ISSN: 2091-2889 (online)
2091-2412 (print)

Received: 10 Nov 2025
Accepted: 20 Dec 2025
Published: 31 Dec 2025

DOI: 10.54530/jcmc.1816

OPEN ACCESS

Complications associated with surgical removal of impacted mandibular third molar

Shashank Tripathi[1], Ravish Mishra[1], Deepak Yadav[1], Laxmi Kandel[1], Harender Singh[2]

[1]Department of Oral and Maxillofacial Surgery, UCMS College of Dental Surgery, Bhairahawa, Nepal
[2]Department of Public Health Dentistry, UCMS college of Dental Surgery, Bhairahawa, Nepal

CC BY NC

Peer reviewed

Abstract

Introduction: Extraction of impacted third mandibular 3rd molar by surgery is one of the commonly performed procedures by the oral and maxillofacial surgeon. This study assessed the demographic data of patients and analysed the associated complications with the mandibular third molar surgical extraction.

Method: This prospective observational study at Universal College of Medical Sciences, Nepal, between 24 Jan 2022 and 19 Dec 2024, included 520 patients aged 18–45 years who required surgical removal of mandibular third molars. Postoperative pain, swelling, trismus, infection, nerve injury, alveolar osteitis, and bleeding were assessed at postoperative days (POD) 3, 7, and 14, and at 3 months. Ethical approval was obtained. Descriptive statistics were used to summarize baseline characteristics. Chi-square and Fisher's exact tests were applied to assess associations between variables. Binary logistic regression analysis was performed to identify predictors of postoperative complications at POD 7. A p-value <0.05 was considered statistically significant.

Result: Majority of patients were aged 26–35 years, 239(46.2%). Almost equal gender distribution was seen. Postoperative complications were more frequent in patients aged >35 years, with higher rates of pain (59.0%), swelling (41.0%), and trismus (24.0%) compared with those ⩽25 years (p=0.03). Smokers (n=136) showed significantly higher rates of pain (57.4%), swelling (43.4%), and trismus (26.5%) than non-smokers (p=0.01). Complications varied by impaction type and longer duration; >60 minutes was strongly associated with increased complications.

Conclusion: Our findings confirm that post-operative complications after the removal of impacted third molars are common but short-lived.

How to cite

Tripathi S, Mishra R, Yadav D, Kandel L, Singh H. Complications Associated with Surgical Removal of Impacted Mandibular Third Molar. Journal of Chitwan Medical College. 2025;15(56):92-100.

Correspondence

Dr. Shashank Tripathi, Lecturer, Department of Oral and Maxillofacial Surgery, UCMS college of Dental Surgery, Bhairahawa, Nepal. Email: shashank040209@gmail.com, Telephone: +977 9801450262

Introduction

Extraction of impacted mandibular 3rd molar by surgery is one of the commonly performed procedure by the oral and maxillofacial surgeon.[1] Most surgeries are performed without any difficulties and complications. Yet, sometimes severe complications may occur that includes bleeding, pain, infection, dry socket, swelling, paresthesia, temporomandibular joint injury and in some cases fractures. These complications can affect the quality of life of patients at serious level. The complication degree of 3rd molar surgery may diverge from 2.6% to 30.9%.[2-4] Present-day studies have reflected patient personal traits such as age and sex, type of impaction, surgical techniques, and surgeon's skills are related to risk factors of post-surgery complications.[5] Therefore, it is decisive to evaluate the surgical difficulty level before performing the surgery to achieving the high success rate. On the basis of above stated risk factors, the investigators observed the demographic data of patients with mandibular third molar surgery history associated with high-frequency visits at the hospital.[6] Occasionally extraction of impacted tooth, in maximum cases it requires surgical intervention. In surgical extraction numerous factors play role such as angulations of tooth, morphology of root, accessibility, age of patient, instrumentation, closeness to vital structures such as inferior alveolar nerve etc.[7,8]

This study assessed the demographic data of patients and analyzed the associated complications with the mandibular third molar surgical extraction.

Method

This prospective observational study was conducted in the Department of Oral and Maxillofacial Surgery at Universal College of Medical Sciences, Nepal, between 24 Jan 2022 and 19 Dec 2024. The study aimed to evaluate the incidence and risk factors of intraoperative and postoperative complications associated with the surgical removal of impacted mandibular third molars.

Patients aged 18 years to 45 years, who required surgical removal of mandibular third molars were included; who were physical fit or with controlled mild systemic diseases, and provided consent and agreed to follow-up visits were included. All patients who met these criteria were consecutively enrolled in the study.

Patients with acute infection, severe systemic diseases, bleeding disorders, or pregnancy, surgically operated in the same region, were excluded.

Sample size was calculated using Cochran's formula based on prevalence of 30%.[2,3] With a 95% CI, 5% precision, and a 10% dropout rate, the minimum required sample was 360. But in this study data was collected for the longer period of time, therefore a total 520 patients were included in this study.

Demographic details (age, sex, BMI, smoking status, and comorbidities) and clinical examination included mouth opening, periodontal status of the adjacent second molar, and tooth angulation were recorded. Radiographic evaluation was done by using panoramic radiographs in all cases, and cone beam computed tomography (CBCT) was done in selected cases, where the tooth was in close to the mandibular canal.

Extractions were performed under sterilized conditions by experienced surgeons including consultant or postgraduate trainee; a standardized protocol were followed during procedure. All procedures were performed under local anaesthesia. A mucoperiosteal flap was raised, bone removal and tooth sectioning were performed when required, and copious irrigation with sterile saline was used throughout. The lingual nerve was not routinely retracted. Wound closure was achieved with 3-0 silk sutures using either primary or secondary closure depending on intraoperative findings. Duration of surgery was recorded from the incision to the last suture. A sterile gauze pack was placed, and patients were observed for postoperative stability before discharge.

The study was approved by the Institutional Review Committee (IRC.no. UCMS/IRC/166/21). All patients were informed about the study procedure and written informed consent was obtained.

All Patients received standard postoperative instructions, including cold compress application, analgesics. Antibiotics were also prescribed only when clinically indicated. Sutures were removed after 7 days.

Early postoperative complications (within 14 days) were recorded. Pain was measured using a Visual Analog Scale at postoperative days 1, 3, and 7. Swelling was measured by using three-point facial linear measurements. Trismus (maximum interincisal opening, with trismus defined as <30 mm or ≥25% reduction from baseline). Alveolar osteitis (dry socket) was diagnosed as post-surgery pain with necrotic bone exposure without suppuration between days 3 and 5. Infection and post-operative bleeding were also recorded. Paraesthesia was analysed by light-touch and two-point discrimination in the distribution of the inferior alveolar or lingual nerve.

Late postoperative complications were observed after 3 months for any persistent neurosensory troubles, periodontal pocket (probing depth ≥6 mm or attachment loss ≥3 mm), chronic infection or osteomyelitis.

Post operative assessment was done by an examiner, who was not involved in the surgery.

Data were analysed using SPSS 25. Descriptive statistics were presented as frequencies, percentages, means±standard deviations for normally distributed data. The Chi-square (Fisher's exact test for cell count <5) was applied for association between postoperative complications and clinic-demographic variables. This was evaluated at POD 7, because most of the complication resolves by one-week, persistent complication are more likely due to other risk factors like smoking, and poor oral hygiene.[9] Logistic regression analysis was used to identify predictors of any postoperative complication at POD 7. A p-value <0.05 was considered statistically significant.

Result

A total of 520 patients were included in the study, with a mean age of 28.6±6.5 years. Majority patients, 239(46.2%), were aged 26–35 years**.** Almost equal gender distribution was seen, with 280(53.8%) males, and overall, 136(26.2%) were smokers. Hypertension was seen in 25(4.8%) and diabetes in 15(2.9%). The mean surgical duration was 41.2±12.5 minutes, and most of the procedures were completed within 30–60 minutes 300(57.7%)**.** Mesioangular 231(44.4%) was the most common type of impaction, followed by horizontal**,** vertical**,** and distoangular, Table 1.

Pain was most commonly reported on postoperative day 1, by nearly all patients, 519(99.9%)**,** decreasing by day 3 and day 7**.** Swelling was found in 429(82.5%) on POD 1, which reduced to 179(34.6%) by POD 7**.** Trismus was found in 232(44.6%) on POD 1 and 101(19.4%) on POD 7. Infection increased marginally over time, 22(4.2%) on POD 14, while alveolar osteitis was seen in 15(2.9%) on POD 7, rising to 19(3.7%) on POD 14, and persisting in 6(1.2%) at 3 months. Nerve injury was detected in 6(1.2%) at POD 7, and remained same at 3 months, Table 2.

At Post-operative day 7, young patients had less complications compared to those aged >35 years, mostly for pain, swelling, and trismus (p=0.03). Females had higher complication rate but the difference was not significant.

Smokers had significantly higher complication rates across all parameters, particularly pain, swelling, and trismus.

Mesioangular and horizontal impactions were more often associated with complications compared to other types.

Operating time was strongly associated with complications, procedures lasting >60 minutes reported higher rates of pain 59(84.3%), swelling 39(55.7%), trismus 20(28.6%),

infection 6(8.6%), and alveolar osteitis 4(5.7%) compared to shorter procedures, Table 3.

The factors like, increasing age (OR: 1.04, 95% CI: 1.01–1.07, p=0.010), smoking (OR: 2.20, 95% CI: 1.30–3.72, p=0.002), systemic disease (OR: 2.80, 95% CI: 1.40–5.60, p=0.003), and surgery duration >60 minutes (OR: 3.20, 95% CI: 1.60–6.40, p=0.001) were independent predictors of complications at POD 7, whereas gender and impaction type were not significant, Figure 2.

Table 1. Clinico-demographics of patients requiring surgical removal of impacted mandibular 3rd molar, n=520

Characteristic	n	%
Age, years		
Mean±SD	28.6±6.5	
Range	18–45	
Age groups, years		
≤25	181	34.8
26–35	239	46.0
>35	100	19.2
Gender		
Male	280	53.8
Female	240	46.2
Smoking		
Yes	136	26.2
No	384	73.8
Systemic disease		
None	470	90.4
Hypertension	25	4.8
Diabetes	15	2.9
Others	10	1.9
Surgery duration (m)		
Mean±SD	41.2 ± 12.5	
Range	18–95	
<30	150	28.8
30–60	300	57.7
>60	70	13.5
Type of impaction		
Mesioangular	231	44.4
Horizontal	109	21.0
Vertical	90	17.3
Distoangular	58	11.2
Others	32	6.2

Table 2. Complications at follow-ups after surgical removal of impacted mandibular third molar, n=520

Complication	POD 1 n(%)	POD 3 n(%)	POD 7 n(%)	POD 14 n(%)	3 Months n(%)
Pain	519(99.9)	400(76.9)	249(47.9)		
Swelling	429(82.5)	349(67.1)	179(34.6)	30(5.8)	8(1.5)
Trismus	232(44.6)	179(34.2)	101(19.4)	20(3.8)	5(1.0)
Infection	10(1.9)	14(2.7)	20(3.8)	22(4.2)	5(1.0)
Alveolar osteitis	0	8(1.5)	15(2.9)	19(3.7)	6(1.2)
Nerve injury	0	4(0.8)	6(1.2)	10(1.9)	6(1.2)
Hematoma	4(0.8)	6(1.2)	6(1.2)	8(1.5)	2(0.4)

Table 3. Association between Complications and Demographic and Clinical Characteristics at POD7.

Characteristic	Pain (249) n(%)	Swelling (179) n(%)	Trismus (101) n(%)	Infection (20) n(%)	Alveolar osteitis (15) n(%)	Nerve injury (6) n(%)	p-value
Age (years)							0.03
≤25 (n=181)	76(42.0)	60(33.1)	31(17.1)	5(2.8)	5(2.8)	1(0.6)	
26–35 (n=239)	114(47.7)	78 (32.6)	46(19.2)	10 (4.2)	6 (2.5)	3(1.3)	
>35 (n=100)	59 (59.0)	41 (41.0)	24(24.0)	5(5.0)	4(4.0)	2(2.0)	
Gender							0.12
Male (n=280)	128(45.7)	95(33.9)	56(20.0)	12(4.3)	7(2.5)	4(1.4)	
Female (n=240)	121(50.4)	84(35.0)	45(18.8)	8(3.3)	8(3.3)	2(0.8)	
Smoking							0.01
Yes (n=136)	78 (57.4)	59(43.4)	36(26.5)	8(5.9)	6(4.4)	3(2.2)	
No (n=384)	171(44.5)	120(31.3)	65(16.9)	12(3.1)	9(2.3)	3(0.8)	
Impaction type							0.02
Mesioangular (n=231)	121(52.4)	79(34.2)	41(17.8)	8(3.5)	6(2.6)	2(0.9)	
Horizontal (n=109)	59(54.2)	46(42.2)	24(22.0)	5(4.6)	4(3.7)	1(0.9)	
Vertical (n=90)	35 (38.9)	30(33.3)	20 (22.2)	4 (4.4)	3(3.3)	1(1.1)	
Distoangular (n=58)	23(41.4)	20(34.5)	10(17.2)	2(3.5)	2(3.5)	1(1.7)	
Others (n=32)	11(34.4)	5(15.6)	6(18.8)	1(3.1)	0	1(3.1)	
Surgery duration							<0.001
<30 min (n=150)	39(26.0)	21(14.0)	11(7.3)	2(1.3)	1(0.7)	0	
30–60 min (n=300)	151(50.3)	119(39.7)	70(23.3)	12(4.0)	10(3.3)	3(1.0)	
>60 min (n=70)	59(84.3)	39(55.7)	20(28.6)	6(8.6)	4(5.7)	3(4.3)	
Systemic disease							0.04
None (n=470)	215(45.7)	155(33.0)	85(18.1)	16(3.4)	11(2.3)	4(0.9)	
Hypertension (n=25)	15(60.0)	10(40.0)	6 (24.0)	2(8.0)	1(4.0)	1(4.0)	
Diabetes (n=15)	10(66.7)	8(53.3)	5(33.3)	2(13.3)	2(13.3)	1(6.7)	
Others (n=10)	5(50.0)	7(70.0)	4(40.0)	1(10.0)	1(10.0)	0	

p≤0.05 statistically significant

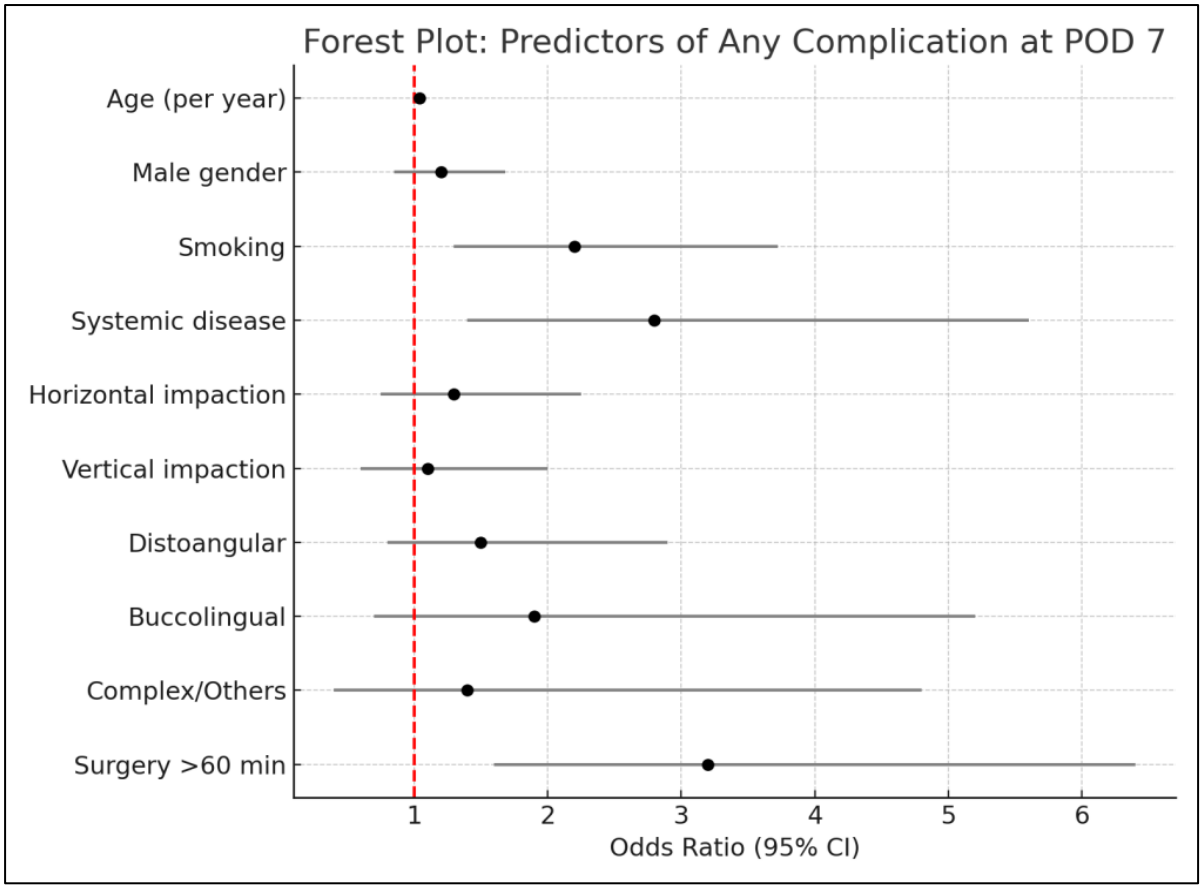

Figure 2. **Forest plot multivariable binary logistic regression analysis for predictors of postoperative complication at POD 7 following mandibular third molar surgery. Points represent adjusted odds ratios (aORs) and horizontal lines indicate 95% confidence intervals (CIs). The vertical dashed line denotes an odds ratio of 1.0 (no association). Values to the right of the line indicate increased odds of complications, while values to the left indicate decreased odds. Increasing age (OR: 1.04, 95% CI: 1.01–1.07, p=0.010), smoking (OR: 2.20, 95% CI: 1.30–3.72, p=0.002), systemic disease (OR: 2.80, 95% CI: 1.40–5.60, p=0.003), and surgery duration >60 minutes (OR: 3.20, 95% CI: 1.60–6.40, p=0.001) were independent predictors of complications at POD 7, whereas gender and impaction type were not significant.**

Discussion

In current study, we found that age, smoking status, systemic comorbidities, and long surgical duration were significantly associated with postoperative complications after third molar extraction. The higher rate of immediate pain, swelling, and trismus occurred due to inflammatory responses after surgical trauma during extraction procedure, pain and swelling usually peak within the first 48 hours and later improve gradually.[10,11]

Our data displayed that elderly patients reported higher rates of post-surgery pain, swelling, and delayed healing compared to young patients. This is similar with other study in which patients >25 years had a significant risk of complications, with an odds ratio of nearly 1.5.[12] This could be due to biological factor that aging reduces tissue elasticity, vascularity, and regenerative potential, thus delayed wound healing and high risk susceptibility to infection.[12,13] Moreover, American Association of Oral and Maxillofacial Surgeons has highlighted that delaying in removal of third molar until later adulthood is related with more complex surgery, extra bone removal, and high prevalence of complication.[13]

In present study, by POD 14, infection rate (4.2%) and alveolar osteitis (3.2%) are similar to previous studies, with postoperative complication rates ranging from 2.6% to 30.9%.[11,14] Literature shows that dry socket and

infection being the primary concerns after third molar surgery.[10,15]

In present study, the nerve injury on POD 1 and POD 3 were recorded as zero, possibly because there could be temporary neuropraxia due to any numbness after anaesthesia or mild surgical stretching. Only 1.2% rate of nerve injury, recorded here at POD 3 months aligns another study.[16] The age, smoking, systemic disease, and long surgical duration are significantly associated with risk factors similar to other established findings. Smoking lessens vascular perfusion and inflammatory regulation, systemic disease like diabetes can obstruct tissue repair, and long surgeries leads to tissue manipulation and risk. Smoking appeared as a prominent risk factor in our study, mainly for alveolar osteitis and late wound healing. This finding is supported by various studies.[6,17,18] A prospective study stated that smokers had six times more risk of dry socket in comparison to nonsmokers.[19] Similarly, a systematic review projected 2-3 times more risk of higher risk of alveolar osteitis among smokers, especially when smoking took place on the day of surgery.[20] Other studies have also shown that smoking can also aggravates trismus and weakens hard tissue healing.[21,22]

The presence of systemic disease, particularly diabetes mellitus, was significantly associated with postoperative complications in our study. Diabetes is well known to impair wound healing through mechanisms such as microvascular dysfunction, reduced immune competence, and delayed collagen synthesis.[23] Studies found a high prevalence of infection and poor tissue repair, highlighting the need for pre surgery medical clearance and glycaemic control.[23]

In our findings surgical duration had significant association with complications. Long surgery duration may involve more tissue trauma, bone removal, and extended exposure of the surgical area, leading to swelling, trismus, and infection. Other studies have shown longer surgical duration was strongly associated with severe postoperative complications, in spite adjusting for confounders such as age, body mass index, and surgical difficulty.[9]

Impaction type and gender demonstrated positive associations, but did not show significance in multivariate analysis.[10,16,24]

Limitations of this study includes, we included only healthy, younger patients which may limit generalizability. Systemic disease was treated as a single variable, potentially marking minor difference between diseases such as hypertension and diabetes. Surgeon experience and technique were not included in analysis. Longer follow-ups after 3 months may help find delayed consequences like permanent nerve paraesthesia or second molar periodontal changes.

Conclusion

Our findings confirm that post-operative complications of pain swelling and trismus are common during the first week, more common in older persons, smokers, and with systemic diseases like diabetes and hypertension. Targeted counselling, enhanced surgical techniques and skills, and watchful follow-ups may help in better outcome.

Author contribution

Conception, design: ST, RM; Data acquisition: ST, RM, DY, LP; Data analysis, interpretation: HS; Drafting: ST, RM, DY, LP; Revision: All; Final approval of the version to be published: All; Agreement to be accountable for all aspects of the work: All

Acknowledgment

None

Conflict of interest

None

Funding

None

Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

References

1. Osunde OD, Adebola RA, Omeje UK. Management of inflammatory complications in third molar surgery: a review of the literature. Afr Health Sci. 2011;11(3):530–7. DOI PubMed Google Scholar Full Text
2. Azenha MR, Kato RB, Bueno RBL, Neto PJO, Ribeiro MC. Accidents and complications associated to third molar surgeries performed by dentistry students. Oral Maxillofac Surg. 2014;18(4):459–64. DOI PubMed Google Scholar Full Text
3. Contar C, De Oliveira P, Kanegusuku K, Berticelli R, Azevedo-Alanis LR, Machado M. Complications in third molar removal: a retrospective study of 588 patients. Med Oral Patol Oral Cir Bucal. 2010;15(1):e74–8. DOI PubMed Google Scholar Full Text
4. 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. DOI PubMed Google Scholar Full Text
5. Soylu H, Akçay G, Çanakci OA, Etöz A, Alkan A. Comparison of pre-operative difficulty and postoperative morbidity in third molar extraction. Ann Clin Anal Med. 2019;10(6):544–8. DOI Google Scholar Full Text
6. Rizqiawan A, Lesmaya YD, Rasyida AZ, Amir MS, Ono S, Kamadjaja DB. Postoperative complications of impacted mandibular third molar extraction related to patient's age and surgical difficulty level: a cross-sectional retrospective study. Int J Dent. 2022;2022:7239339. DOI PubMed Google Scholar Full Text
7. Akadiri OA, Obiechina AE. Assessment of difficulty in third molar surgery: a systematic review. J Oral Maxillofac Surg. 2009;67(4):771–4. DOI PubMed Google Scholar Full Text
8. Kim JC, Choi SS, Wang SJ, Kim SG. Minor complications after mandibular third molar surgery: type, incidence and possible prevention. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102(2):e4–11. DOI PubMed Google Scholar Full Text
9. Qiao F, Li L, Zhang J, Dong R, Sun J. Operation time is independent associated with serious postoperative symptom in patients with mandibular third molar removal. Ann Palliat Med. 2021;10(3):2668–77. DOI PubMed Google Scholar Full Text
10. Albanese M, Caccianiga G, Chiesa M, Butera A, Scribante A. Influence of surgical technique and flap design on postoperative outcomes of lower third molar surgery. Dent J (Basel). 2023;11(10):238. DOI PubMed Google Scholar Full Text
11. Rizqiawan A, Susanto A, Ramadhani A, Adiatman M, Hidayat A, Mahdani Y. Postoperative complications of impacted mandibular third molar surgery and their associated risk factors: a cross-sectional study. Clin Cosmet Investig Dent. 2022;14:55–62. DOI PubMed Google Scholar Full Text
12. Chuang SK, Perrott DH, Susarla SM, Dodson TB. Age as a risk factor for third molar surgery complications: a prospective cohort study. J Oral Maxillofac Surg. 2007;65(9):1685–92. DOI PubMed Google Scholar Full Text
13. American Association of Oral and Maxillofacial Surgeons. Management of third molar teeth. J Oral Maxillofac Surg. 2012;70(9 Suppl 1):S1–66. DOI PubMed Google Scholar Full Text
14. Chen YW, Lee CT, Hum L, Chuang SK. Effect of age on third molar surgery postoperative complications: a systematic review and meta-analysis. PLoS One. 2021;16(2):e0246625. DOI PubMed Google Scholar Full Text
15. Yamada SI, Hasegawa T, Yoshimura N, Hakoyama K, Nakaoka K, Ueda N, et al. Prevalence of and risk factors for postoperative complications after lower third molar extraction. Medicine (Baltimore). 2022;101(32):e29989. DOI PubMed Google Scholar Full Text
16. Dudde F, Neff A, Rustemeyer J. Impacted third molar surgery in older patients: complication rates and risk factors. Clin Oral Investig. 2024;28(2):763–72. DOI PubMed Google Scholar Full Text
17. Kuśnierek W, Brzezińska K, Nijakowski K, Surdacka A. Smoking as a risk factor for dry socket: a systematic review. Dent J (Basel). 2022;10(7):121. DOI PubMed Google Scholar Full Text
18. Tandon P, Sahoo SK, Mohanty L, Das S, Sahoo A, Jena A, et al. Dry socket prevalence and risk factors in third molar extractions: a prospective observational study. Cureus. 2024;16(3):e56721. DOI PubMed Google Scholar Full Text
19. Blum IR. Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management. J Oral Maxillofac Surg.

2002;60(6):615–23. DOI PubMed Google Scholar Full Text
20. Kolokythas A, Olech E, Miloro M. Alveolar osteitis: a comprehensive review of concepts and controversies. Int J Dent. 2010;2010:249073. DOI PubMed Google Scholar Full Text
21. Sancaklı E, Gökçen-Röhlig B, Özkurt-Kayabalı Z, Çakan U. The effect of smoking on the postoperative complications of lower third molar surgery. J Istanb Univ Fac Dent. 2014;48(2):29–35. DOI Google Scholar Full Text
22. Torres-Lagares D, Serrera-Figallo MA, Romero-Ruiz MM, Infante-Cossío P, García-Calderón M, Gutiérrez-Pérez JL. Update on dry socket: a review of biological bases and risk factors. Med Oral Patol Oral Cir Bucal. 2005;10(1):81–5. DOI PubMed Google Scholar Full Text
23. Mealey BL, Oates TW. Diabetes mellitus and periodontal diseases. J Periodontol. 2006;77(8):1289–303. DOI PubMed Google Scholar Full Text
24. Shah AK, Gautam S, Singh H. Outcome of patients with surgical extraction of lower third molar in teaching hospital. J Chitwan Medical College. 2021;11(38):126–30. DOI Google Scholar Full Text