

Review Article

## Assessing Riyadh Dentists' Awareness of Orthodontic Emergencies and Treatment Approaches

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### ABSTRACT

Orthodontic appliance problems may be classified as a dental emergency. Any unplanned orthodontic procedure for the repair of an urgent orthodontic appliance issue that can affect eating, pronunciation, or appearance is referred to as this. Orthodontic emergencies sometimes occur and cause stress for the patient and their parents. They range from straightforward issues that a conventional dentist can manage to more complex ones that call for a referral to an orthodontist. The present study aimed to determine and evaluate the clinical expertise of general practitioners and dental interns in diagnosing and treating various orthodontic crises and complications in their daily dental practice. In the city of Riyadh, general practitioners and dentistry trainees were given an online survey consisting of roughly 13 questions. The questions focused on the many kinds of orthodontic crises and problems that may arise during routine dental care and how to appropriately handle them. When asked how TMJ dysfunction was managed during active orthodontic treatment, there was a significant gender difference ( $P$ -value = .047). When asked about the care of labial lacerations produced by orthodontic appliances, there were statistically significant differences in the participants' job experience ( $P$ -value = .038). Referrals to specialists were found to be the most typical method of accepting patients with orthodontic emergencies.

**Keywords:** Orthodontics complications, Emergencies, Dental interns, Saudi dentists

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### Introduction

Any serious issue involving the teeth or tissues that support it that needs prompt attention from a qualified dentist is referred to as a dental crisis or complication. It may be possible to classify orthodontic appliance problems as a dental emergency. Any unplanned orthodontic appointment for the repair of an urgent orthodontic appliance issue that could impact eating, pronunciation, or appearance is referred to as this. Occasionally orthodontic urgencies occur, and this can cause stress for the patient and their parents. They vary from straightforward issues that a conventional dentist can manage to more complex ones that call for a recommendation to an orthodontist. Short-term complications include: Pain or discomfort; irritation of

the lips or cheeks; debonded bracket or fixed appliance; issues with the length of the archwire; and lost ligatures from the fixed appliance. More complex issues include: loosed retainer, broken removable appliance, aspirated or swallowed appliance piece, root resorption, periodontal disease, decalcification, and temporomandibular dysfunction (TMD) [1].

Depending on the orthodontic procedure, the level of medical knowledge in this field, the patient's general dental health, and oral hygiene habits, several problems may arise [2].

#### Literature review

Dental emergencies are any unplanned problem that can happen to a patient without a prior appointment; they are not usually associated with pain. To quickly

alleviate pain and anguish, the treatment aims to give all patients with various situations the best care possible. Management will so keep moving forward in the right direction. This will increase the effectiveness and efficiency of dental care [3].

Emergency dental clinics will primarily manage all dental emergencies, including those involving orthodontic equipment, with general practitioner dentists. To be clinically equipped to handle orthodontic crises, they ought to receive training. According to published research, students lack the necessary skills and confidence to manage orthodontic emergencies [4].

For instance, dental graduates must be equipped to manage all kinds of orthodontic crises, such as referrals when needed, according to the Association for Dental Education in Europe (ADEE). There are numerous ways that orthodontic emergencies can arise, and some of them call for prompt care, such as:

#### *Extended archwire*

This extra-long wire, which is typically found distal to the last bracket, has the potential to lacerate the mucosa. It must be controlled by employing distal end cutter pliers to cut the extended portion. An alternative is to bend the wire into a non-traumatic shape, although it can be difficult to bend flexible arch wires, like those made of nickel titanium. Additionally, if wire protrudes via bondable tubes instead of bands, bending must be avoided because wire manipulation often dislodges the tubes.

#### *Debonded, loose bracket*

The components of an orthodontic fixed appliance called brackets are affixed to the middle of each tooth and work to create forces that assist in moving teeth in the proper direction. The brackets may come loose if the patient consumes crunchy or hard foods while receiving treatment. Therefore, it may be controlled by repositioning the bracket in the desired location; to fully engage the bracket, it could be necessary to drop a wire size.

#### *Discomfort and pain*

After bonding or during the orthodontic fixed appliance activation appointment, discomfort or soreness may persist for a few days. In addition to advising the patient to eat delicate meals and rinse their mouth with warm salt water, reassure them that it's temporary and normal. If the patient has no pharmaceutical allergies, prescribe pain relievers like ibuprofen, aspirin, or acetaminophen.

#### *Irritation of cheeks and lips*

Sometimes, new brackets might irritate the mouth, particularly the labial mucosa. A tiny quantity of wax that has been released functions effectively as a barrier between the metal and the rest of the oral cavity.

#### *Inhaled or ingested pieces of appliances*

This condition is rare, but when it happens:

If the individual in question was having difficulty breathing or coughing violently, the piece might have been aspirated. Reassure the patient that the piece most likely passed through the digestive system if it was swallowed. If the fragment is visible, remove it; if not, refer them to a chest x-ray.

#### *Detached fixed retainer*

After receiving orthodontic treatment, retainers—passive orthodontic appliances—assist in preserving and stabilizing the position of teeth.

1. If fixed retainer detachment occurs:

- Isolate and re-bond with a composite repair in the proper location if the retainer is not warped and the teeth are in good alignment.
- Apply a new retainer if the old one is distorted and the teeth are properly aligned.
- See an orthodontist for follow-up or retreatment if teeth have relapsed.

2. If a patient loses their removable retainer a new impression should be taken to fabricate a new one [5].

Treatment may be postponed until a routine dental session if indications and symptoms of dental issues arise during the orthodontic period. These complications include:

#### *White spot lesions (WSL)*

White spot lesions are caused by plaque retention sites, which encourage enamel demineralization. Without proper dental hygiene, plaque and acidogenic bacteria develop around the permanent appliance. It is a phase in the tortuous process that surrounds orthodontic appliances that are fixed. With the proper management, preventive, and treatment strategies, it can be decreased. Maxillary anterior teeth are typically affected by white spot lesions, which are then followed by lateral incisors, canines, premolars, and central incisors [6].

Additionally, the literature has described the dispersion of WSLs in a variety of ways. According to Manuelli *et al.* [7], the maxillary lateral incisor was the tooth most frequently affected. Conversely, Mizrahi [8] discovered that the maxillary and mandibular first molars were the teeth most frequently affected. In

another study, Øgaard agreed with the findings of another experiment by Yadav *et al.* [9].

*For the visual inspection, the following scale was used*

- Score 0 = No visible white spots or surface disruption (no demineralization).
- Score 1 = Visible white spot without surface disruption (mild demineralization).
- Score 2 = Visible white spot lesion having a roughened surface but not requiring a restoration (moderate demineralization).
- Score 3 = Visible white spot lesion requiring restoration (severe demineralization).

According to clinical research, the number of WSLs increased quickly during the first six months of treatment and then more slowly during the following twelve months [10, 11].

White spot lesions can be treated with fluoride agents (fluoridated toothpaste, fluoride-containing mouthwash, gel, varnish, bonding materials, elastic ligature), casein phosphopeptide-amorphous calcium phosphate—nano complexes (CPP-ACP), antiseptics, lasers, tooth whitening, resin infiltration, and micro-abrasion [12].

It is being shown that patients, not their parents, dentists, or orthodontists, are ultimately accountable for the occurrence and, therefore, the prevention of WSL.

#### *Gingival hyperplasia*

According to Shivakumar *et al.* [13], malocclusion has been shown to negatively impact periodontal health, and one of the objectives of orthodontic treatment is to improve dental health and prolong dentition's lifespan by addressing the occlusion. As a result, the relationship between periodontics and orthodontics is still debatable today.

Any orthodontic appliance use has been connected to improvements in periodontal health and oral cleanliness. Clinical observations have shown irreversible loss of attachment (permanent bone loss), gingival recession, inflammatory hyperplasia, and chronic infection. Gingival signs and symptoms that could appear during orthodontic therapy include: Gum soreness, red, inflamed, swollen gums, little bleeding after brushing and flossing, and foul breath.

In contrast to gingival hyperplasia, which is brought on by periodontal illnesses and causes irreversible damage to the periodontal tissues, gingival changes brought on by orthodontic therapy are thought to be temporary and contingent on the patient's dental hygiene. As a result, gingival hyperplasia will either go away on its own or react to plaque removal through curettage, prophylaxis,

or scaling. During orthodontic therapy, the enlargement of the gingival tissue impedes tooth movement; nevertheless, it must be surgically eliminated, ideally, after the orthodontic treatment is removed.

The initial course of management for gingival hyperplasia involves teaching the patient how to properly brush with an orthodontic interdental brush, floss carefully and frequently, and use mouthwash while receiving treatments.

Nonsurgical periodontal therapy (scaling, root planing, and/or curettage) is the 2nd line of management. When severe hyperplasia results from orthodontic therapy, laser gingivectomy is advised as the third line of therapy [13].

#### *Root resorption*

It is a pathological or physiological process brought on by loss in the tooth or periapical tissues around it. Although root resorption in the permanent teeth is an issue that needs to be addressed, it is a normal physiological process in the deciduous dentition.

The phases of analysis vary from person to person and from one person's teeth to another. They can be divided into:

- Grade 0: no root resorption is visible.
- Grade 1: Mild resorption, slow rooted, and diffuse.
- Grade 2: The root apex vanishes with moderate resorption, becoming more akin to a semicircle. There are instances where the contour is not smooth or continuous; roughly 25% of the root is resorbing.
- Grade 3: Severe resorption, shows the end of the root is too tight; the contour of the root vertex is most likely discontinuous; root resorption is more than a quarter of the root [14].

Apical root resorption represents a number of the effects of orthodontic treatment issues. Severe root resorption can endanger the teeth's lifespan, but most resorption is clinically insignificant. Research on root resorption and its relationship to orthodontic therapy indicates that a variety of factors affect root resorption during orthodontic therapy [15].

Even though age, gender, diet, and genetics are the primary factors that can speed up root resorption, other factors like the type of appliance used, the quantity of force used during therapy, how well the case was extracted or not, the length of therapy, and the distance between teeth moved can also increase the likelihood of resorption during orthodontic treatment [16].

When contrasted with non-extraction instances, the incidence of root resorption is higher in extraction cases; this may be connected to the length of orthodontic therapy. It was discovered that

predisposing factors, which are more common in upper anterior teeth, such as numerous therapies, thin roots, and dilacerated roots, increased root resorption [17].

When root resorption is observed during orthodontic treatment, it should be stopped, particularly if it is severe and detected during treatment. However, if resorption is just mild, the orthodontic treatment method has to be modified.

#### *Temporomandibular joint dysfunction (TMD)*

TMJ disorders are a group of problems that include difficulty eating or opening the jaw, as well as pain, clicking, or grating in the jaw joint [18].

Occlusal interferences, class II or III malocclusion, anterior open bite, excessive overjet or posterior crossbite, the effects of using intermaxillary elastics, extra oral forces, or functional appliances have demonstrated that the association between TMD and orthodontic treatment is a contentious one, with few authors finding a strong relationship between the two topics [19].

There is no connection between orthodontics and TMD, according to other studies. However, others asserted that TMD symptoms might be lessened by creating a perfect occlusion by orthodontic therapy and/or occlusal adjustments [20].

#### *The aim of the study*

To ascertain and evaluate general practitioners' and dental interns' clinical expertise in diagnosing and treating various orthodontic crises and complications in their day-to-day dental practice.

### **Materials and Methods**

In the city of Riyadh, general practitioners and dentistry trainees were given an online survey consisting of roughly thirteen questions. The questions centered on the many kinds of orthodontic crises and difficulties that may arise during routine dental care and how to appropriately handle them.

Results were collected and analyzed statistically using the software SPSS version 19.

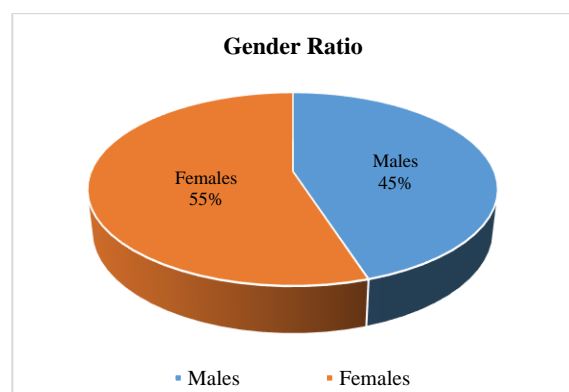
### **Results and Discussion**

The results, which came via SPSS, showed that 160 surveys had been completed in total. 81% of the sample had 1–5 years of professional experience, 11% had 6–10 years, and 8% had 10+ years. The sample was composed of 55% females and 45% males, 51% general practitioners, and 49% dental interns. Work sectors were also identified, and it was found that 44%

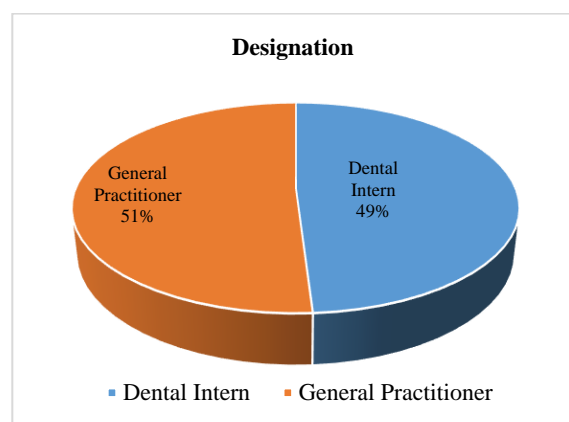
of workers were employed by the government, 22% by the commercial sector, and 34% by academic institutions (Figures 1-4).

Table 1 displayed all of the replies, which were also compared by employment sectors, gender, job titles, and work experience. Overall, the variables did not show any statistically significant differences. When asked how TMJ dysfunction was managed during active orthodontic treatment, there was a significant gender difference ( $P$ -value = .047). When participants were questioned regarding orthodontic equipment producing TMJ issues, a significant contrast was also made based on occupational classifications ( $P$ -value = .001).

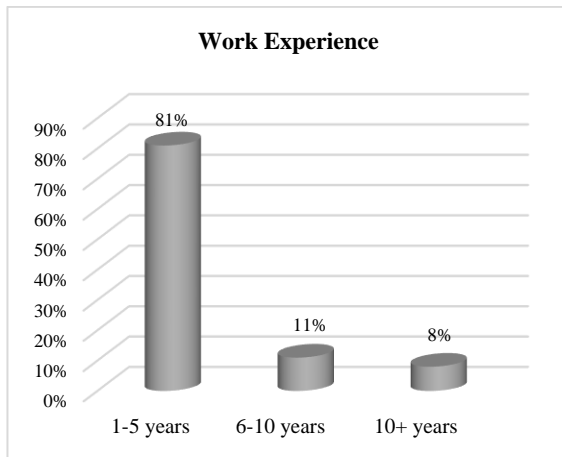
When asked about the management of labial laceration caused by orthodontic appliances ( $P$ -value = .038) and surgical treatment of severe gingival hyperplasia ( $P$ -value = .039), participants' work experience showed statistically significant differences. Lastly, working sectors also showed some significant comparisons when asked about patients who presented to emergency room clinics with debonded brackets ( $P$ -value = .014) and lost removable retainers ( $P$ -value = .021).



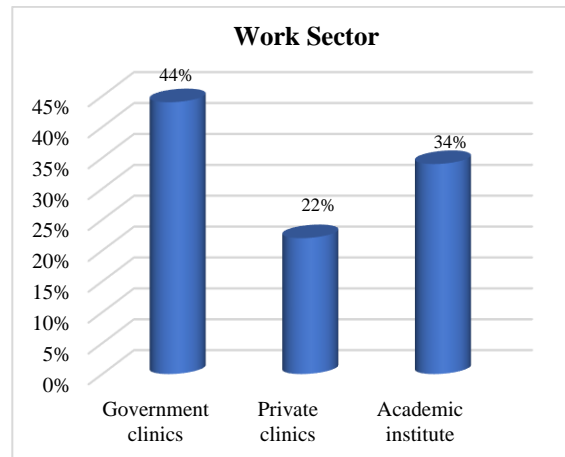
**Figure 1.** Gender ratio of study participants



**Figure 2.** Working designation of the study participants



**Figure 3.** Work experience of the study participants



**Figure 4.** Work sectors of the study participants

**Table 1.** An explanation of the poll results and how they relate to gender, job title, experience, and industry (\*\*means statistically significant)

| Survey Items  | Responses   | Relationship with Gender (P-value) | Relationship with work designation (P-value) | Relationship with work experience (P-value) | Relationship with work sector (P-value) |
|---|---|------------------------------------|--|---|---|
| Have you dealt with any orthodontic emergencies?  | Yes: 49%<br>No: 51%   | .201                               | .132   | .296  | .703                                    |
| Did you learn how to manage orthodontic emergencies and complications in your clinic during your undergraduate education?                                 | Yes: 28%<br>No: 63%<br>Not interested: 9%   | .754                               | .993   | .778  | .654                                    |
| How to treat a patient's cheek laceration caused by an extended archwire?   | Option 1: 30%<br>Option 2: 55%<br>Option 3: 15%   | .254                               | .697   | .428  | .518                                    |
| If a patient presents to the ER clinic with a debonded bracket, what is the proper management?  | Refer to his/her orthodontist: 63%<br>Rebond the bracket: 20%<br>Reassure the patient, no treatment: 17%          | .911                               | .495   | .994  | .014**                                  |
| How to manage labial lacerations caused by orthodontic appliances?  | Dental wax: 77%<br>Reassure the patient, no treatment: 11%<br>NSAI medication: 12%                                | .101                               | .214   | .038**                                      | .642                                    |
| When a patient shows up for a follow-up visit with his orthodontist three months after losing a detachable retainer, the appropriate course of action is? | Reassure patient until next appointment: 14%<br>Construct new retainer: 56%<br>Refer to another orthodontist: 29% | .748                               | .507   | .805  | .021**                                  |
| During orthodontic treatment, what is the first line of defense against white spot lesions?   | Composite restoration: 10%<br>Fluoride application: 83%<br>Discontinue orthodontic treatment: 7%                  | .937                               | .761   | .904  | .247                                    |
| Is a visible white spot lesion with a rough surface considered on the visual examination scale?   | Score 1 (mild): 37%<br>Score 2 (moderate): 55%<br>Score 3 (severe): 8%  | .720                               | .237   | .716  | .057                                    |

|   |  |        |        |        |      |
|---|--|--------|--------|--------|------|
| <b>The main cause of this case?<br/>(Gingival hyperplasia)</b>  | Poor oral hygiene during<br>Ortho Tx: 98%<br>Defective restoration: 1%<br>Diabetic patient: 1% | .158   | .200   | .952   | .293 |
| <b>Surgery may be used to address<br/>severe gingival hyperplasia that<br/>develops during orthodontic<br/>therapy.</b> | During Ortho Tx: 30%<br>No surgery required: 29%<br>After Ortho Tx: 41%                        | .436   | .535   | .039** | .373 |
| <b>During active orthodontic<br/>treatment, which teeth are most<br/>usually damaged by root resorption?</b>            | Maxillary teeth: 35%<br>Mandibular teeth: 29%<br>Both: 36%                                     | .136   | .238   | .729   | .237 |
| <b>In your opinion, do orthodontic<br/>appliances cause TMJ problems?</b>   | Yes: 50%<br>No: 38%<br>I don't know: 12%   | .062   | .001** | .156   | .216 |
| <b>TMJ dysfunction during active<br/>orthodontic treatment can be<br/>managed by?</b>                                   | Patient education by self-<br>care: 85%<br>Arthroscopy surgery: 15%                            | .047** | .217   | .301   | .637 |

Finding out how effectively dental professionals understood how to handle orthodontic challenges was the aim of this study. The fact that over half of the study participants lacked any prior experience handling the aforementioned emergencies was intriguing. Furthermore, there was no discernible correlation with any other characteristics.

An essential component of a hospital's emergency management protocol has been handling orthodontic crises. Nonetheless, these cases continue to occur at a low frequency [21]. The results of an analysis to determine the proportion of orthodontic-related crises showed similar results. Dental professionals are now more aware of the need to manage these patients during their undergraduate education as a result of these incidents [22]. Nonetheless, a large number of survey respondents stated that they were not trained in handling orthodontic crises.

Just twenty percent of study participants were willing to handle debonded brackets if they were given such circumstances, as can be seen from the results. This is interesting to know because sustaining the integrity of orthodontic therapy depends on promptly managing broken appliances. Additionally, easing patients' suffering is a crucial part of an effective orthodontic treatment plan [15].

Our results clearly show that most of the respondents supported sending the patient to their orthodontist. Nevertheless, as general practitioners are obliged to offer these patients adequate orthodontic emergency therapy to ensure their satisfaction, this practice ought to be avoided. For these dental professionals to handle such emergency patients, they need also to receive training during their clinical practice [23].

As long as we can add more individuals, there is room for data expansion in this study, which would support the conclusions.

## Conclusion

When comparing the replies by gender, job title, work experience, and industry, no overall significant differences were discovered. Referrals to specialists were found to be the most typical method of receiving patients with orthodontic emergencies. Students must take an orthodontic management program as part of their clinical training.

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