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Original Article

Challenges Faced by Libyan Dental Practitioners in Endodontic Treatment

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ABSTRACT

Objectives. *The purpose of this study was to recognize the most challenging aspects of root canal treatment encountered by Libyan dental practitioners.* ***Methods****: A questionnaire was distributed randomly to 130 general dental practitioners who were working in Libya's public and private dental centers and dental faculty. The data was gathered and statically analyzed.* ***Results****: The results showed that 33.8% of the respondents had some difficulties taking periapical radiographs, 45.4% experienced problems in providing proper isolation with the rubber dam, and only 32.3% reported that they faced difficulties when determining working length. The majority of respondents 74.6% had appropriate knowledge about the various irrigation procedures and 26.9% of those experiencing problems associated with difficulties shaping the canal(s).In addition, 30% of respondents were having difficulties obturating the canal; 56.4% during master cone fitting; 30.8% choosing the proper technique; and 12.8% sealer placement.76.9% of respondents had challenge mishaps cases, the most challenging mishap case they had treated was separated instrument(s) by32.3% respondents, 19.2% respondents by ledge bypass, 15.4% of them by negotiating missed canal(s) and 10.0% of them by perforation management.* ***Conclusion****. The evaluation of the challenges that dental practitioners face during root canal therapy can help in the creation of instructional plans for preclinical and clinical training. Further studies should be required about this subject, this present survey helped to ascertain various gaps in the education schedule which, if altered correctly, would be of great benefit to both the quality of dental practitioners' performance.*

Keywords: *Endodontic Treatment, Endodontic Challenges, General Dental Practitioners, Rubber Dam.*

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الأهداف. كان الغرض من هذه الدراسة التعرف على أكثر جوانب علاج قناة الجذر تحديًا التي واجهها أطباء الأسنان الليبيون. **الطرق:** تم توزيع استبيان عشوائيًا على 130 طبيب أسنان عام يعملون في مراكز طب الأسنان العامة والخاصة في ليبيا وكلية طب الأسنان. تم جمع البيانات وتحليلها إحصائيًا. **النتائج**: أظهرت النتائج أن 33.8٪ من المستجيبين واجهوا بعض الصعوبات في أخذ الأشعة السينية حول الذروة، وواجه 45.4٪ مشاكل في توفير العزل المناسب مع السد المطاطي، وأفاد 32.3٪ فقط أنهم واجهوا صعوبات عند تحديد طول العمل. كان لدى غالبية المستجيبين 74.6٪ معرفة مناسبة بإجراءات الري المختلفة و26.9٪ من هؤلاء الذين واجهوا مشاكل مرتبطة بصعوبات تشكيل القناة (القنوات). بالإضافة إلى ذلك، واجه 30٪ من المستجيبين صعوبات في سد القناة؛ و56.4٪ أثناء تركيب المخروط الرئيسي؛ و30.8٪ في اختيار التقنية المناسبة؛ و12.8% وضع مانع التسرب. 76.9% من المستجيبين لديهم حالات حوادث صعبة، وكانت حالة الحادث الأكثر تحديًا التي عالجوها هي أداة (أدوات) منفصلة من قبل 32.3% من المستجيبين، و19.2% من المستجيبين عن طريق تجاوز الحافة، و15.4% منهم عن طريق التفاوض على القناة (القنوات) المفقودة و10.0% منهم عن طريق إدارة الثقب. **الاستنتاج.** يمكن أن يساعد تقييم التحديات التي يواجهها أطباء الأسنان أثناء علاج قناة الجذر في إنشاء خطط تعليمية للتدريب السريري وما قبل السريري. يجب إجراء المزيد من الدراسات حول هذا الموضوع، وقد ساعد هذا الاستطلاع الحالي في تحديد الفجوات المختلفة في جدول التعليم والتي، إذا تم تعديلها بشكل صحيح، ستكون ذات فائدة كبيرة لكل من جودة أداء أطباء الأسنان.

INTRODUCTION

It's generally recognized that one of the most important things a dentist should do in his profession is root canal treatment. Endodontics is among the rapidly expanding departments within the field of daily clinical practice, involving the combination of new tools, substances, and methodologies [1].

The performance of root canal therapy is characterized by its high level of technical complexities, with instances of failure arising from a deviation from the established standards of care. To guarantee that patients are provided with the latest and most reliable treatment protocols, practitioners must thoroughly understand the outcomes associated with endodontic interventions.

It is imperative to recognize that the success of root canal therapy relies not solely on specific variables such as the presence of canal infections and the complexity of canal morphology, but is equally influenced by more mysterious and distinctive factors including the proficiency and attitudes of the treating dentist [2].

Endodontic therapy, is remarkable for giving rise to significant challenges, necessitating considerable accuracy in the preparatory stages. The primary objectives of root canal treatment (RCT) entail the eradication of bacterial irritants within the root canal system, thoroughly cleansing and shaping the canal, followed by meticulous filling to prevent potential reinfection of the sealed canal system [3]. Therefore, every clinician should be well aware of the errors that may occur at any treatment phase, and their influence on the results of root canal therapy [4].

To ensure the success of each step of root canal treatment, the dentist must train to acquire skills and reduce the errors that may occur every time. The European Society of Endodontology (ESE) has suggested an approach to achieve this, 20 root canal treatments (RCTs) in 20 teeth—including extracted teeth—can be accomplished before graduating to the undergraduate program's recommendations [5]. The feedback from undergraduates is relevant for developing the program and learning process [6].

The endodontic procedure has greatly improved in all respects in the last few years while dentists can successfully perform root canal therapy in more than 94% of cases [7].

The anatomical diversity of root canals, the need to provide adequate patient care, and the lack of self-confidence among students led many to consider endodontics a difficult and stressful discipline while performing endodontic treatment [8].

For these reasons, undergraduate endodontic teaching has an important role in the practice of endodontics by general practitioners, moreover, in limiting the relatively poor technical standard of root canal treatment among them [9,10].

It is crucial to gather information related to technical challenges to identify areas of weakness and enhance training approaches. Therefore, the present study aims to assess the difficulty encountered by dental students when conducting root canal treatments and determine which step poses the greatest difficulty for each student.

METHODS

This cross-sectional survey study was conducted on (October – December 2023) in Libya's public and private dental centers and dental faculty. The prepared questionnaire was randomly distributed among 130 DPs.

The inclusion criteria involve general dental practitioners and interns, both male and female, who have completed the pre-clinical endodontic course and agreed to participate in the research. Those students who had not fulfilled the requirements of the pre-clinical endodontic course were not considered for inclusion in the study. A structured questionnaire will serve as the primary tool for data collection. The questionnaire, containing 24 questions, is structured into three sections that address the challenges experienced by dental practitioners during creating access cavities, maintaining an aseptic field, locating the canal orifice, and obturating the root canal. Data was collected by distributing an online survey to universities in Libya. The data gathered was analyzed using computer software to derive meaningful outcomes. The analysis employed a simple descriptive approach to present the results in terms of frequencies and percentages.

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RESULTS

Demographic Characteristics of Respondents.

A total of 130 respondents, were included in the study based on the inclusion criteria out of which 25 (19.2%) were interns, 74 (56.9%) were general dentists, and 31 (23.8%) were specialists. Approximately 61 (46.9%) were in private practice, 43 (43.1%) worked in public sector, and 26 (20.0%) worked in dental faculty. Above three-quarters, their patients' group was 101 (77.1%) different age groups, followed by 27 (20.8%) adults and 2 (1.5%) children.

Perceived Difficulties among participants.

Table 1 illustrates that one-third of respondents, 44 (33.8%), reported that they had some difficulties taking periapical radiographs, 59 (45.4%) experienced problems associated with difficulties in providing proper isolation with the rubber dam, and less than one-third (32.3%) reported that they faced difficulties when determining working length. The results showed that 97 (74.6%) of respondents had appropriate knowledge about the various irrigation procedures and 35 (26.9%) of those experiencing problems associated with difficulties shaping the canal(s). Figure 1 revealed 39 (30%) respondents who were having difficulties obturating the canal; 22 (56.4%) during master cone fitting; 12 (30.8%) choosing the proper technique; and 5 (12.8%) sealer placement. (figure1)

100 (76.9%) of respondents have challenge mishaps cases they have treated, while 30 (23.1%) did not have challenge mishaps cases. Figure 2 revealed that the most challenging mishap case they have treated was separated instrument(s) by 42 (32.3%) respondents, 25 (19.2%) respondents by ledge bypass, 20 (15.4%) of them by negotiating missed canal(s) and 13 (10.0%) of them by perforation management.

Table 1. Frequency and percentage of response based on difficulties during endodontic procedure

Item	Yes		No	
	N	%	N	%
Do you face any difficulties during taking periapical radiographs?	44	(33.8)	68	(66.2)
Do you face any difficulties in providing proper isolation with the rubber dam?	59	(45.4)	71	(54.6)
Is there any difficulty in determining the working length?	42	(32.3)	88	(67.7)
Do you have sufficient knowledge about the different irrigation? protocols?	97	(74.6)	33	(25.4)
Do you have any difficulty during shaping the canal/s?	35	(26.9)	95	(73.1)
Do you have any difficulty in obturating the canal/s?	39	(30.0)	91	70.0)

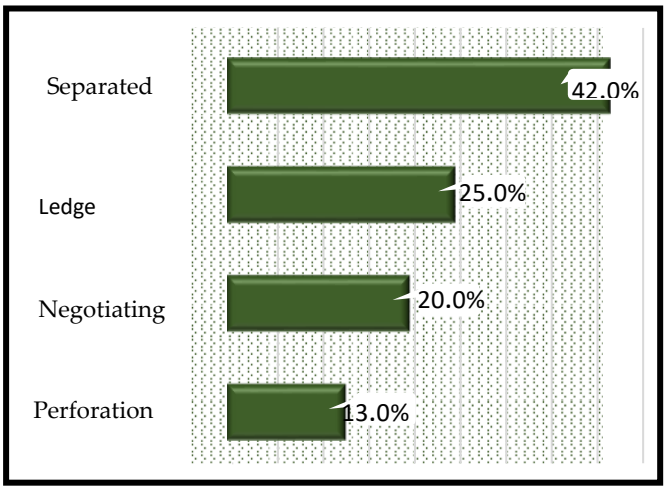

Figure 1. Correlation Between Answers Regarding Difficulties among dental practitioners during obturation.

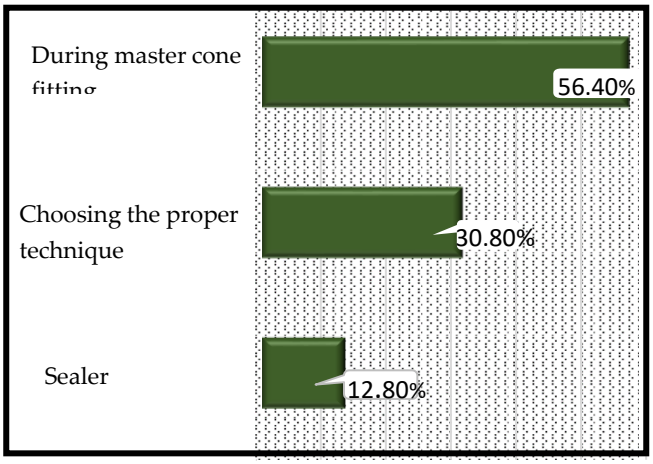

Figure 2. The most challenging mishaps case among study respondents.

DISSCUSION

Root canal treatment is important for eradicating pulpal or periradicular pathologies, the most popular cause of tooth loss. Moreover, preserving teeth in the oral cavity and assisting prosthetics. [11]. for these reasons, a dentist needs to identify the difficulties of the procedure and perform high-quality root canal treatment before graduating. Its success depends on the success of many steps. Even a single complication in only one step can cause a negative prognosis [9,12,13].

To provide these skills, the teaching staff must determine at which step of the procedure the dental student is having trouble. To solve the problem and guide the students to perform root canal therapy effectively [13].

The present study demonstrated that 59 (45.4%) experienced problems with properly isolating the rubber dam. The reason for that is tearing or ripping the rubber dam sheet; in some cases, it is due to the patient's cooperation. Using rubber dam sheets during RCT offers three main advantages: cross-infection control, protection, and improved treatment efficiency [14].

This is similar to the study done in Sudan where no more than 2% of general practitioners used a rubber dam sheet [15].

Some practitioners attributed their low rubber dam use to concerns over their training and technical difficulties [16]. In contrast, Tavares et al. reported that around 68-90% of students did not perceive rubber dam application as difficult [17].

This may be because students receive extensive hands-on training in rubber dam application during their second and third years of study [18].

Additionally, throughout our study, we further noticed that one-third of respondents 44 (33.8%), had some challenges in taking periapical radiographs, similar findings were reported in 2009, Peker and Alkurt stated that the wrong angulation concerning anatomical areas was one of the most common mistakes among students when taking periapical radiographs [13] [19]. This agrees with a study conducted by Almutairi et al 2023 [18], who demonstrated that the students have the most difficulty with mesial and distal shift radiograph techniques [18].

Regarding the percentage of difficulties encountered by the general practitioners during working length determination, 32.3% of them had challenges in reaching apical constriction. Similarly, [Mubashir BaigMirza] [20] in his study stated that the maximum level of difficulty faced by the students was to detect the apical constriction during working length determination [20].

Another interesting finding of our study is that 30% of general practitioners reported finding obturation/root filling difficult. In the present study, students were found to have trouble with master cone adaptation; similar findings were reported by Kaplan T *et al* [13].

Obturation is the last step, and one of the most important steps of the entire procedure, In addition, a perfect adaptation of the master cone to the apical constriction is an important step for an apical seal to prevent apical microleakage [21], over-filled or under-filled root canal obturations are shown to have worse prognoses with apical pathology.

Considering all of these variables, during this final stage, it is reasonable, for both the patient and the undergraduate student to experience a sense of being overwhelmed by the stress and length of the process. To address these challenges comprehensively, the undergraduate student must be allowed to handle more cases [13].

Recent studies showed that performing RCT in molar teeth is challenging due to their complex anatomy [22]. Our study has yielded similar results regarding root canal shaping.

On the other hand, the dental practitioners reported having the least difficulty in irrigation procedures compared to Kaplan et al., 2020 [13].

This may be related to the irrigation procedure requiring less time and effort than other stages of root canal treatment, particularly when compared to mechanical preparation and root canal obturation.

Regarding the challenge mishaps cases, our result revealed the most challenging mishaps case they have treated was separated instrument(s) by 42 (32.3%) respondents, 25 (19.2%) respondents by ledge bypass, 20 (15.4%) of them by negotiating missed canal(s) and 13 (10.0%) of them by perforation management.

When associating the phenomenon of instrument separation with the specific tooth type, it was observed that molar teeth exhibited a greater incidence of instrument separation compared to premolars and anterior teeth. This finding is consistent with findings reported in earlier research studies [23,24]. This could be explained by Martin, et al. who demonstrated that the operator and the complexity of the canal anatomy could influence the fracture rate [25].

Concerning the negotiation of the missed canals, the present study reported that 15.4% of respondents faced this challenge, Seijo et al [26] showed similar findings. Creating an endodontic access cavity and debriding the pulp chamber are crucial steps in recognizing the root canal anatomy, as evidenced by the findings of this research study [27].

Furthermore, in the preclinical time of dental education, educators must enhance the number of practical demonstrations involving artificial and extracted teeth, to effectively instruct students on clinical procedures. This hands-on training is crucial in enabling dental students to assess and reflect on their skills at an early stage [28].

CONCLUSION

The evaluation of the challenges and difficulties that dental practitioners face during root canal therapy can help in the creation of instructional plans for preclinical and clinical training. Our results indicate that additional emphasis in the training process is needed in working length determination, access cavity preparation, and the application of mesial and distal shift radiography procedures. Feedback promotes student reflection on their clinical encounters and enables instructors to customize guidance based on each student's unique needs and preferred learning approaches. This individualized methodology guarantees that students are provided with appropriate recommendations and assistance tailored to their distinct developmental needs and preferred learning methods.

Further studies should be required about this subject, this present survey helped to ascertain various gaps in the education schedule which, if altered correctly, would be of great benefit to both the quality of dental practitioners' performance.

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