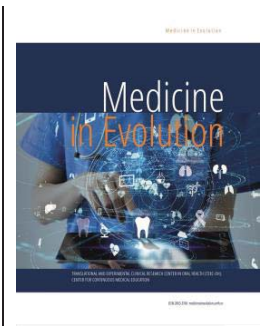


The management of the inferior third molar in the mandibular fracture line



Roi C.¹, Riviş M.^{1*}, Badea I.², Roi A.³, Monea A.⁴, Nica D.¹

¹Department of Anesthesiology and Oral Surgery, Multidisciplinary Center for Research, Evaluation, Diagnosis and Therapies in Oral Medicine, Faculty of Dental Medicine, Victor Babeş University of Medicine and Pharmacy, Timișoara, Romania, Eftimie Murgu Sq. no.2, 300041 Timisoara, Romania

²PhD student, Victor Babeş University of Medicine and Pharmacy, Timișoara, Romania, Eftimie Murgu Sq. no.2, 300041 Timisoara, Romania

³Department of Oral Pathology, Multidisciplinary Center for Research, Evaluation, Diagnosis and Therapies in Oral Medicine, "Victor Babeş," University of Medicine and Pharmacy Timisoara, Romania, Eftimie Murgu Sq. no.2, 300041 Timisoara, Romania

⁴Department of Odontology and Oral Pathology, Faculty of Dental Medicine, "G.E.Palade" University of Medicine and Pharmacy, Tg.-Mureş, Romania

Correspondence to:

Name: Riviş Mircea

Address: Bulevardul Take Ionescu nr. 5, Timișoara

Phone: +40 722287582

E-mail address: rivis.mircea@umft.ro

Abstract

The treatment approach concerning the mandibular fractures is often challenging and requires an accurate local and radiographic examination. The presence of the teeth in the fracture line is an important aspect that can influence the outcome of the treatment. **The aim** of the present study is to evaluate the management of the inferior third molar localized in the fracture line. Our retrospective study included a number of 12 subjects diagnosed with mandibular fractures with the involvement of the third molar in the fracture line. The results revealed the fact that the treatment option related to the presence of the third molar was in 67% of the cases the decision to maintain it in position, while in 33% the indication was for the odontectomy. The management of the third molar in the fracture line should take into consideration the consequences upon the final treatment of the fracture and the possible complications associated to the presence of the tooth.

Keywords: mandibular fracture, third molar, odontectomy, complications, maxillofacial fractures

INTRODUCTION

The therapeutic approaches concerning the teeth that are situated nearby the fracture line are of a high importance. The existent studies sustain the idea of the maintenance of the tooth that is localized in the fracture line, due to its high implication in the further correct repositioning of the detached fragments.

The extraction of the teeth in these situations can determine numerous complications and various supplementary compressions in the fracture lines. In case of the conservative treatment and the maintenance of the involved teeth, a periodic clinical and radiological evaluation is recommended. Severe dental destruction, high mobility (grade II or III) or other pathological lesions that prevent the correct anatomical reduction of the fractured segments, are part of the indications for extraction of the implicated teeth.

The mandible is the largest bone of the human cranium and it sustains the inferior teeth, having an active role in the mastication process. It is formed by the body and two vertical ramus, joining together and forming the mandibular angle [1,2]. In the superior part, the condylar processes articulate with the temporal bone, creating the temporo-mandibular joint. The mandible is the only mobile bone of the cranium with a direct implication in multiple actions [2]. The mandibular canal is localized within the mandible and contains the inferior nerve, inferior alveolar artery and vein. It is an important anatomical structure that can have various topographical variations that can complicate the further surgical treatment in the area [1].

The wisdom teeth are the ones with the highest variety and frequency of secondary pathological issues that can occur in the development and eruption process. The inflammatory complications can be localized or extended, determining nervous disorders, mechanical alterations of the soft tissue or nearby teeth [3,4]. Based on the incidence, the lower wisdom teeth are the ones that are the most predisposed to be impacted, compared to the superior ones, developing in the region delimited by the ascendent ramus and the lower jaw's body [5].

The mandible is the largest and most resistant bone of the visceral cranium. The fractures of the mandibular angle represent the highest percentage of incidence and most often occur due to car accidents or human aggressions [6]. There are two main reasons why the mandibular angle is frequently exposed to this type of trauma: first is the existence of the third molar that weakens the bone consistency and second is the thin vestibular and lingual bone wall in the area [7,8, 9,10]. The fractures of the mandibular angle represent a challenge for surgeons, being associated with a high rate of post operative complications. The complications have a higher incidence in males (60-80%) and especially young adults between 20-45 years. Also, these types of fractures often affect children, due to the direct impact upon the menton during an accidental fall [9,11,8].

1.2 Etiology of mandibular fractures

The causes that lead to the occurrence of mandibular fractures can be subdivided into three main categories: trauma, pathological and surgical. Trauma is the most frequent cause that leads to these fractures, in the first place being aggression, followed by accidental falls, car and work accidents and sports [6,12]. The pathological causes represented by several disorders and lesions that determine a bone resorption that eventually leads to a fracture [6,7,13]. Surgical causes include those of an iatrogenic cause (third molar extraction or during the excision of endosseous tumours) or a planned surgical procedure that involves the sectioning of the facial bones [6,7,14].

1.3 Classification of mandibular fractures

The classification of the mandibular fractures can be based on the number of the fracture lines (unique, double, triple or communitive) [6], based on the degree of bone destruction (incomplete or complete) [6], on the relationship with the exo-oral environment

(closed/simple or open) [6], the energy of the trauma (low or high) or based on the anatomical localization of the fracture line (corps, angle, ramus, coronoid or condyle) [15].

The treatment of the patients with mandibular fractures aims for the regain of the function and a proper local healing [16]. The correct immobilization of the fragments, pain medication, an accurate oral hygiene and alimentation is mandatory to avoid the possible complications [6, 16]. In case of the teeth localized in the fracture line, the decision is whether they can remain or need to be extracted is based on a previous clinical examination and a radiologic evaluation [17, 18].

Aim and objectives

The aim of the present study was to identify and establish a proper therapeutical approach related to the management of the third molars that are localized in the fracture area, based on anatomic and functional considerations.

MATERIAL AND METHODS

The study was conducted between July 2020 - January 2021 in the Maxillo-Facial Clinic from Timisoara County Hospital and included 12 subjects that were diagnosed with mandibular fractures. The inclusion criteria were the diagnosis of mandibular fracture, both sexes, age over 18 and the presence of the third molar in the fracture line. The exclusion criteria were the absence of the third molar in the fracture line, age under 18. All the included patients were informed, agreed and signed an informed consent that followed the guidelines of the Declaration of Helsinki. A statistical analysis was performed taking into consideration the sex, age of the subjects and the management of the third molar in relation with the mandibular fracture line and the possible consequences.

RESULTS

The age distribution among the included patients was divided into three groups: group I (age 20-25 years), group II (age 26-30 years) and group III (over 30 years). The study revealed a prevalence of the age group II (26-30 years), the young adults being more exposed to accidents, aggression and falls with a direct impact upon the lower jaw (*Table 1*).

Table 1. Age group distribution

Group age	No. of patients
Group I (20-25 years)	4
Group II (26-30 years)	6
Group III (over 30 years)	2

The graphic below shows in percentages the group distributions, 17% of the cases belonging to age group III, 33% percent to group I and 50% of the cases to group II (*Figure 1*).

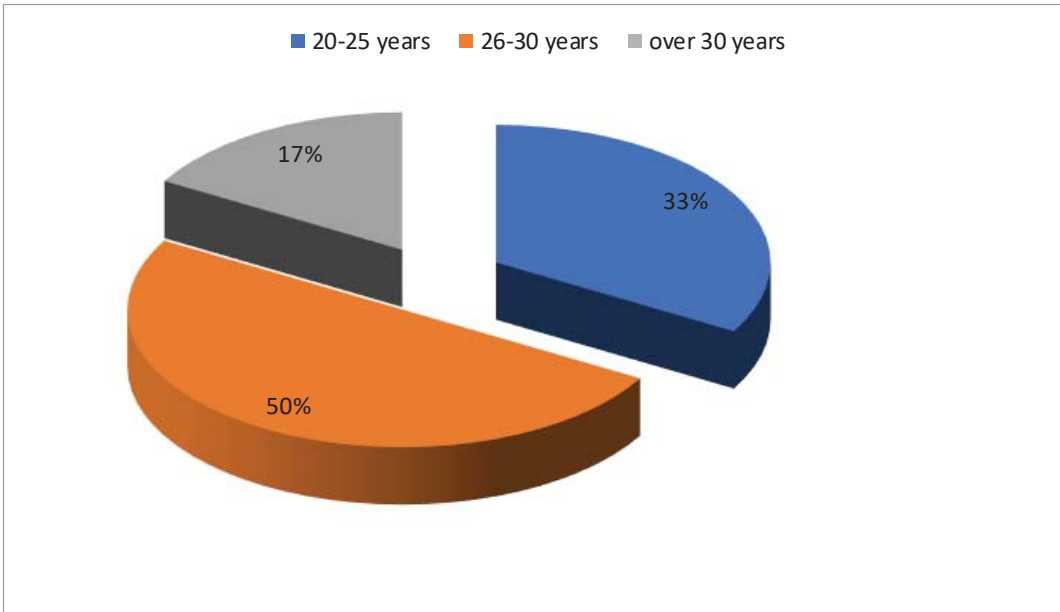


Figure 1. Percentages of each age group

The sex distribution of the included patients revealed the fact that 11 of them were males (representing 92%) and 1 was a female (representing 8%) (Table 2, Fig. 2). These results can outline the fact that males are more predisposed to trauma in the maxilla-facial area.

Table 2. Sex distribution

Sex	No. of patients
Females	1
Males	11

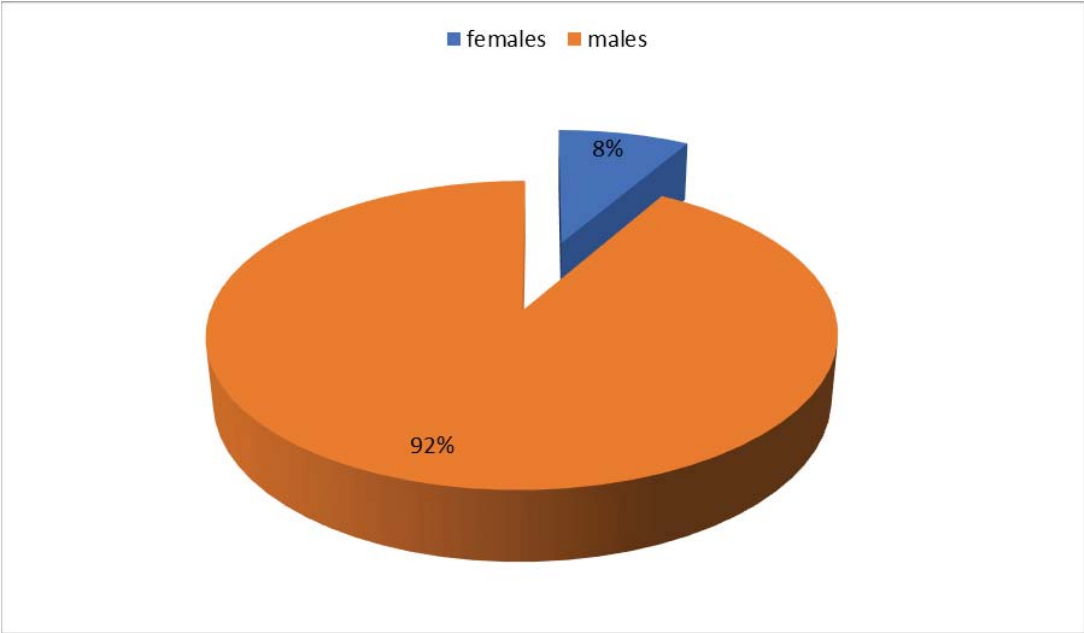


Figure 2. Percentages of the sex distribution

The treatment approach related to the management of the third molar that is localized in the fracture line was as follows: in 4 case odontectomy was performed, and in 8 cases the decision was to maintain the molar in its position (*Table 3*).

Table 3. The management of the third molar

Treatment option	No. of patients
Odontectomy	4
Maintainance of the third molar	8

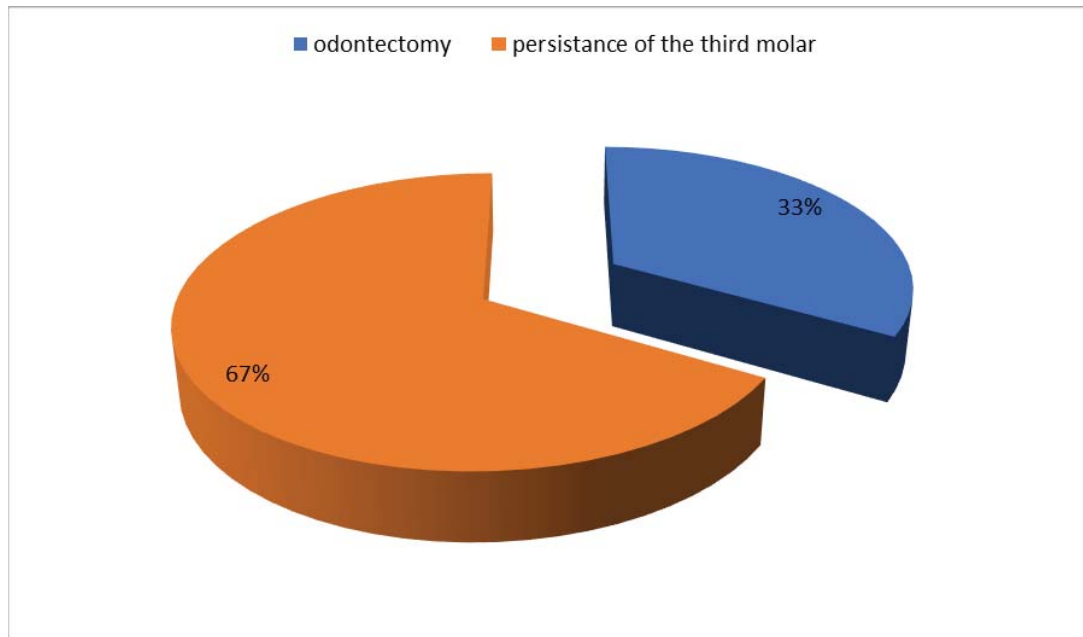


Figure 3. Therapeutic approach in case of the third molar

Figure 3 outlines the percentages of cases in which the treatment decision was for the odontectomy of the third molar (33% of the cases) and for the maintenance of the third molar as part of the fracture treatment (67% of the cases) (*Fig. 4, Fig.5*).

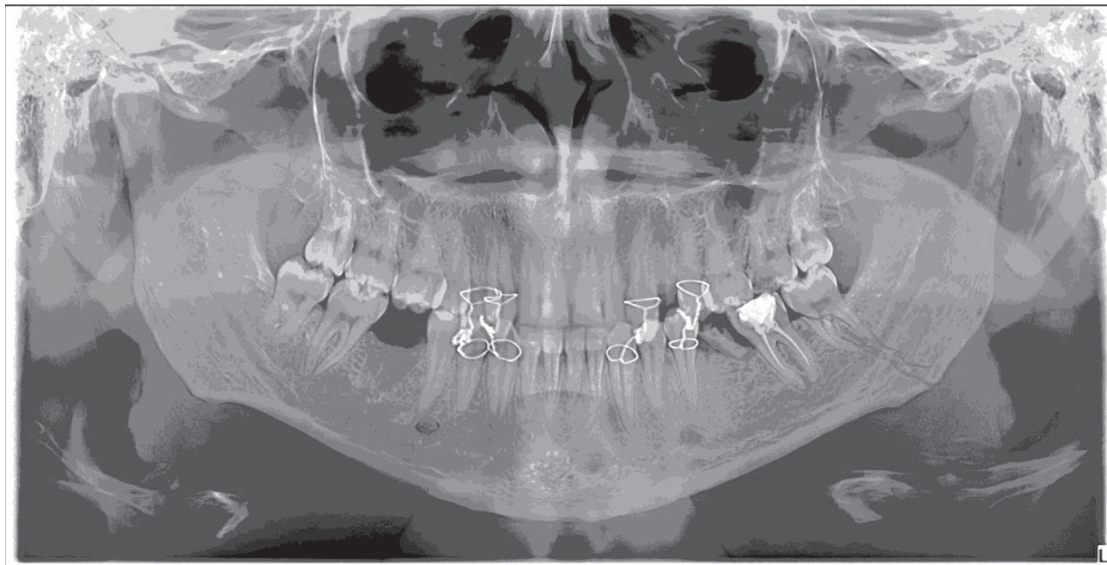


Figure 4. Radiography of one of the included cases in which the treatment option was the extraction of the lower left third molar in order to proceed with the proper treatment of the mandibular angle fracture

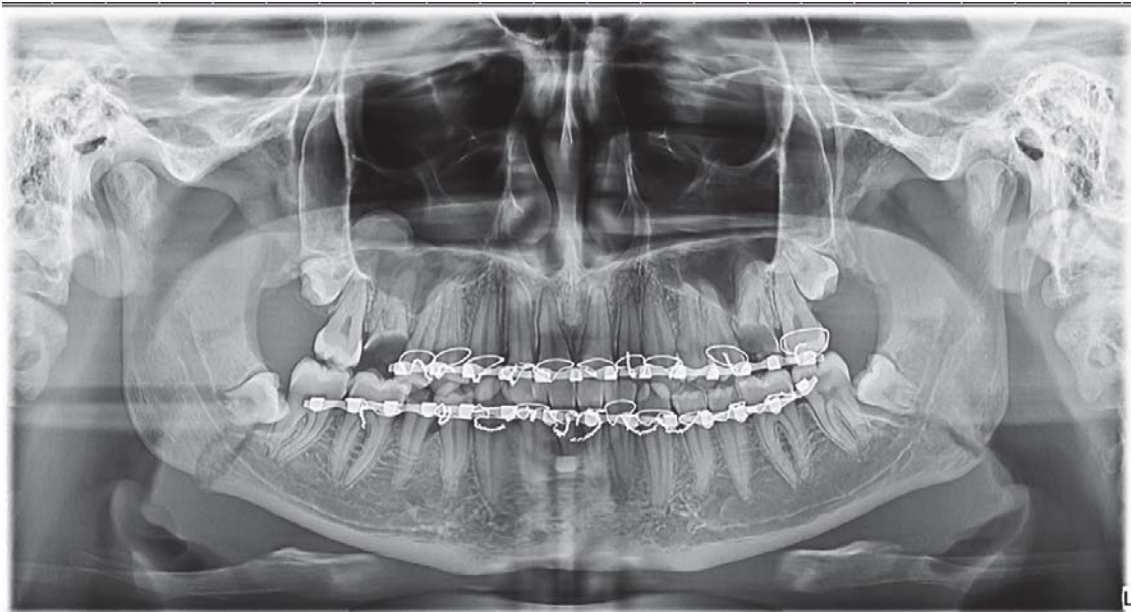


Figure 5. Radiography of one case in which the therapeutical approach was to maintain the lower third molars localized in the fracture lines on both sides and proceed with an intermaxillary immobilization

DISCUSSIONS

The existing research indicate numerous clinical situations related to the mandibular fractures and the management of the third molar localized in the area of the fracture line, suggesting rather a difficult treatment approach. In the present, clinicians need to focus on a treatment option according to the possible evolution and the contemporary treatment principles [19. 20]. There are situations where the indication is for extraction of the mobile teeth localized in the fracture area, due to the fact that even after a correct treatment their mobility will persist, and they can become a future connection with the septic buccal environment. Therefore, if the tooth is mobile the indication will be for extraction. Another situation that implies the extraction is if after the radiological examination there is a fracture of the tooth or roots [21].

In situations where there is a good implantation, and the teeth have no periapical infections, the indication is to maintain the tooth in position. If the mandibular fracture is with displacement, the tooth can be maintained if its position doesn't interfere with the reduction of the fractured fragments. There are certain clinical situations in which the presence of the teeth in the fractured area helps and guide the clinician to correctly reposition and fix in place the fragments. If the mandibular fracture is without displacement, the argument for the maintenance of the teeth localized in the area is the fact that during the potential extraction manoeuvres, an eventual movement of the fractured fragments can occur. In case of the existence of periapical infections, the indication for extraction is mandatory due to the high risk of septic complications [7]. A periodic follow-up is essential for the surveillance of these teeth in order to assure a proper healing.

The management of the molars localized in the fracture line implies a correct loco-regional clinical examination and a radiographic image that will provide information for a further treatment.

CONCLUSIONS

The surgical treatment options of the mandibular fractures and the teeth localized in the area need to focus on a simple, fast and efficient treatment approach with good outcomes

for the future functionality and aesthetics of the patient. It is important to acknowledge the potential risks related to the management of the third molars in the area of a fracture line and minimize the further complications.

REFERENCES

1. Papilian V. Tratat elementar de anatomie descriptivă și topografică (cu aplicațiuni medico-chirurgicale). Ediția III-a. Vol. I. Generalități, osteologie, artrologie, miologie. Sibiu, editura "Dacia Traiana" S. A; 1942.
2. Papilian V. Anatomia omului. Ediția a XI-a (revizuită integral de prof. univ. dr. Ion Albu). Editura ALL; 2006.
3. Greeshma G, Wali V, Sridhar HN, Shyla. A Study on Dentigerous Cystic Changes with Radiographically Normal Impacted Mandibular Third Molars. *J. Maxillofac. Oral Surg.* 2011; 11(4):458-465.
4. Cankaya AB, Erdem MA, Cakarer S, Cifter M, Oral CK. Iatrogenic Mandibular Fracture Associated with Third Molar Removal. *Int J Med Sci.* 2011; 8(7):547-553.
5. Kumar SR, Sinha R, Uppada UK, Reddy BVR, Dushyanth P. Mandibular Third Molar Position Influencing the Condylar and Angular Fracture Patterns. *J Maxillofacial and Oral Surg.* 2015; 14:956-961.
6. Balaji P, Balaji S M. Fate of third molar in line of mandibular angle fracture - Retrospective study. *Indian J Dent Res.* 2015; 26(3):262-266.
7. Rai S, Pradhan R. Tooth in the line of fracture: Its prognosis and its effects on healing. *Indian J Dent Res,* 2011; 22(3):1-5.
8. Hull A.M., Devlin T. Lowe M. Psychological consequences of maxillofacial trauma: a preliminary study. *Br. Journal of Oral and Maxillofacial Surgery.* 2003; 41:317-322.
9. Bolourian R., Lazow S., Berger J. Transoral 2.0-mm miniplate fixation of mandibular fractures plus 2 week maxillo-mandibular fixation: a prospective study. *J. Oral Maxillofac. Surg.* 2002; 60(2):167-170.
10. Cawood JI. Small plate osteosynthesis of mandibular fractures. *British Journal of Oral Maxillofac. Surg.* 1985; 23(2):77-91.
11. Chele N. Optimizarea tratamentului complex al fracturilor de mandibulă. Teză de doctor în științe medicale. Chișinău, 2007.
12. Masaki K., Tamio N., Genji S. Effects of Maxillomandibular Fixation on Respiration. *Journal of Oral and Maxillofacial Surgery.* 1993; 51:992 -996.
13. Ouatu V, Chele N, Hitu D. Frecvența traumatismelor maxilofaciale în dependență de regiunea anatomică, gen, profesie și vârstă. Tezele conferinței științifice. 1996, p. 392.
14. Railian S. Actualități în tratamentul traumatismelor oro-maxilo-faciale la copii. Chișinău, 2001. p. 25-28, 45-56.
15. Sîrbu D. Osteosinteza endoorală funcțională stabilă a mandibulei cu miniplăci din titan. *Curierul medical.* 2005; 4(286):27-30.
16. Stacey, DH., Doyle, JF., Mount, DL, Snyder M, Gutowski, K. Management of mandible fractures. *Plast. Reconstr. Surg.* 2006; 117(3):48e-60e.
17. Blondeau F, Daniel NG. Extraction of impacted mandibular third molars: postoperative complications and their risk factors. *J Can Dent Assoc.* 2007; 73(4):325-325e.
18. Sârbu D., Conduita în tratamentul pacienților cu fracture mandibulare, Editura Centrul-Poligrafic Medicina, Chișinău, 2011;
19. 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:e70-2.
20. Ethunandan M, Shanahan D, Patel M. Iatrogenic mandibular fractures following removal of impacted third molars: an analysis of 130 cases. *Br Dent J.* 2012; 212:179-184.
21. Shaikh AKM. Complications of surgical removal of mandibular third molar: A Retrospective Study. *Univ J Maxillofacial Surg and Oral Sci.* 2021; 1(1):37-42