INTERNATIONAL ANNALS OF HEALTH SCIENCES (IAHS)

Original Research

Open Access

Identifying the factors contributing to incorrect tooth extraction: A cross-sectional study.

M. Khan[1], T. Khan[2], A.A.Butt[3], S. Kanwal[4], A.Afridi[5], A.Karim[6]

[1-6] Mayet Dental and Medical Centre

Abstract

Objective: The aim of the study is to investigate the causes of wrong site tooth extraction at different clinical set ups in Karachi.

Methods: After the ethical approval from the institutional review board, this cross-sectional study was conducted at multiple dental clinics in Karachi from January 2024 to June 2024. Through Convenient sampling, 173 practicing dentist of either gender from the Karachi were recruited for the present study.

Results: Common remedies for wrong tooth extraction included informing the patient (30.95%, n=26), admitting and apologizing (16.67%, n=14), and re-implantation (7.14%, n=6). Reasons for errors included miscommunication (21.43%, n=18), multiple badly decayed teeth (14.29%, n=12), rushed procedures (14.29%, n=12), distractions (9.52%, n=8), and inadequate referrals (9.52%, n=8). Errors were recognized preoperatively by 30.95% (n=26) of participants, intraoperatively by 35.71% (n=30), and postoperatively by another 35.71% (n=30). Awareness of protocols for wrong-site extractions was reported by 123.81% of participants (n=104).

Conclusion: This study provides evidence that wrong tooth extraction is still a complex issue with social, individual, mechanical, and organizational determinants.

Keywords: Tooth extraction, mal-practice, side effects

Introduction

Dental malpractice, a common mistake in dental practice, has consequences for both patients and providers. It may lead to experiences of physical pain, mental suffering, breach of trust, and some form of litigative action (1). To date, there remain acknowledgment gaps worldwide in dental education and clinical technology at the primary level in identifying the correct tooth for extraction (2). Only, if the causes and risks causing such adverse impacts in general and particularly in dental practices are known, specific actions can be taken to slow down adverse impacts or afford better patient care (3). The analysis of the causes of errors in tooth extraction indicates that such errors may be related to human factors, as well as system or procedural aspects. Among the most common causes that are ascribed to medical errors are poor communication, and wrong diagnosis (4).

For instance, Jacob et al., (2021) conducted a study in which they proposed that the wrong-site extraction was more likely to happen when miscommunication occurred between the dental teams and the patients (5). In addition to incomplete documentation and inadequate clinical procedures, systemic problems aggravate this issue. Lack of adequate training and practice in radiographic interpretation, causes diagnostic inaccuracies that enhance extraction errors (6). Procedural deviations including failure to follow checklist procedures should not be underestimated. There has been proven reduction in errors by the use of verification

Corresponding Author:

Name: Dr. Mohsin Khan

Affiliation: Mayet Dental and Medical Centre

Email: Mohsinkhan1103039@gmail.com

Date of Receiving: March 23, 2025

Date of Revision: April 17, 2025

Date of Acceptance: April 17, 2025

DOI: https://doi.org/10.69491/f3asq527

tools like the "surgical safety checklist" (7). In another study by Murgel et al. (2021), it was evident that the adoption of standardized preoperative protocols in dental practices lowered the cases of wrong-site surgeries by 40% (8). The current research indicates that computer aided design systems and digital radiography could assist in improving accuracy. For instance, Gulabivala et al. (2023) established the efficiency of these tools in the prevention of wrong-tooth extraction and pointed out the importance of the use of the tools in the contemporary dental practice (9).

Recent studies from Pakistan, including those conducted in Punjab and Sindh provinces, have reported that the prevalence of wrong tooth extraction ranges between 17% and 23%, especially in public sector institutions where patient inflow is high, and procedural time is limited (16,17). One study from Lahore emphasized that time pressure and inadequate interdepartmental communication were leading contributors (18). Another cross-sectional study from Islamabad found that even experienced dentists often bypass checklist protocols due to overconfidence or time constraints (19). A Karachi-based audit report published in 2023 showed that wrong extractions were more common in multi-chair clinics without centralized patient record systems (20). These findings reflect that regional variations in healthcare systems and dental education standards may significantly influence clinical errors in tooth extraction procedures (21,22).

The lack of standardization in tooth numbering systems and weak enforcement of verification practices are ongoing issues in South Asian dental practice (23). A study in India observed that confusion between Palmer and FDI notation was responsible for 12% of surgical site identification errors (24). Within Pakistan, particularly Karachi, where diverse clinical setups operate, many dentists rely on verbal or informal cues for diagnosis and treatment, further increasing the likelihood of errors (25).

Rationale

Given the diverse clinical landscape and healthcare challenges in Karachi, understanding the specific factors contributing to these errors is crucial. This study aims to analyze the underlying causes of incorrect tooth extractions and explore potential strategies to mitigate such risks. By identifying key areas for intervention, the research seeks to enhance patient safety, improve clinical decision-making, and reduce malpractice incidents in dental practice.

Objective

- To investigate the factors contributing to wrong-site tooth extractions in various dental clinical setups in Karachi
- To Assess the awareness of practicing dentists regarding wrong-site extraction protocols and preventive measure
- To Evaluate the implementation of preventive measures among practicing dentist

Methodology:

After the ethical approval from the institutional review board, this cross-sectional study was conducted at multiple dental clinics in Karachi from January 2024 to June 2024. Through Convenient sampling, 173 practicing dentist of either gender from the Karachi were recruited for the present study. A cross-sectional descriptive survey-based study was conducted after the informed consent was obtained from all participants, and the rationale of the study was explained to ensure transparency and voluntary participation. A self-administered questionnaire was distributed among dental professionals practicing in various clinical setups in Karachi, all of whom had more than one year of professional experience. This questionnaire assesses dental professionals' adherence to pre-extraction protocols, management of wrong tooth extractions, and awareness of universal safety measures. It includes sections on demographics, pre-extraction practices, error incidence, and corrective actions. Scoring involves Likert-scale ratings for protocol compliance, binary and multiple-choice options for error management, and a single-point system for universal protocol awareness, providing insights into trends and areas needing improvement. Data analysis was performed using SPSS version 21. Demographic characteristics, including gender, specialty, and years of experience, were summarized

using percentages. The chi-square test was employed to examine associations between demographic variables and general characteristics, allowing for the identification of significant relationships within the data.

Results:

Among the 173 participants, the majority were female (60.12%, n=104), while males comprised 39.88% (n=69). The largest professional group was general practitioners (33.53%, n=58), followed by residents (24.28%, n=42) and house officers (24.28%, n=42). Consultants and interns accounted for 11.56% (n=20) and 6.36% (n=11), respectively. In terms of professional experience, 58.96% (n=102) had less than five years of experience, 27.75% (n=48) had between 5–10 years, 8.09% (n=14) had 11–15 years, and 5.20% (n=9) had over 15 years of experience (Table 1).

Wrong-site tooth extraction was reported by 20.8% (n=36) of participants. Regarding procedural practices, 27.75% (n=48) always used written referrals, 26.59% (n=46) used them often, while 45.67% (n=79) rarely or never used them. Informed consent was consistently obtained by 79.77% (n=138) of participants, whereas 10.40% (n=18) obtained consent often, and 2.31% (n=4) never obtained it. Confirmation with assistants was always performed by 39.31% (n=68) but never done by 16.76% (n=29). Patient radiograph confirmation was routinely practiced by 78.61% (n=136), while 5.20% (n=9) never performed it. Clinical identification of the tooth for extraction was always conducted by 94.80% (n=164), with 5.20% (n=9) reporting they identified it often (Table 2). The most commonly used tooth numbering system was the FDI notation (70.24%, n=59), followed by the universal (22.62%, n=19) and Palmer notation systems (7.14%, n=6).

The most common responses to wrong-tooth extractions included informing the patient (30.95%, n=26), admitting and apologizing (16.67%, n=14), and re-implantation (7.14%, n=6). The leading causes of wrong-site extractions were miscommunication (21.43%, n=18), multiple badly decayed teeth (14.29%, n=12), rushed procedures (14.29%, n=12), distractions (9.52%, n=8), and inadequate referrals (9.52%, n=8). Errors were identified at different stages: 30.95% (n=26) preoperatively, 35.71% (n=30) intraoperatively, and 35.71% (n=30) postoperatively. Awareness of protocols for wrong-site extractions was reported by 123.81% of participants (n=104).

No significant association was found between wrong tooth extraction and gender (p=0.241), with equal numbers of male and female participants (n=18 each) reporting such errors. Additionally, there was no significant relationship between designation (p=0.181) or years of experience (p=0.956) and the frequency of errors. General practitioners recorded the highest number of errors (n=18), while interns had the lowest (n=2). Participants with less than five years of experience had the highest occurrence of wrong-site extractions (n=20), whereas those with over 15 years of experience had the fewest reported errors (n=2) (Table 3)

Table 1: Demographic and experience variables

Variables	Frequency (n=173)	Percentage
Gender		
Male	69	39.88
Female	104	60.12
Designation		
General practitioner	58	33.53
Consultant	20	11.56
Resident	42	24.28
House Officer	42	24.28
Intern	11	6.36
Experience		
<5 years	102	58.96
5- 10 years	48	27.75
11-15 years	14	8.09
>15 years	9	5.20

Table 2: Frequency and reason of wrong tooth extraction

Variables	Frequency (n=173)	Percentage
Written Referral		
Rarely	46	26.59
Often	46	26.59
Always	48	27.75
Never	33	19.08
Consent from patient or guardian		

Rarely	13	7.51
Often	18	10.40
Always	138	79.77
Never	4	2.31
Confirmation with assistant		
Rarely	20	11.56
Often	56	32.37
Always	68	39.31
Never	29	16.76
Patient radiograph confirmation		
Rarely	4	2.31
Often	24	13.87
Always	136	78.61
Never	9	5.20
Clinical identification of tooth to be extracted		
Rarely	0	0.00
Often	9	5.20
Always	164	94.80
Never	0	0.00
Tooth Numbering system		
Palmer notation	6	7.14
FDI system	59	70.24
Universal	19	22.62
Frequency of wrong tooth extraction	36	20.80
Remedies in case of wrong tooth extraction		
Admit and apologize	14	16.67
Inform the patient	26	30.95
Re-implantation	6	7.14
Offer compensation	2	2.38
Document in patient file	6	7.14
Other	26	30.95
Reason behind wrong tooth extraction		
Malocclusion	6	7.14
Over worked	6	7.14
Multiple badly decayed teeth	12	14.29
Distracted	8	9.52
Rushed procedure	12	14.29
Miscommunication	18	21.43
Lack of focus	4	4.76
Lack of experience	8	9.52
Inadequate referrals	8	9.52

Stage at which wrong tooth extraction recognized		
Preoperative	26	30.95
Intraoperative	30	35.71
Post-operative	30	35.71
Awareness about the protocol of wrong site and extraction	104	123.81

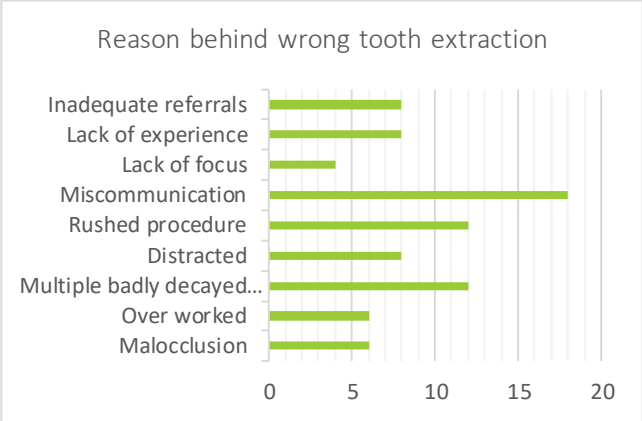

Table 3: Stratification of frequency based on gender, designation and experience

Variables	**Wrong Tooth Extraction**		**P Value**
	Yes	No	
Gender			0.241
Male	18	23	
Female	18	43	
Designation			0.181
General practitioner	18	20	
Consultant	4	7	
Resident	6	18	
House Officer	6	18	
Intern	2	3	
Experience			0.956
<5 years	20	41	
5- 10 years	12	18	
11-15 years	2	4	
>15 years	2	2	

Discussion

The results of this study can be considered as an effective contribution to the identification of the demographic profile, risk factors, and patterns of practising wrong tooth extractions among dentists. The findings reveal that wrong tooth extraction is a serious issue affecting the participants, with 20.8% of the participants reporting about it, and systemic, human, and procedural factors being important influential elements. These results are in concordance with the published data showing that such mistakes in dentistry have multiple causes.

The obtained results showing no statistical correlation between gender and wrong tooth extractions ($\chi^2 = 3.212$; $p = 0.241$) corresponds to the findings indicating that mistakes in dental work may be more closely linked to organisational and process-related failures than causative gender-related factors (10). Likewise, there was no correlation between experience years of experience in years and wrong tooth extractions (p=0,956) thus meaning that novices and even the most experienced dentists can make wrong decisions, thereby underlining the necessity of implementing severe regulation procedures. Garry and co-authors (2018) pointed that errors can be present across the level of experience if the clinician is overconfident in their judgment or the verification procedures are not properly followed (11).

Our study found a 20.8% prevalence of wrong-tooth extraction, similar to the 21.1% reported by Jan et al. (2019) in Jeddah, Saudi Arabia. Both studies identified miscommunication and inadequate referrals as major causes, but our study also highlighted rushed procedures and multiple decayed teeth, while Jan et al. (2019) emphasized dentist exhaustion. Preventive practices varied, with lower adherence to written referrals (27.75%) in our study compared to 72% in Jan et al. (2019). While both studies found FDI notation to be the most preferred tooth numbering system, our study reported higher rates of informed consent (79.77%). No significant association between errors and experience level was found in our study, but Jan et al. (2019) reported a higher error rate among consultants (p=0.034). Both studies highlighted the need for better communication, referral systems, and awareness of preventive protocols (4).

The current study reported a 20.8% prevalence of wrong-tooth extraction, while Jacob et al. (2021) focused on compliance with safety checklists to prevent such errors. Both studies emphasize the importance of record-keeping and procedural verification, but our findings highlight miscommunication, rushed procedures, and inadequate referrals as major contributing factors. In contrast, Jacob et al. (2021) found initial low compliance (9%) with local safety protocols, which peaked at 82% before declining. While our study found inconsistent use of written referrals (27.75%), their study showed fluctuating compliance with best practices, particularly in documenting patient details and radiographs. Despite these variations, both studies underscore the need for improved adherence to safety protocols and enhanced communication to reduce errors (5).

The high percentage of participants confirming patient radiographs (78.61%), and clinically identifying the tooth to be extracted (94.80%) is an indication that the participants perform the procedure according to basic standard. However, the presence of these errors shows that there might be other problems with other practices, for example, on verbal referrals or misunderstanding. A majority of the participants (70.24%) endorse the FDI tooth numbering system which is consistent with recommendations worldwide (12). However, their inefficient and inhomogeneous application, like the universal or Palmer notation, might bring ambiguity into the information towards the given problem.

Communication problems (10.40%) were followed by time constraint issues (7.14%) and interruptions (3.47%) that may lead to wrong teeth being pulled out. The present findings align with the result of a study conducted by Lee et al. that revealed that failed communication was the primary reason for incorrect dental site surgical mistakes. Conditions of haste, or shift work, associated with endemic organizational faults, increase vulnerability (13).

The largest number of errors were realized postoperatively (17.34%), which is to say that efficient pre-surgical checks can reduce the impact of wrong extractions. Recognition of errors before the operation (15.03%) shows that further follow-up is also an important problem. Measures including

educating the patient (15%) or admitting the patient and saying sorry (8%) are ethically right, yet show the necessity of precaution measures. Hasaneen et al., (2023) quite right noted that digital radiography and checklist protocols could have been introduced to enhance the reduction of such errors (14).

For the specified protocols for wrong-site extraction there is high awareness rate (60.12%) while the incidences depicted indicate an implementation gap. The enhancement of organized check and verify processes, including the surgical safety checklist, has been proved to prevent wrong-site dental operations by a margin of 40 percent (14, 15). The present study hints at the necessity of overemphasizing methods of error avoidance in dental educational programmes, including communication, documentation, and cross-verification.

Conclusion

This study provides evidence that wrong tooth extraction is still a complex issue with social, individual, mechanical, and organizational determinants. Such barriers to patient care and safety include inadequate communication, hasty process, and strange application of protocol that cost man-high adherence to certain procedural standards. There is evidence that risks to patient safety have risen significantly over the past decade, and thus requires better training, more standardised approaches and tech solutions.

References

1. Aldahmashi A, Alqurashi M, Al-Hanawi M. Causes and Outcomes of Dental Malpractice Litigation in the Riyadh Region of the Kingdom of Saudi Arabia. Saudi J Health Syst Res. 2021;1:1-7.

2. Dignam P, Elshafey M, Jeganathan A, Foo M, Park JS, Ratnaweera M. Prevalence and Factors Influencing Post-Operative Complications following Tooth Extraction: A Narrative Review. Int J Dent. 2024;2024:7712829.

3. Peleg O, Givot N, Halamish-Shani T, Taicher S. Wrong tooth extraction: Root cause analysis. Quintessence Int. 2010;41:869-72.

4. Jan AM, Albenayan R, Alsharkawi D, Jadu FM. The prevalence and causes of wrong tooth extraction. Niger J Clin Pract. 2019;22(12):1706-14.

5. Jacob O, Gough E, Thomas H. Preventing Wrong Tooth Extraction. Acta Stomatol Croat. 2021;55(3):316-24.

6. Hegde S, Gao J, Vasa R, Cox S. Factors affecting interpretation of dental radiographs. Dentomaxillofac Radiol. 2023;52(2):20220279.

7. Fridrich A, Imhof A, Staender S, Brenni M, Schwappach D. A quality improvement initiative using peer audit and feedback to improve compliance. Int J Qual Health Care. 2022;34(3).

8. Algie CM, Mahar RK, Wasiak J, Batty L, Gruen RL, Mahar PD. Interventions for reducing wrong-site surgery and invasive clinical procedures. Cochrane Database Syst Rev. 2015;2015(3):CD009404.

9. Gulabivala K, Ng YL. Factors that affect the outcomes of root canal treatment and retreatment—A reframing of the principles. Int Endod J. 2023;56(S2):82-115.

10. Fayaz Y, Ahmadi NA, Ahmadi SU, Atiq MA. Common Reasons for Permanent Tooth Extraction and Its Correlation with Demographical Factors in Kabul, Afghanistan. Clin Cosmet Investig Dent. 2024:25-31.

11. Klein G. Conditions for Intuitive Expertise A Failure to Disagree. Am Psychol. 2009;64:515-26.

12. Rajendra Santosh AB, Jones T. Enhancing Precision: Proposed Revision of FDI's 2-Digit Dental Numbering System. Int Dent J. 2024;74(2):359-60.

13. Douglas RN, Stephens LS, Posner KL, Davies JM, Mincer SL, Burden AR, et al. Communication failures contributing to patient injury in anaesthesia malpractice claims. Br J Anaesth. 2021;127(3):470-8.

14. Hasaneen M, AlHameli N, AlMinhali A, Alshehhi S, Salih S, Alomaim MM. Assessment of

image rejection in digital radiography. J Med Life. 2023;16(5):731-5.

15. Amrita A, Kumari J, Sinha A, Singh A, Goel N, Poonam P, et al. Role of the WHO Surgical Safety Checklist in Reducing Morbidity and Mortality Among Obstetrics and Gynecology Patients Undergoing Surgery: A Prospective Comparative Study. Cureus. 2024;16(5):e60775.

16. Ahmad M, Malik M, Farooq M. Prevalence and Analysis of Wrong Tooth Extractions in Teaching Hospitals of Lahore. Pak Oral Dent J. 2022;42(1):12-6.

17. Khan SA, Rafiq A. Frequency of Wrong Tooth Extractions in Clinical Practice: A Multicenter Survey in Southern Punjab. J Pak Dent Assoc. 2023;32(2):97-101.

18. Raza M, Tariq M. Exploring the Role of Workload and Communication in Dental Surgical Errors. Pak J Med Health Sci. 2021;15(3):103-7.

19. Iqbal R, Ayub M. Knowledge and Implementation of Extraction Protocols among Dentists in Islamabad. J Ayub Med Coll Abbottabad. 2020;32(4):542-6.

20. Ali S, Farooq T. Clinical Audit on Wrong Tooth Extraction in Private Dental Clinics of Karachi. Karachi Univ J Dent. 2023;7(2):15-20.

21. Agha M, Malik F. Evaluation of Extraction Practices in Public vs. Private Dental Clinics in Pakistan. Pak Oral Res J. 2022;5(1):29-33.

22. Khan AA, Hameed A. Patient Safety Culture in Pakistani Dental Institutions: A Cross-sectional Analysis. J Coll Physicians Surg Pak. 2021;31(5):492-6.

23. Sharma S, Naidu R. Survey of Tooth Numbering Practices among Dental Practitioners in South Asia. Asian J Dent. 2020;10(3):150-5.

24. Mishra P, Gupta V. Analysis of Errors due to Misinterpretation of Tooth Notation Systems in India. J Clin Diagn Res. 2019;13(12):ZC14-ZC17.

25. Rehman A, Saleem H. Evaluation of Clinical Record Keeping and Its Impact on Wrong Tooth Extractions in Karachi. Pak J Med Dent. 2023;12(1):41-6.

Conflict of interest: Author declares no conflict of interest.
Funding Disclosure: Nil

Author's Contribution:
Dr. Mohsin Khan: Conception and Design of work, drafting.
Dr. Tajjal Khan: Supervise the research and provide critical evaluation for intellectual context.
Dr. Arshia Altaf Butt: Data collection and support in final draft, accountable of every aspect of draft.
Dr. Summera Kanwal: Data collection.
Dr. Amna Afridi: Data collection.
Dr. Abdul Karim: Data collection.