

AWARENESS OF INTERDISCIPLINARY ORTHODONTIC-ENDODONTIC PATIENT MANAGEMENT AMONG THE DENTAL PRACTITIONERS OF HAZARA DIVISION

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ABSTRACT

Background: Collaborative orthodontic-endodontic approaches are vital in addressing complex dental cases. However, existing literature reveals a notable dearth in understanding and implementing this approach among dental practitioners.

Objective: This study aimed to bridge the gap in understanding current practices among dental practitioners, fostering enhanced patient care and ethical standards. This cross-sectional survey, conducted from September 1st to 30th, 2023, involved distributing a validated questionnaire to dental practitioners in the Hazara Division, yielding 96 responses from 105 visited clinics and 44 from hospitals. Descriptive statistics were used for frequencies and percentages using SPSS version 23.

Methodology: The survey involved 78.6% general dentists, 13.6% orthodontists, and 7.9% endodontists. Varying levels of correct responses were observed for the knowledge-based questions.

Results: Positive attitudes were seen, with 70% of respondents expressing an interest in enhancing knowledge through educational programs, and 73% agreeing to adhere to interdisciplinary guidelines. Furthermore, 79.3% of practitioners had experience treating cases requiring both orthodontic tooth movement and endodontic therapy.

Conclusion: Notably, orthodontists and endodontists showed higher percentages of accurate responses compared to general dentists. In conclusion, this study underscores the need for improved education, standardized protocols, and better patient communication for effective interdisciplinary dental care specifically in general dental practitioners.

Keywords: Awareness; Interdisciplinary Management; Orthodontics-Endodontics; Dental Practitioners

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INTRODUCTION

In contemporary dental practice, the interdisciplinary collaboration between *orthodontists and endodontists* has emerged as a significant avenue for addressing complex dental issues, particularly those concerning malocclusions and root canal treatments. This union

has become increasingly crucial in addressing intricate cases involving orthodontic treatment coupled with the need for endodontic intervention, arising from various factors such as trauma, root resorption, non-vitality, and other challenging clinical scenarios.^{1,2} The collaborative synergy between these two specialized domains is particularly instrumental in managing complex cases that necessitate both orthodontic and endodontic expertise.³

When approaching an orthodontic treatment for a tooth with pulpal involvement, achieving a balanced interrelationship between orthodontics and endodontics becomes paramount.^{4,5} Various factors such as the patient's age, gender, and tooth condition, alongside the type, duration, and magnitude of orthodontic forces applied, significantly influence the biological response of the dental tissue.⁴ Moreover, the specific treatment planning for such cases necessitates a meticulous understanding of the optimal timing for performing endodontic procedures in conjunction with orthodontic

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interventions.⁶ Traumatic injuries, for instance, can result in the misalignment of teeth, necessitating both orthodontic realignment and subsequent endodontic interventions to address pulp vitality, root resorption, or other associated complications.⁷ Similarly, cases of root resorption, often encountered during orthodontic treatment, may demand simultaneous endodontic procedures to ensure successful treatment outcomes.⁸ Furthermore, the preservation of pulpal vitality in teeth undergoing orthodontic treatment is crucial, as the alteration in tooth position and occlusal forces can potentially impact pulpal health, necessitating timely endodontic interventions.⁹

The evolving landscape of these interdisciplinary treatment protocols demands a comprehensive understanding of the latest advancements and an in-depth knowledge of the treatment dynamics.¹⁰ However, a thorough analysis of existing literature from 2000 to 2021, including Medline, PubMed, and Scopus databases, reveals a striking dearth of studies that specifically assess the knowledge, attitude, and practice of dental clinicians concerning the orthodontic-endodontic interdisciplinary treatment approach. One of the very few available surveys like that of Sodvadia et al.⁴ presented that only 25% of the respondents correctly answered the knowledge-based questions. Also, not more than 50% of the specialized practitioners were applying their knowledge in interdisciplinary orthodontic-endodontic cases. One must also keep in mind here that a local study pointed out that the “dental practitioners in the market are practicing orthodontic skills”,¹¹ if they are doing so, then the question arises have they the correct knowledge specifically for complex interdisciplinary cases?

Given the critical need to enhance ethical practices and elevate patient care standards, it becomes imperative to gauge the current understanding and implementation of the orthodontic-endodontic interdisciplinary approach among dental practitioners. This survey aims to address this significant gap in the literature, offering insights into the existing knowledge, attitudes, and practices of endodontic, orthodontic, and general dental practitioners. This study endeavors to provide a comprehensive understanding of the prevailing trends and challenges in the context of orthodontic endodontic interdisciplinary treatment, *thus paving the way for proficient dental care practices not only in this region. But help to set a protocol for others to follow in the best interest of patients.*

METHODOLOGY

Study Design

The present study was a cross-sectional survey based on a questionnaire. The questionnaire was distributed to a sub-population of dental practitioners of Hazara Division (i.e., Abbottabad and Manshera Districts) only. Once ethical approval from the Ayub Medical Institute Ethical Review Board was taken

(Approval Code/Ref.No.RC-2023/EA-01/048). The data was collected from 1st September 2023 to 30th September 2023 (30 days).

Participants and Sampling

The questionnaire was delivered to doctors in hard copy form. For this purpose, the services of a private courier company were taken. They were instructed to deliver the questionnaires to all their regional distribution centers, instructing them to visit all dental clinics of the region within the allocated time while the primary author personally visited the four dental teaching hospitals and two district headquarters facilities (DHQs) of the division. The courier company was paid according to the count of responses they retrieved so that maximum respondents/clinics would be contacted. The courier company provided us data that 105 clinics were visited out of which 96 responded to the questionnaire on the spot. The respondents from the hospitals were 44 only.

Questionnaire

The questionnaire was an already validated 15 questions based on knowledge, attitude, and practice from a recent and regional study.⁴ (Figure 1) The questionnaire was a two-page proforma. The first page was the title page along with consent of the participant and his specialty if any. The consent clearly stated the confidentiality of the identity of the respondents as well as his/her willingness to respond. For the description of specialty only orthodontists or endodontists were considered specialists rest of the specialists were considered under general practitioners for the study.

RESULTS

The majority of the practitioners surveyed were general dentists (78.6%), with a smaller percentage being orthodontists (13.6%) and endodontists (7.9%). (Figure 2)

Table 1 shows the percentages of the correct responses indicating varying practitioner knowledge.

According to Figure 3, the majority of respondents (70%) either strongly agreed or agreed to upgrade their knowledge through continuing education programs, indicating a positive attitude toward furthering their understanding of interdisciplinary dental practices. A significant proportion (73%) of respondents agreed or strongly agreed to adhere to guidelines in cases requiring an interdisciplinary approach, demonstrating a strong commitment to following established protocols and standards. A substantial majority (75.7%) of respondents agreed or strongly agreed with the statement, acknowledging the correlation between severe dental trauma and the increased risk of root resorption during orthodontic treatment, with or without endodontic

involvement.

A significant majority (79.3%) of respondents reported having treated cases that required orthodontic tooth movement to achieve the set goals. The data reveals that the surveyed practitioners varied in their waiting time for periapical healing before initiating orthodontic force application. The highest proportion of respondents (32.1%) reported waiting for 6 weeks after endodontic therapy before applying orthodontic force, followed closely by 3 weeks (24.3%) and 8 weeks (27.9%). A smaller proportion (15.7%) reported waiting for 1 week. A significant majority (80.0%) of respondents reported that they inform their patients about the risk of root resorption in interdisciplinary treatment for traumatic tooth injuries. (Table 2)

Table 3 summarizes the responses depending on the practitioners' specialty and provides insight into the disparities in viewpoints and knowledge levels among general dentists, orthodontists, and endodontists. The findings demonstrated that orthodontists and endodontists had higher percentages of correct knowledge-based responses than general dentists.

DISCUSSION

In this study, the responses of dental practitioners, orthodontists, and endodontists were assessed to understand their knowledge, attitudes, and practices related to the interdisciplinary approach of orthodontic-endodontic patient management. The results have provided valuable insights into the current understanding and implementation of this approach, highlighting several key areas of consideration and potential areas for improvement in dental care practices.

Firstly, the results clearly state that in the general description (i.e., without segregation of specialists) not a single knowledge-based question was answered correctly by more than 44% of the respondents. While respondents of both specialties i.e., orthodontics and endodontics almost all answered correctly. This directs us to the significance of post-graduate studies. Only the specialists in the subjects knew about interdisciplinary patient management. A regional study pointed to the fact that 86.9% of general practitioners responded positively to knowledge of orthodontic skills.¹¹ But these were basic principles of orthodontic treatment not advanced interdisciplinary as in the present study.

The most positive finding was the attitude of the respondents as the majority of the respondents (70%) were willing to enhance their knowledge of interdisciplinary dental practices. The concise link between endodontics and orthodontics during treatment planning extends to the clinical management of teeth requiring combined endodontic and orthodontic therapy, as well as the effects of orthodontic treatment on the pulp and the possibility of resorption during tooth movement.^{5,12}

Knowledge-Based:		Attitude-Based:	
1. Are males and females equally susceptible to Orthodontically induced External apical root resorption (EARR)?	a. Yes b. Females are more susceptible c. Males are more susceptible d. Not sure	1. Do you agree to upgrade/enhance/improve your knowledge of interdisciplinary dental practice through continuing education programs?	a. Strongly Agree b. Agree c. Unsure d. Disagree e. Strongly disagree
2. Irreversible pulpal changes resulting from Orthodontic force is more likely seen in ?	a. Closed apices in aged patients b. Open apices in younger patients c. Both are equally susceptible	2. Do you agree to strictly follow guidelines while treating a case that requires an the interdisciplinary approach of endodontic orthodontic treatment?	a. Strongly Agree b. Agree c. Unsure d. Disagree e. Strongly disagree
3. Which phase shows the highest accuracy for the pulp sensibility test during an orthodontic treatment?	a. Active treatment phase b. Resting Phase c. Retention Phase d. Don't know	3. Do you agree that severe trauma to the tooth, higher are the chances of root resorption during orthodontic movement, with or without endodontic treatment?	a. Strongly Agree b. Agree c. Unsure d. Disagree e. Strongly disagree
4. Which portion of the pulp is most affected by the Orthodontic forces?	a. Coronal portion b. Middle portion c. Apical portion d. Doesn't relate to the location	Practice-Based:	
5. Replacement resorption or ankyloses is seen when heavy and continuous orthodontic forces are applied to?	a. Tooth with a history of trauma b. Tooth with Dental caries c. Both the above d. None of the above	1. Have you ever treated a case that requires Orthodontic tooth movement to undergo endodontic therapy?	a. Yes b. No
6. Is there any difference in the resultant orthodontic movement of vital teeth and endodontically treated teeth?	a. Vital tooth moves at a faster rate b. Non-vital tooth moves at a faster rate c. Tooth movement not related to vitality d. Not sure	2. How long do you wait for periapical healing after endodontic therapy to initiate orthodontic force application?	a. 1 week b. 3 weeks c. 6 weeks d. 8 weeks
7. Do you think normal Orthodontic force can be applied to a tooth following successfully healed periapical surgery?	a. Yes b. No c. Don't know	3. Do you inform your patients about the risk of root resorption in Interdisciplinary treatment for traumatic tooth injuries?	a. Yes b. No
8. What is the time interval required for the stability of the orthodontic tooth movements (extrusion, tipping, etc.) following which endodontic therapy needs to be carried out?	a. 4-8 weeks b. 0-4 weeks c. 8-12 weeks d. 6 months		
9. Is the apical seal disturbed in the Root canal-treated tooth during orthodontic tooth movement?			

Fig 1: Questionnaire
Specialty-Based Practitioner Demographic

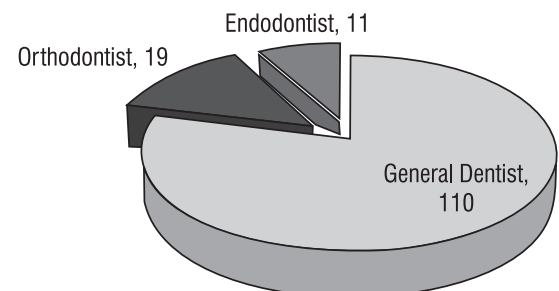


Fig 2: Specialty-Based Practitioner Demographics

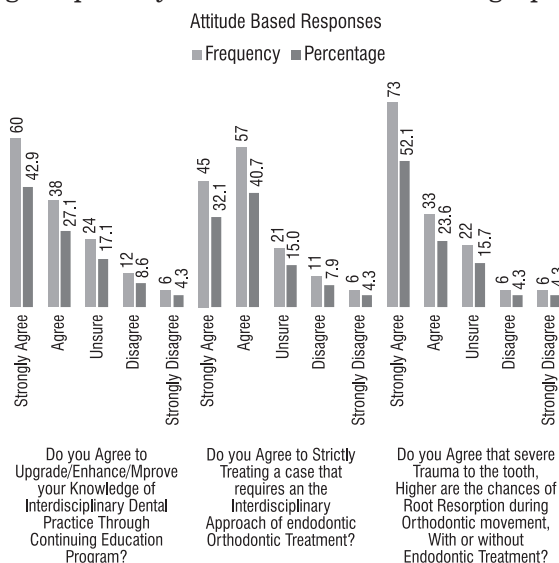


Fig 3: Attitude-Based Responses

TABLE 1: KNOWLEDGE-BASED RESPONSES

Knowledge-Based Responses	n	%
Are males and females equally susceptible to Orthodontically induced External apical root resorption (EARR)?	51	36.4
Irreversible pulpal changes resulting from Orthodontic force is more likely seen in?	45	32.1
Which phase shows the highest accuracy for the pulp sensibility test during an orthodontic treatment?	42	30
Which portion of the pulp is most affected by the Orthodontic forces?	51	36.4
Replacement resorption or ankyloses is seen when heavy and continuous orthodontic forces are applied to?	56	40.0
Is there any difference in the resultant orthodontic movement of vital teeth and endodontically treated teeth? ^a	44	44.0
Do you think normal Orthodontic force can be applied to a tooth following successfully healed periapical surgery?	61	43.6
What is the time interval required for the stability of the orthodontic tooth movements (extrusion, tipping, etc.) following which endodontic therapy needs to be carried out? ^b	34	24.3
Is the apical seal disturbed in the Root canal-treated tooth during orthodontic tooth movement?	56	40.0

Highest correct response^a

Lowest correct response^b

TABLE 2: PRACTICE-BASED RESPONSES

Practice-Based Responses		n	%
Have you ever treated a case that requires Orthodontic tooth movement to undergo endodontic therapy?	Yes	111	79.3
	No	29	20.7
How long do you wait for periapical healing after endodontic therapy to initiate orthodontic force application?	1 week	22	15.7
	3 weeks	34	24.3
	6 weeks	45	32.1
	8 weeks	39	27.9
Do you inform your patients about the risk of root resorption in Interdisciplinary treatment for traumatic tooth injuries?	Yes	112	80.0
	No	28	20.0

TABLE 3: RESPONSES BASED ON SPECIALTY

		Specialty			Total
		General Dentist	Orthodontist	Endodontist	
Are males and females equally susceptible to Orthodontically induced External apical root resorption (EARR)?	Yes	26	0	0	26
	Females are more susceptible	22	19	10	51
	Males are more susceptible	16	0	0	16
	Not sure	46	0	1	47
Irreversible pulpal changes resulting from Orthodontic force is more likely seen in?	Closed apices in aged patients	22	17	6	45
	Open apices in younger patients	36	2	5	43
	Both are equally susceptible	52	0	0	52

Which phase shows the highest accuracy for the pulp sensibility test during an orthodontic treatment?	Active treatment phase	24	8	0	32
	Resting phase	6	0	0	6
	Retention phase	32	7	3	42
	Don't know	48	4	8	60
Which portion of the pulp is most affected by the Orthodontic forces?	Coronal portion	16	0	0	16
	Middle portion	16	0	0	16
	Apical portion	23	19	9	51
	Doesn't relate to the location	55	0	2	57
Replacement resorption or ankyloses is seen when heavy and continuous orthodontic forces are applied to?	Tooth with a history of trauma	26	19	11	56
	Tooth with Dental caries	22	0	0	22
	Both the above	21	0	0	21
	None of the above	41	0	0	41
Is there any difference in the resultant orthodontic movement of vital teeth and endodontically treated teeth?	Vital tooth moves at a faster rate	10	0	0	10
	Non-vital tooth moves at a faster rate	17	0	0	17
	Tooth movement not related to vitality	32	19	10	61
	Not sure	51	0	1	52
Do you think normal Orthodontic force can be applied to a tooth following successfully healed periapical surgery?	Yes	42	9	10	61
	No	29	6	0	35
	Don't Know	39	4	1	44
What is the time interval required for the stability of the orthodontic tooth movements (extrusion, tipping, etc.) following which endodontic therapy needs to be carried out?	4-8 weeks	33	0	1	34
	0-4 weeks	17	10	0	27
	8-12 weeks	28	2	3	33
	6 months	32	7	7	46
Is the apical seal disturbed in the Root canal-treated tooth during orthodontic tooth movement?	Yes, though it depends on the quality of endodontic treatment	10	0	0	10
	Yes, though it depends on applied orthodontic forces	48	8	0	56
	No significant difference due to resorption	24	0	5	29
	Not sure	28	11	6	45

Acknowledging this predicament with or without proper knowledge is still a step in the right direction. Literature from regional studies shows us the same trends with 60.42% of general practitioners having a positive response to orthodontic treatment and its significance in dental practices. (11) On the same topic literature shows that even in attitude there is a difference between general dentists and specialists. Where Shastri et, al. presented that there was a significant ($p < 0.001$) statistical difference between general dentists and specialists.¹³

The highlight from the practice-based response was that 79% of the respondents had treated ortho-en-

do interdisciplinary cases. Although this percentage would be less if specialists were excluded, it however is a decent number. A regional study reported 47.9%⁴ which is significantly less than the present study. With increasing trends of the populous to pursue orthodontic treatment in the last decade, the possibility of patients needing, or planning to undergo orthodontic treatment at the practices of general dental practitioners (GDP) is bound to increase.^{14,15} This phenomenon has been presented accordingly in the present study. There were mixed responses related to waiting duration on teeth with periapical disease before initiating orthodontic forces among the GDP. Literature states that even with chronic periapical lesions 4-6 weeks are usually

enough before applying orthodontic forces.^{16,17} Keeping in mind that this guideline eventually will affect the prognosis of the affected tooth and the overall success of orthodontic treatment¹⁸, the correct decisions by the clinician are paramount.

One other positive finding was that the majority (80%) of the respondents either GDPs or specialists informed their patients regarding the probability of root resorption as a consequence of orthodontics. Recent orthodontic literature clearly states that most (>70%) cases of orthodontics undergo some form of root resorption. Now that may be clinically insignificant (<1mm) in most of the presentations but it is a sequel and ethically every patient right to know.^{19,20}

The biggest flaw of this present study was the sampling. However, it needs to be explained here that no electronic data was accessible from the two governing bodies (Pakistan Medical Council or Health Regulatory Authority) regarding the registered clinics/ clinicians or their bio-data for contact in this defined area. Hence it had to be conducted manually/in person. Secondly, the ratio of orthodontists and endodontists could not be kept the same as this was part of the demographic data. So, a comparison among the two specialist groups was best avoided.

CONCLUSION

In conclusion, the findings of this study reflect that the current knowledge gaps were observed among dental practitioners in the interdisciplinary management of orthodontic-endodontic cases. The results strongly emphasize the need for continuous education, standardized protocols, and enhanced patient awareness to ensure the delivery of high-quality, evidence-based interdisciplinary dental care.

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- Analzed and interpreted the data, and wrote the manuscript.
- Formulated and designed the study, was responsible for data collection, and collection, and helped in writing the manuscript.
- Analyzed and interpreted the data, helped in writing the manuscript.
- Provided design, data collection analysis.
- Provided design, data collection and proof reading.
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