A National Wide Survey of Opinions and Attitude of Endodontists towards the Intra Canal Separation of Endodontic Instruments

Karunakar .P¹, Jayadev.M², Soumya Chinmayi. S³, Siddhartha.P⁴

¹Prof and HOD, ²Asst. Professor, ³P.G Student, ⁴Asst. Professor,
Panineeya Dental College, Department of conservative dentistry and Endodontics, Hyderabad

Corresponding Author:
Email: Jayadev311@gmail.com

Abstract:
Aim: The purpose of current survey is to investigate the opinions and attitudes of endodontists towards the intracanal separation of endodontic instruments, attending a national conference in India.

Materials and Methods: 1000 copies of the questionnaire were circulated at the 28th IACDE and 21st IES National Conference, held at Hyderabad, amongst the Endodontists and students pursuing post- graduation in conservative dentistry and endodontics at various colleges across the country, on the issue of instrument separation. The survey participants were asked about experience of instrument separation, management of fractured instruments, techniques used for removal of fractured instruments.

Results: This survey elicited a response rate of 68.5%. The respondents of our survey comprised of 73.4% being post graduate students and 26.6% being staff delegates. Of the respondents, 51.4% would use an endodontic file for 2-5 times before discarding. Files manufactured by Nickel-Titanium alloy were most commonly separated in root canal (64.4%). Step back technique is more prone for separation of instrument (60.4%). The majority of respondents reported that they would try to retrieve fractured instruments located in the coronal one-third (71.7%), bypass when located in middle third (69.1%), leave and review when located in apical third (76.8%) of root canal. The most frequently used technique for the retrieval of fractured instrument was ultrasonic (39.7%). Overall, 35.2% of the respondents reported experience of root perforation as a complication during retrieval of fractured instruments. Most respondents have reported a poor success rate in retrieving the fractured instrument when in apical third (91.2%). A total of 66.7% of respondents noticed highest incidence of fracture in mesial root of mandibular molar. 45% preferred using microscope for removal of separated instrument.

Conclusion: General awareness, knowledge and understanding of most aspects related to fracture of endodontic instruments was apparent among majority of the participants.

INTRODUCTION

The primary goal of endodontic treatment is to eradicate micro-organisms from the root canal system; to prevent further reinfeciton, by the procedure of cleaning and shaping of root canal system with copious irrigation. Procedural errors can occur during root canal instrumentation. The most problematic being, separation of endodontic instruments within the root canal. Such an error prevents the achievement of efficient cleaning and shaping, which in turn can result in under filling of root canal (1).

Review of the literature shows that the incidence of separated stainless steel hand instruments ranges between 2% and 6% (2). Therefore, in the year 1988, root canal instruments manufactured from Nickel- Titanium (Ni-Ti) alloy were introduced to overcome rigidity of stainless steel files and are known to show superior resistance to torsional fracture than stainless steel files (3). Even after the advent of rotary Ni-Ti files, unfortunate increase in the separation of these instruments has been reported (4). According to the survey studies, operators recognize file fracture as one of the most prominent issues with Ni-Ti rotary instruments (5).

Although, factors for occurrence and different techniques for successful removal of separated instruments have been studied, little research has been conducted to determine the widespread practice and acceptance of such methods among endodontists. The current survey was carried out to evaluate the opinions and attitudes towards the intracanal separation of endodontic instruments among endodontists, attending a national conference in India.

MATERIALS & METHODS

After approval from the organizing committee, 1000 copies of the questionnaire were circulated at the 28th Indian Association of Conservative Dentistry & Endodontics (IACDE) and 21st Indian Endodontic Society (IES) National Conference, held at Hyderabad, India, amongst the Endodontists and students pursuing post-graduation in conservative dentistry and endodontics at various colleges across the country, on the issue of instrument separation. A questionnaire was prepared which was modified form of that employed by Madarati et al, among dentists in UK, published in International Endodontic Journal (2008). Among student delegates, 1st year post graduates were excluded, due to lack of awareness and experience. Ineligible forms were not taken into consideration when final response was calculated. A total number
of 685 completely filled forms were received back by us. The survey participants were asked about pattern of practice and experience of instrument separation, management of fractured instruments, techniques used for removal of fractured instruments, and about the approach they take when management of fractured instrument does not succeed. A sample of survey questionnaire given to participants is given in Table 1. The data were collected and analyzed using SPSS software version 18.

RESULTS
Out of 1000 copies of the questionnaire which were circulated, 685 completed surveys were received yielding an overall response rate of 68.5%. The questionnaire results are shown in Table/Fig-1.

**[Table/Fig-1]: Questionnaire and response received for each question**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Question</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student Delegates</td>
<td>503</td>
<td>73.4%</td>
</tr>
<tr>
<td></td>
<td>Staff Delegates</td>
<td>182</td>
<td>26.6%</td>
</tr>
</tbody>
</table>

**STUDENT DELEGATE:**
- 2nd Year Post Graduate: 232 (46.1%)
- 3rd Year Post Graduate: 271 (53.8%)

**STAFF DELEGATE:**
- Teaching: 22 (12.1%)
- Practice: 21 (11.5%)
- Both: 139 (76.4%)

**Q1** Frequency of endodontic file usage before discarding?
- Single use: 20 (2.9%)
- 2-5 times of use: 352 (51.4%)
- 6 times or more: 313 (45.7%)

**Q2** Alloy type of separated files?
- Stainless Steel: 244 (35.6%)
- Nickel-Titanium: 441 (64.4%)

**Q3** Which technique as per you is more prone for separation of instrument?
- Step back: 414 (60.4%)
- Crown down: 271 (39.5%)

**Q4** How do you manage separated instruments in the coronal part of root canal?
- Retrieve: 491 (71.7%)
- Bypass: 168 (24.5%)
- Leave and Review: 26 (3.8%)

**Q5** How do you manage separated instruments in the middle part of root canal?
- Retrieve: 151 (22.0%)
- Bypass: 473 (69.1%)
- Leave and Review: 61 (8.9%)
- Extraction: 0 (0)

**Q6** How do you manage separated instruments in the apical part of root canal?
- Retrieve: 11 (1.6%)
- Bypass: 119 (17.4%)
- Leave and Review: 526 (76.8%)
- Surgical Approach: 29 (4.2%)

**Q7** Which technique do you use for retrieval of fractured instrument?
- Ultrasonics: 272 (39.7%)
- Masseran: 132 (19.3%)
- File Braiding: 173 (25.3%)
- Cancellar: 4 (0.6%)
- IRS: 7 (1.0%)
- Forceps: 1 (0.1%)
- Multi-Purpose: 96 (14.0%)

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DISCUSSION

Though there are many advancements in the design of endodontic instruments, alloy and techniques of instrumentation; separation of instrument still remains a problem and may occur suddenly (6). Many studies in literature have reported on this issue, but with very little information on attitudes and opinions of practitioners. Surveys are a
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towards the Intra Canal Separation of Endodontic Instruments

The questionnaire of our survey was based on the survey employed by Madarati et al. amongst Dental Practitioners in UK. The main objective of the present survey was to determine the practice and management of intracanal fracture of endodontic instruments among endodontists.

The literature indicates that a response rate of 50-70% is acceptable for dental surveys (8). In the present survey, overall response rate of 68.5% was achieved, which is acceptable. Our results revealed that 73.4% of the respondents were student delegates where as 26.6% were staff delegates who attended the conference. In our survey, only PG students (of endodontics) and Endodontists were selected as participants, because of their continuing education programs to update their knowledge in the field of endodontics and widespread clinical practice (9).

The results of our survey reported that 51.4% of respondents would use an endodontic file for 2-5 times, 45.7% reported reusing them for more than 6 times, only 2.9% of respondents discard them after single use. Clinically, it is difficult to recommend a specific number of clinical use for endodontic instruments. Hence single use is recommended for reducing the risk of file separation (10) and to prevent cross contamination (11). Multiple uses were more prominent than single uses among the respondents of our survey. This must be either due to experience based opinion that a file can be safely re-used more or the high cost of files that has forced clinicians to re-use them (12).

The majority of respondents of present survey had experienced instrument separation when using Ni- Ti files (64.4%), than stainless steel files (35.6%). Although Ni-Ti files were known to show superior resistance to fracture than stainless steel files, but with the results of present survey, it was considered, over usage, excessive pressure on file, complex root canal anatomy and incorrect insertion angle as the most common factors related to file fracture (13).

Technique more prone for separation of instrument according to survey results is stepback technique (60.4%), where as 39.4% of participants experienced separation when using crown down technique. On a direct comparision between crown down and step back techniques, it has been shown that using crown down technique will result in less tip contact, less force, and less torque compared with step back technique, and hence crown down is safer than step back and thus results in less instrument separation.(14)

The question was related to the management and success of separated instruments in different parts of the root canal (coronal, middle and apical third). The results revealed that the deeper the fractured instrument, the less likely clinicians would attempt to remove it. Majority of the respondents (71.7%) would attempt to retrieve the fractured segment from the coronal part, 69.1% would attempt to by-pass from middle part, 76.8% would prefer to leave and review the patient when present in the apical part which provides good and fair success rates in retrieving from coronal and middle third and poor success rates from the apical third. These results were found to be similar in comparision to the survey conducted among dental practitioners in UK (15). Apart from this, experience can also be a significant factor in taking decision on management and success rate of separated instrument.

When asked about the technique preferred for the retrieval of fractured instrument, 39.7% of the respondents used Ultrasonics, 25.3% used technique of file braiding, 19.3% used Masseran technique and 14% reported to use more than one technique (may use several techniques in individual cases) for retrieval of fractured instruments. This states that of all the techniques, Ultrasions are relatively easy which can effectively dislodge the fractured segment and have been reported to be successful. It can be used in narrow and curved canals especially when the fractured segment is located apically (16).

According to our survey, 35.2% of respondents have reported that they experienced complication of root perforation during retrieval of fractured fragment, whereas 31.7% reported it as weakened tooth, followed by, fracture of another instrument by 27.3% of respondents. There are many previous studies which have reported different types of complications, even with the use of most advanced techniques (17, 18). Because enlargement of the root canal, from coronal to the fractured segment is essential to visualize the most coronal aspect, the less dentine thickness remains after fragment removal. Consequently, root perforation is highly likely.

Respondents were asked on how do they manage an un bypassed instrument. The majority (75.1%) reported that they would leave the fractured segment and continue treatment with follow up. In the previous study, 88.5% (Madarati et al 2008) and 97% (Parashos and Messer et al 2004) reported a similar approach. A very low percentage preferred to perform a surgery (19.1%) or extract the tooth (5.5%). This demonstrates the conservative attitude of the respondents which can be either their perception or experience, that the prognosis could be favorable. (19)

The present study also showed time taken by endodontists to retrieve the separated instrument from root canal. The higher proportion of the respondents (48.5%) require more than 1 hour for managing fractured instruments, whereas as 39.6% would take time of 30 min- 1 hour. It has been reported that as the time taken for treatment prolongs,
the greater are the chances for complications and the lower the success rate (20).

The most common method employed to prevent separation of instrument is to discard the instrument after certain number of uses (56.6%). The results of this survey, showed the disagreement with the literature, where only a single use was recommended. While in our study, only 21.2% preferred to discard after single use. The results obtained were similar to previous studies (14). Hence it is recommended to suggest not to consider this pattern of use. The study revealed that only 38.1% of respondents examine the instruments both before and regularly during treatment, which is an efficient strategy. There are still vast majority of respondents who were not aware of the need to examine the instruments. A need for higher awareness is necessary. About 66.4% of respondents experienced instrument separation frequently in mesial root of mandibular molars followed by 31.6% in the mesio buccal root of maxillary molar. These results were found to be similar with the study conducted by Iqbal et al, 2006 (21).

A further question was regarding the use of magnification for the retrieval of separated instrument. The majority (45%) reported the use of operating microscope, where as 41% used loupes for magnification. Most of the studies have recommended the use of magnification as an essential pre requisite for the successful management of fractured instruments (20). But in our survey, there are 14% of respondents who do not use any magnification. Hence this study suggests the need and awareness about different types of magnification for successful treatment. It is generally accepted that the better the visibility, the fewer the complications.

CONCLUSION

General awareness, knowledge and understanding of most aspects related to fracture of endodontic instruments was apparent. While in the current survey, most of the respondents were aware of the need of examination of instruments, management of fractured instruments, techniques used for removal of fractured instruments and importance of magnification, while there are still a low proportion of participants who require further education and training.

REFERENCES:

15. Madarati AA, Watts DC, Qualtrough AJE. Opinions and attitudes of endodontists and general dental practitioners in the UK towards the intra-canal fracture of endodontic


