day, while the mean swelling score was found to be 0.25 ± 0.01 in the primary group and 0.08 ± 0.02 in the secondary group on the seventh postoperative day [Figure 2]. On comparing the data statistically, a significant difference between two groups was seen for swelling postoperatively ($P < 0.05$) [Table 2].

Table 2

This table represents the measurements following swelling after surgical removal of impacted third molars obtained from patients who underwent primary and secondary closure following

	Post op 3rd day	Post op 7th day	TEST VALUE	P VALUE
Primary closure	2.09	0.25	31.251	0.00
Secondary closure	1.13	0.08	25.918	0.00

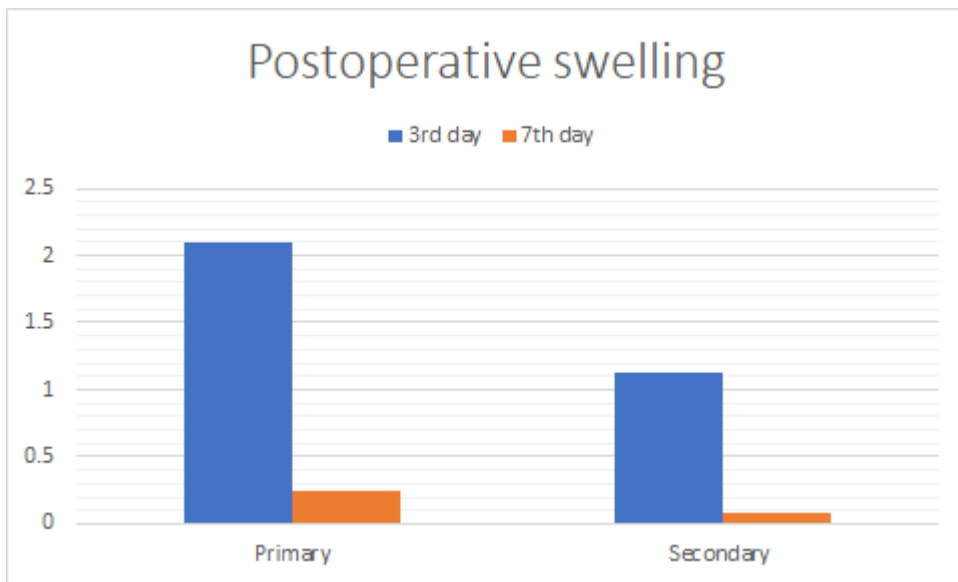


Figure 2. The above bar graph represents the Postoperative swelling in the test and control group preoperatively, on day 3 and day 7. X axis represents the type of closure used, Y axis represents the swelling in mm.

Discussion

Surgical removal of impacted third molars is one of the most frequently performed procedures in oral and maxillofacial surgery and can lead to immediate and postoperative discomfort [22, 23]. It is a procedure that demands technical skill, sound judgment, sound knowledge of anatomy and surgical principles, rationale of antibiotic therapy, good anesthesia, proper medication, nutritional balance and total patient care [24]. This postoperative discomfort might be related to the surgical technique and the suturing procedure [25]. The severity of pain and extent of swelling are the chief indicators of a patient's comfort during the postoperative period after transalveolar third molar removal [26]. Most surgical wounds heal by primary intention, and the edges of the wound are brought together with sutures, staples, glue, or clips [27]. After all these, re-epithelialization of the epidermis and progressive deposition of connective tissue around the surgical wound facilitate healing. Surgical wounds that heal by secondary intention can be left open to heal when there is a risk of infection or appreciable tissue loss [27]. The socket remains in communication with the oral cavity whereas in primary healing the socket is sealed and covered by a mucosal flap. The parameters used for assessing the postoperative complications reported in previous studies have been swelling, trismus, and pain.

In the present study, primary closure was done in group I patients, and secondary closure was done in group II patients. Each group had 43 patients, 37 (43.02%) were females and 49 (56.9%) were males in the study. Swelling and pain were evaluated using 3 different facial measurements and the VAS scale respectively. In the present study, we found that secondary closure was more comfortable for the patients because of less postoperative swelling and pain. The

ability of the surgeon would influence the surgical outcome. In the present study, a single surgeon performed the procedure for all the patients to avoid introducing that variable.

Dubois et al. reported that following the surgical removal of both lower molars, pain and swelling were significantly greater when the surgical wound healed by first intention [28]. These findings coincide with the findings of this study. Pasqualini *et al* [25] did a study on 200 patients (122 women, 78 men; age range 19–27 years) with totally or partially bony-impacted mandibular third molars. The conclusion of this study indicated that secondary closure of the socket causes less inconvenience to the patient as it appears to minimize post-extraction swelling and pain. Rakprasitkul and Pairuchivej [29] used a tube drain and compared it with primary closure. A tube drain was placed to facilitate drainage in 1 group and primary closure was performed in the other group. The drain was removed after 72 hours. They found that swelling in the drain group was significantly less than in the no drain group, with no change in the pain severity in both groups. The time taken to place the drain was significantly longer.

Total wound closure can act as a one-way valve that permits food debris to enter the socket but does not allow it to escape, predisposing to local infection, inflammation, edema and pain [3, 30, 31]. The main drawback of suture-less is that healing may be delayed. In addition, there may be high potential for the formation of a periodontal pocket in relation to the adjacent second molar [32]. Our institution is passionate about high quality evidence based research and has excelled in various fields [11, 33–42]. The limitation of this study is that the operating time was not considered as a parameter, which also is a factor in determining the degree of postoperative complications. Also, this study was not a split mouth study thereby decreasing the power of the study. The results of this study show that there is a statistically significant difference in terms of pain and swelling between the primary and secondary closure, secondary closure technique is better than primary closure technique for removal of impacted mandibular third molar.

Conclusion

We observed a significant reduction in postoperative swelling and pain inpatient with secondary wound closure. From the outcome of the above study, we can conclude that the secondary wound closure technique has a significant advantage over primary wound closure concerning swelling, postoperative pain and comfort level of the patient. However, we think that further studies are required to be done to evaluate the effect of secondary wound closure technique on postoperative morbidity after surgical removal of impacted mandibular third molar surgery.

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Conflict of interest

The authors declare no conflicts of interest.

References

- [1] Peterson LJ, Ellis E, Hupp JR, et al. Contemporary oral and maxillofacial surgery, http://www.just.edu.jo/FacultiesandDepartments/FacultyofDentistry/Departments/Oral%20MedicineandOral%20Surgery/Lists/Courses/Attachments/58/Dent_483.doc (1998).
- [2] Acar AH, Kazancıoğlu HO, Erdem NF, et al. Is Horizontal Mattress Suturing More Effective Than Simple Interrupted Suturing on Postoperative Complications and Primary Wound Healing After Impacted Mandibular Third Molar Surgery? *Journal of Craniofacial Surgery* 2017; 28: e657–e661.
- [3] Waite PD, Cherala S. Surgical outcomes for suture-less surgery in 366 impacted third molar patients. *J Oral Maxillofac Surg* 2006; 64: 669–673.
- [4] Chaudhary M, Singh M, Singh S, et al. Primary and secondary closure technique following removal of impacted mandibular third molars: A comparative study. *Natl J Maxillofac Surg* 2012; 3: 10–14.
- [5] Holland CS, Hindle MO. The influence of closure or dressing of third molar sockets on post-operative swelling and pain. *Br J Oral Maxillofac Surg* 1984; 22: 65–71.
- [6] Berge TI. Visual analogue scale assessment of postoperative swelling. A study of clinical inflammatory variables subsequent to third-molar surgery. *Acta Odontol Scand* 1988; 46: 233–240.
- [7] Govindaraju L, Gurunathan D. Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study. *J Clin Diagn Res* 2017; 11: ZC31–ZC34.
- [8] Christabel A, Anantanarayanan P, Subash P, et al. Comparison of pterygomaxillary dysjunction with tuberosity separation in isolated Le Fort I osteotomies: a prospective, multi-centre, triple-blind, randomized controlled trial. *Int J Oral Maxillofac Surg* 2016; 45: 180–185.
- [9] Soh CL, Narayanan V. Quality of life assessment in patients with dentofacial deformity undergoing orthognathic surgery--a systematic review. *Int J Oral Maxillofac Surg* 2013; 42: 974–980.
- [10] Mehta M, Deeksha, Tewari D, et al. Oligonucleotide therapy: An emerging focus area for drug delivery in chronic inflammatory respiratory diseases. *Chem Biol Interact* 2019; 308: 206–215.
- [11] Ezhilarasan D, Apoorva VS, Ashok Vardhan N. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. *J Oral Pathol Med* 2019; 48: 115–121.
- [12] Campeau PM, Kasperaviciute D, Lu JT, et al. The genetic basis of DOORS syndrome: an exome-sequencing study. *Lancet Neurol* 2014; 13: 44–58.
- [13] Kumar S, S S. Knowledge and awareness regarding antibiotic prophylaxis for infective endocarditis among undergraduate dental students. *Asian J Pharm Clin Res* 2016; 154.
- [14] Christabel SL. Prevalence of type of Frenal Attachment and morphology of frenum in children, Chennai, Tamil Nadu. *World J Dent* 2015; 6: 203–207.
- [15] Kumar S, Rahman R. Knowledge, awareness, and practices regarding

- biomedical waste management among undergraduate dental students. *Asian J Pharm Clin Res* 2017; 10: 341.
- [16] Sridharan G, Ramani P, Patankar S. Serum metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Cancer Res Ther* 2017; 13: 556–561.
- [17] Ramesh A, Varghese SS, Doraiswamy JN, et al. Herbs as an antioxidant arsenal for periodontal diseases. *J Intercult Ethnopharmacol* 2016; 5: 92–96.
- [18] Thamaraiselvan M, Elavarasu S, Thangakumaran S, et al. Comparative clinical evaluation of coronally advanced flap with or without platelet rich fibrin membrane in the treatment of isolated gingival recession. *J Indian Soc Periodontol* 2015; 19: 66–71.
- [19] Thangaraj SV, Shyamsundar V, Krishnamurthy A, et al. Molecular Portrait of Oral Tongue Squamous Cell Carcinoma Shown by Integrative Meta-Analysis of Expression Profiles with Validations. *PLoS One* 2016; 11: e0156582.
- [20] Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, et al. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. *Toxicol Mech Methods* 2019; 29: 276–290.
- [21] Fluoride, fluoridated toothpaste efficacy and its safety in children - review. *Int J Pharm Res*; 10. Epub ahead of print 1 October 2018. DOI: 10.31838/ijpr/2018.10.04.017.
- [22] Goldberg MH, Nemarich AN, Marco WP 2nd. Complications after mandibular third molar surgery: a statistical analysis of 500 consecutive procedures in private practice. *J Am Dent Assoc* 1985; 111: 277–279.
- [23] de Brabander EC, Cattaneo G. The effect of surgical drain together with a secondary closure technique on postoperative trismus, swelling and pain after mandibular third molar surgery. *Int J Oral Maxillofac Surg* 1988; 17: 119–121.
- [24] Killey HC, Kay LW. The impacted wisdom tooth.
- [25] Pasqualini D, Cocero N, Castella A, et al. Primary and secondary closure of the surgical wound after removal of impacted mandibular third molars: a comparative study. *Int J Oral Maxillofac Surg* 2005; 34: 52–57.
- [26] Winter L, Rovenstine EA. *Operative oral surgery*. Mosby, 1947.
- [27] McCaughan D, Sheard L, Cullum N, et al. Patients' perceptions and experiences of living with a surgical wound healing by secondary intention: A qualitative study. *Int J Nurs Stud* 2018; 77: 29–38.
- [28] Dubois DD, Pizer ME, Chinnis RJ. Comparison of primary and secondary closure techniques after removal of impacted mandibular third molars. *J Oral Maxillofac Surg* 1982; 40: 631–634.
- [29] Rakprasitkul S, Pairuchvej V. Mandibular third molar surgery with primary closure and tube drain. *Int J Oral Maxillofac Surg* 1997; 26: 187–190.
- [30] Bello SA, Olaitan AA, Ladeinde AL. 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* 2011; 69: e24–30.
- [31] Sanchis Bielsa JM, Hernández-Bazán S, Peñarrocha Diago M. Flap repositioning versus conventional suturing in third molar surgery. *Med Oral Patol Oral Cir Bucal* 2008; 13: E138–42.
- [32] Osunde OD, Adebola RA, Saheeb BD. A comparative study of the effect of suture-less and multiple suture techniques on inflammatory complications

- following third molar surgery. *Int J Oral Maxillofac Surg* 2012; 41: 1275–1279.
- [33] Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol* 2019; 90: 1441–1448.
- [34] Pc J, Marimuthu T, Devadoss P. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. *Clin Implant Dent Relat Res*, <https://europepmc.org/article/med/29624863> (2018).
- [35] Ramesh A, Varghese S, Jayakumar ND, et al. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. *J Periodontol* 2018; 89: 1241–1248.
- [36] Ramadurai N, Gurunathan D, Samuel AV, et al. Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial. *Clin Oral Investig* 2019; 23: 3543–3550.
- [37] Sridharan G, Ramani P, Patankar S, et al. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Oral Pathol Med* 2019; 48: 299–306.
- [38] Mathew MG, Samuel SR, Soni AJ, et al. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: Randomized controlled trial. *Clin Oral Investig* 2020; 1–6.
- [39] Samuel SR. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life? *Int J Paediatr Dent* 2021; 31: 285–286.
- [40] R H, Hannah R, Ramani P, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology* 2020; 130: 306–312.
- [41] Chandrasekar R, Chandrasekhar S, Sundari KKS, et al. Development and validation of a formula for objective assessment of cervical vertebral bone age. *Prog Orthod* 2020; 21: 38.
- [42] Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species. *Arch Oral Biol* 2018; 94: 93–98.